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IMPACT OF LOCATIONAL ATTRIBUTES ON HOUSING PRICE: A HEDONIC ANALYSIS IN DIMAPUR TOWN, NAGALAND (INDIA)

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Abstract:

Housing demand and its market price (rent) is inclined by several factors such as its construction cost and buyers' assessment of the housing unit's innate characteristics including locational attributes. Thus, price of residential buildings vary across time and space even if construction costs may be similar, depending upon the distinctive characteristics of the houses as well as on the inclinations of the prospective buyers and their means. This research tries to examine the impact of locational attributes on housing price and its demand of the residents in Dimapur town of Nagaland state, India. The study reveals that in a small town like Dimapur, it is not the distance to particular place of regular visit but the average distance to places of regular visit like workplace, market, children's school, etc. which impact the housing price (or rent) significantly.

Key Words: Dimapur Town, Housing Price (rent), Locational Attributes & Tenant and Owner-Occupied Households.

Introduction:

The market price (rent) of a housing unit is influenced by several factors including the cost of construction as well as by the buyers' evaluation of the housing unit's package of inherent attributes. In contrast to other consumption goods, the housing market is unique because it manifests the characteristics of durability, heterogeneity and spatial fixity. The housing attributes can be chiefly classified into Locational, Structural and Neighbourhood characteristics and they fulfill a number of requirements of the residents (Freeman, 1979). The estimation of price has been done by fitting a demand function for housing characteristics/attributes (Li & Brown, 1980; Shimizu, 2014; and Hulagu, et al., 2016). Price of residential buildings vary across time and space depending upon the distinctive characteristics of the houses as well as on the inclinations of the prospective buyers and their means.

Review of Literature:

With regard to the locational attributes, distance to the central business district (CBD) and job accessibility has been found to significantly affect housing prices. Accessibility variables depict the ease with which local amenities can be accessed from the property where the individual or family reside. The early model developed by Kain and Quigley (1970) included distance to CBD, but it was not statistically significant. But Waddell (2011) challenged the common assumption that a workplace is determined prior to the residence location. He used a joint model specification by allowing for some interaction between these two variables. Moreover, he asserted that the degree to which residence location is determined by workplace location (or the opposite) depends on the degree to which workplace locations are distributed in a city, as well as on individual's socioeconomic characteristics. However, one shortcoming of Waddell's study is that it does not incorporate transit and highway accessibility measures.

But several later studies found significant negative impact of distance to city or employment centre on house prices. For instance, Soderberg and Janssen (2001) using the market as the city centre in Stockholm found significant negative impact on property price with increasing distance. Frew and Jud (2002) also estimated the value of a sample of apartment properties sold during 1996–99 in the greater Portland, Oregon area and found that property values decline with increasing distance from the city centre. Grimes and Liang (2007) also found that land is highly valued near the city centre, declining (non-linearly) as distance from the CBD increases. In the same way, Zou (2015) found house prices to decrease with distance from the CBD and walking distance to the nearest transit station. Nunns, Hitchins & Balderston, (2015) further found evidence of spatial dependence in Auckland's housing market. In other words, the sale price of a single house is significantly correlated with neighbouring property values. Frew and Wilson (2002) found a significant connection between apartment location and rents in Portland Oregon Metropolitan Area in USA during 1993. They showed that rental values drop substantially for the first ten miles outside of the city centre, indicating that the downtown area is the central urban hub.

Hedonic price methods can be applied to separate segments of metropolitan areas to measure price differences both within and among such submarkets. It was observed that judicious subdivision of the

metropolitan market using separate equations reveals valuable information about price variation within the metropolitan area (Goodman, 1978). McMillen and McDonald (1998) used distances to multiple employment centres in models to predict both population and employment densities in Los Angeles and suburban Chicago, respectively.

Travelling time, cost of travel, availability and convenience of different modes have all been employed to measure accessibility to CBD. Vessali (1996) consolidated the empirical evidence of 37 studies on accessibility and concluded that accessibility to transit tends to appreciate residential property value by 6 to 7 per cent. So, Tse and Ganesan (1997) showed that the accessibility to minibuses emerges as the most influential in determining house prices based on a sample of a large residential area of the middle income class in Hong Kong. In this situation, the use of minibuses as a daily transport mode is important because minibuses pick up commuters close to their homes and are widely used for connecting to other transport modes. Welch (2010), also found in a study of Atlanta that accessibility to rail station appreciates property value. However, he found that property located in economically strong area benefit much more as compared to those located in economically weak area for similar transit proximity.

Alterations in accessibility were found to affect property prices significantly – both in a statistical and practical sense. Kockelman (1997) found that changes in accessibility and travel costs affect land and dwelling-unit values in highly significant ways both statistically and economically. Srour, Kockelman and Dunn (2002) made use of location accessibility as a major explanatory variable for property-valuation and residential location modelling. Access to jobs, shopping centre and parks were found to be statistically and practically significant. They also divulge relations of interest with land rent estimates, which are calculated based on normalized residuals of property-valuation models. Such an association has not been made so clear before, and it suggests that rent formulations may prove an important measure of access, since they follow consumers' willingness to pay for location. Savings in transportation costs and the frequency of transport services appear to have positive impacts on housing prices. However, Kain and Quigley (1970) found that better educated and higher income households tend to reside farther away from CBD, which may be due to preference for tranquillity and cleaner environment.

There are studies that used the hedonic price model to estimate the implicit price of views. Li and Brown (1980) asserted that higher on-site visual quality is strongly associated with higher sales price of residential properties. They estimated that the implied price differential between the highest and the lowest index amounts to $2520. Rodriguez and Sirmans (1994) examined the role of scenic view in housing market in Fairfax County, Virginia and found that a good scenic view adds about 8 per cent to the value of a single-family house.

Tse (2002) affirmed that there is a strong preference for a sea view in Hong Kong indicating that residents are willing to pay a higher price for a sea facing house with a readily sea view. Fleischer (2011) calculated the room prices of hotels situated along the Mediterranean Sea and found that hotels charge higher prices (by about 10 per cent) for a room with a sea view compared to a room without sea view. Lansford and Jones (1995) in their study of the implicit price of recreational and aesthetic benefits found proximity to Lake Travis (with better view of the lake) in Texas command a high premium on residential property prices. Kruse and Ahmann (2009) also observed that Lake Adjacency does have a positive and significant impact on residential property values and that, all else being equal, properties with lake proximity or with a lake view are worth more than properties without these characteristics. Benson, Hansen, Schwartz and Smersh (1998) employed a detailed classification system that categorizes views on the basis of both type and quality of view to estimate the value of the view amenity. They estimated that ocean view and lake view command a high premium in single-family residential prices in Bellingham, Washington and the study also found a positive relationship between the quality of view and property prices.

Corell, Lillydahl and Singell (1978) found that green views have a significant positive impact on adjacent property values. They estimated that distance from the greenbelt has a statistically significant negative impact on the price of residential property. Other things being identical, there is a $42 decrease in the residential property price for every 10 feet distance away from the greenbelt. Jim and Chen (2006) also estimated that view of green spaces and proximity to water bodies increase housing price, contributing notably at 7.1 per cent and 13.2 per cent, respectively in Haizhu district in the core area of Guangzhou (China). Rohani (2012) on the other hand combined view and access to amenity and found that views and amenity of the Hauraki Gulf together has significant impact on property prices in the study area. On an average, other things remaining the same, a broad water view increased the mean land value by 50 percent while locations on the coastline increased land value by 43 per cent. Similarly, Bourassa, et al. (2003) found that the hedonic value of aesthetic externalities increased more rapidly than house prices from 1986 to 1996 in Louisville's neighbourhoods. On the other hand, Tse and Love (2000) found that the attribute of a cemetery view has a significant negative impact on property value in the Hong Kong real estate market.

Since housing comes as a bundle of attributes and it is very difficult to separate them, an attempt is made to determine which locational attribute(s) significantly impact the demand for housing in the study area. It

may also be noted that frequent construction of residential buildings are difficult and it is observed that rarely residential buildings are sold or purchased in a year in the study area. Most house owners who inherited their houses are constrained to live there since it is too difficult for many of them to buy or construct a new residential building. Not only that, many a time, several family members having share of the same property (by virtue of inheritance law) stay with difficulty in the same location/building (for locational advantage) instead of moving to a remote area where more space is available.

On the other hand, for the tenants, given their income and other preferences, it is relatively easier for them to change accommodation as per their needs and capabilities. A large number of residents, who are from outside the region, are constraint to stay in rented accommodation. The preference pattern in respect of various attributes may differ between the purchase for (construction of) own house and rented accommodation by the tenants. For tenants, it is temporary and some of the attributes they cannot change but accept for the convenience of, say, their work or their children's education. But the owners may like to add many features to their houses for their long term objectives of maintaining livelihood and/or enjoying amenities. Thus, due to the basic differences in the nature of demand for housing attributes, the analysis is done separately for Tenants and House Owners.

Objectives:

This study identifies various locational determinants of housing demand in the study area. Also, it estimates which of the locational characteristic(s) impact the demand more and its price with respect to owner-occupied and tenant households.

Background and Study Area:

Dimapur town, the 'gateway' of Nagaland state in North-East India also occupies an important place for the neighbouring districts of Assam and the state of Manipur. Its strategic location on the rail, air and road ways has given it a growing importance as manifested by the commercial prosperity during the last few decades. It has been experiencing a steady flow of immigrants since the statehood of Nagaland in 1963 (Town Planning Organization, 1975). Besides being the commercial capital of Nagaland, Dimapur is also an educational hub attracting many students not only from rural Nagaland but also from the neighbouring states. Its population increased from 57182 in 1991 with density of 2238.92 per Sq Km to 122834 with density 4809.47 per Sq Km in 2011(GOI, Census)**.** That has put increasing pressure on the housing sector, though there has been spatial expansion of the town, which is clear from the rapid growth of density during previous two decades. The price (rent) is found to vary significantly across the Wards with the lowest figure of 800 Indian Rupees (INR) for a one member stay. The highest implicit or explicit rent paid by a family is 20000 INR. Here implicit rent indicates the market worth rent of an owner occupied house. Over 60 per cent of the households stay in rented accommodations as they mostly came from various places of the country for different opportunities including government services, businesses and daily labour.

Data and Methodology:

In order to carry out the analysis, a primary survey has been conducted during July, 2015 to May, 2016 in the study area. On an average, twenty (20) households each were selected by simple random sampling without replacement from all the 23 wards in the study area. However, from the larger ward proportionately more numbers were also selected. After proper scrutiny for the erratic and incomplete information, finally 490 interview schedules are used for the analysis. Out of 490 total sample units 414 are tenant households and 76 are owner occupied households. The information has been collected through an interview schedule from the respective sample respondents in each ward. From both the tenants and owners, information on locational attributes in regard to the residential building has been collected. Quality of approach road, location of the house near river, distance from workplace, business centre, rail station, shopping centre, etc. are collected from each respondent.

From the data collected, first some important locational attributes based on earlier empirical studies were selected. Then by using SPSS the data was checked for the problem of multi-collinearity and some variables had to be dropped with high Variance Inflation Factor (VIF) value even though they were considered important in other studies (Maddala, 2001). Next, in order to reduce the problem of heteroscedasticity a double-log form of the hedonic price function is chosen for the estimation by transforming the quantitative data into their natural log form (Wooldridge, 2013). Thus, the hedonic price equation with *n* housing attributes is given by

$$\log P_i = \alpha_1 + \sum_{i=1}^{n} \beta_i \log z_i + \sum_{i=1}^{n} \gamma_i X_i + U_i$$

Where P_i represents the monthly rent paid by the i^{th} respondent, z_i represents quantitative explanatory variables like distances to places of importance and X_i represents categorical variables like quality of approach road, etc., α_1 represents the intercept and U_i the random disturbance term with usual classical regression properties. Here β_i represents the elasticity of P_i with respect to i^{th} explanatory variable Z, while γ_i is the impact of a marginal change in the i^{th} categorical variable on the rate of changes in P_i.

Results and Discussions:

The impact of the locational attributes on the monthly rent is given in the Table 1. Here two indexes are calculated for better analysis of various qualitative data. First, a weighted view quality index was calculated by combining the view availability from house of green cover, forest cover and good architectural building. Next, a weighted locational convenience index was also constructed on the basis of seven locational convenience options for choosing the place of residence. The index has been constructed by assigning weights to opinion expressed by each respondent on each option for choosing the present location of residence such as for more space, nearer to work place, children school, location inconvenience of the earlier house, better neighbourhood quality, natural environment and security. These weights have been computed by calculating the ratio of the sum of each option (for all the respondents) to the sum total score of the seven options. Presence or absence of each option is accrued value 1 or 0. Then value of each option corresponding to every respondent is multiplied by the weight of that particular opinion and then added up to get overall index for the corresponding respondent. Symbolically, locational convenience index (LCI) = $\sum W_i X_i$, where W_i is the weight of the ith value of individual locational variable. In the same way view index is constructed.

Table 1: Estimated Coefficients of Regression of LnRent on Locational Attributes According to Status of Ownership

	Tenants			**Owners**		
Variable	Coeff	t-Stat	Prob.	Coeff	t-Stat	Prob.
(Constant)	8.379	9.576	0.000	8.394	22.346	0.000
Located near River/Lake	-0.042	-0.611	0.541	-0.017	-0.182	0.856
Approach Road Quality	0.291	8.786	0.000	0.176	2.474	0.016
LnDistance_Workplace	0.077	4.548	0.000	0.000	0.865	0.390
LnDistance_Market	-0.089	-4.075	0.000	0.000	1.0181	0.312
LnDistance_Forestcover	-0.058	-0.725	0.469	-7.89E-06	-0.156	0.877
LnDistance_Rail Station	-0.099	-2.164	0.031	-6.73E-05	-0.812	0.419
View Quality Index	0.029	0.43	0.668	0.311	2.008	0.049
Location Convenience Index	1.073	8.658	0.000	0.345	1.449	0.152
Dependent Variable: LnMonthlyRent						
	R^2 = 0.40, Adj. R^2 = 0.39, F-Stat. = 33.97 (0.000)			R^2 = 0.18, Adj. R^2 = 0.08, F-Stat. = 1.81 (0.091)		
White Heteroskedasticity Test:						
	F -stat.= 1.42,(0.047) & Obs*R squared =58.72 (0.06)			F-stat.=0.90,(0.63) & Obs*R-squared =41.65 (0.53)		
Dependent Variable: Squared Residual. Source: Field Survey conducted during 2015-16.						

With regard to the tenant respondents, the quality of approach road connected to house, distance from workplace and location convenience are found to have positive significant impact on the monthly rent paid by the tenants, while distance from market as well as train station have significant negative impact on the rent. The White heteroskedasticity test gives a p-value of 0.06 of the observed R-squared value. Availability of approach road to house across the wards ranges from about 86 per cent to 100 per cent with 13 wards comprising 100 per cent respondents having approach road connected to their housing units. The respondent whose house is connected with approach road is discerned on the basis of the surface quality such as earth, stone and earth, and concrete or black-topped. The quality of approach roads improves accessibility and comfort of travel. Hence, the positive impact of quality of approach road on the monthly rent paid is on expected line.

Contrary to the general expectation of significant negative impact of distance from workplace on housing price (or rent), the present study showed that distance from workplace have significant positive impact on rent. From the sample, it is observed that a great number of individuals came in recent years and it is difficult for them to get accommodation in the vicinity of their workplace. Moreover, Dimapur being a small town, distance from workplace is not much as indicated by the average distance of 0.85 km and distance to workplace is found to range between 0 to 6 km. Travel time, which is used as a measure of accessibility to job places, is also found to be quite insignificant and the average time to commute by the tenant respondents on foot is about eight and half minutes (with average distance of 292 metres) only and by car average travel time is observed to be 13 minutes (with average distance of 1335 metres). Those who shuttle on foot everyday actually travel lesser distance or take short cut road, while the distance for the car users is comparatively more. Besides, it is also observed in the sample that 53.38 per cent of the tenants possess a personal vehicle, which eases their accessibility. More importantly, the ***locational convenience index*** for choosing the current place of residence is found to have significantly positive impact on rent. This indicates that for most tenants the importance of proximity to workplace is overshadowed by other factors. People, especially the servicemen and business community, like to stay near main town and railway station and intend to pay more rent in order to avoid

difficulty in communication to market, rail station etc. Hence, the negative coefficient of distance from market as well as train station is on expected line.

In case of owner-occupied respondents, quality of approach road and view quality index is observed to have significantly positive impact on housing price. The White heteroskedasticity test gives observed R-squared value of 41.69 with a p-value of 0.529. Locations with better quality of approach roads are generally close to the central market areas and so the positive coefficient of approach road quality is as expected. Nonetheless, owners do not like to stay in congested and heavily crowded places but prefer some degree of privacy and open space as indicated by the positive coefficient of the view quality index. The view index has also been computed by computing weights (as in the case of locational convenience) for availability of view from the house such as green cover, forest area and good architectural building. Though distance to workplace, market and other amenities are important, it is observed that such amenities do not significantly impact housing price in case of owners. As mentioned in case of tenants, for owner-respondents too, distance may not be an important factor since the average distance to workplace on foot is recorded to be about 179 metres which takes an average time of about 6 minutes, and by vehicle the average distance and time is found to be 1563 metres and 15 minutes respectively. Average distance from market is also recorded to be only about 1284 metres and it is observed that a great majority (89.47 per cent) of the owner-respondents own personal vehicle.

Table 2: Estimated Regression Coefficients of Respondents by Selected Socio-Economic Characteristics, Median Distance, House Construction Quality & Locational Attributes

Variable	Model 1	Model 2
(Constant)	2256.145 (5.89)***	3.754 (10.69)***
Occupation of Head	-110.194 (-1.04)	0.014 (0.77)
Monthly Family Income*	.099 (13.26)***	0.519 (15.26)***
Personal Vehicle	295.302 (3.68)***	0.048 (3.77)***
AverageDist_WMSDS*	-.978 (-4.45)***	-0.177 (-6.90)***
House Construction quality	610.988 (3.333)***	0.123 (3.88)***
Location near River	--	-0.052 (-1.07)
Approach Road Quality	--	0.043 (1.57)
View Quality Index	--	-0.025 (-0.48)
Locational Convenience Index	--	0.425 (4.41)***
R^2, Adj.R^2 & F-stat. (Sig.)	0.55, 0.55 & 118.44 (.000)	0.68, 0.67 & 112.17 (.000)

Note:
1. AverageDist_WMSDS represents the mean distance from workplace, market, school & Departmental Store.
2. Dependent Variable: Monthly Rent (Model 1) & LnMonthly Rent (Model 2).
3. * Represents variables in Model 2 are in log form.
4. *** represents 1 per cent level of significance.

Source: Field Survey conducted during 2015-16.

When all respondents are considered together, it is observed in model 1 of the regression that monthly family income, possession of personal vehicle, average distance from places of importance which are visited more frequently and the quality of house construction have significant impacts on rent and thereby choice of housing (Table 2). It may be noted that housing choice in respect of locational attributes is not determined by distance from, say workplace alone, but by the combined distances from places of travel on a regular basis. On the whole, it is observed that house construction quality impacts housing price (rent) most significant as indicated by the highest coefficient.

In the regression model 2, the numeric variables like monthly rent, family income and average distance to workplace, market, children's school and departmental store have been transformed into their natural log. It is observed all the variables which significantly impact rent in model 1 have significant impact on rent in model 2 besides *locational convenience index*.

Conclusion:

The analysis of the impact of locational attributes on the housing prices (or rent) revealed that locational attributes impact tenants and owner-occupied households differently. In respect of tenant respondents, the quality of approach road connected to house, distance from workplace and location convenience are found to have significantly positive impact on the monthly rent paid, while distance from market and also train station have significantly negative impact on the rent. In case of owner-occupied respondents, quality of approach road and view quality is observed to have significantly positive impact housing price. This result implies that tenants are relatively choosier in selection of location for residence. However, when all respondents are considered together, the combined result shows that housing choice in respect of locational attributes is not determined by distance from, say workplace alone, but by the combined distances from places of travel on a regular basis. An important policy implication of the finding is that as distance from workplace, market and other places of importance affects house price significantly, proper distribution of such facilities can distribute the housing

preferences across the areas and help in avoiding congestion of some central areas. Good communication facilities can reduce the travel time further and development of all wards with major common amenities can make the pricing space neutral.

References:

1. Benson, E. D. Hansen, J. L., Schwartz, A. L. Jr. and Smersh, G.T. (1998). Pricing residential amenities: The value of a view. Journal of Real Estate Finance and Economics, 16 (1), 55 – 73.
2. Carroll, T. M., Clauretie, T.M. and Jensen, J. (1996). Living next to Godliness: Residential property values and churches. Journal of Real Estate Finance and Economics, 12(3), 319-330.
3. Fleischer, A. (2011). A room with a view – A valuation of the Mediterranean Sea view. Tourism Management, 30, 1-5
4. Freeman, A.M. (1979). Hedonic prices, property values and measuring environmental benefits: A survey of the issues. The Scandinavian Journal of Economics, 81(2), 154-174.
5. Frew, J. and Jud, G.D. (2002). Estimating the value of apartment buildings. Paper presented at the 2002 American Real Estate Society Annual Meeting. Retrieved from: aux.zicklin.baruch.cuny.edu/jrer/ papers/pdf/past/vol25n01/05.77_86.pdf on 15/6/2014.
6. Frew, J. and Wilson, B. (2002). Estimating the connection between location and property value. Journal of Real Estate Practice and Education, 5 (1), 17-25.
7. Goodman, A.C. (1978). Hedonic prices, price indices and housing markets. Journal of Urban Economics, 5(4), 471-484.
8. Grimes, A. and Liang, Y. (2009). Spatial Determinants of Land Prices: Does Auckland's
9. Metropolitan Urban Limit Have an Effect? Applied Spatial Analysis and Policy, 2 (1), 23-45. DOI 10.1007/s12061-008-9010-8
10. Hugalu, T. et al. (2016). A hedonic house Price Index for Turkey. Working Paper No. 16/03, Central Bank of the Republic of Turkey. Retrieved from: https://www.unece.org/fileadmin/dam/stats/ documents/ece/ces/ge.22/2016/session_6_hedonic_house_price_index_for_turkey.pdf on 22/08/2016
11. Jim, C.Y. and Chen, W.Y. (2006). Impacts of urban environmental elements on residential housing prices in Guangzhou (China). Landscape and Urban Planning, 78, 422-434.
12. Kain, J.F. and Quigley, J.M. (1970). Measuring the value of housing quality. Journal of the American Statistical Association, 65(5), 532-548.
13. Kockelman, K.M. (1997). The effects of location elements on home purchase prices and rents: Evidence from the San Francisco Bay area. Transportation Research record No. 1606, pp. 40–50.
14. Kruse, S.A. and Ahmann, J. (2009). The value of Lake adjacency: A hedonic pricing analysis on the Klamath River, California. Ecotrust Working Paper Series No. 5. Retrieved from: www.ecotrust.org /workingpapers on 18/1/2014.
15. Lansford, H. Jr. and Jones, L.L. (1995). Marginal price of Lake recreation and aesthetics: An hedonic approach. Journal of Agricultural and Applied Economics, 27 (1), 212 – 223.
16. Li, M.M. and Brown, H.J. (1980). Micro-neighbourhood externalities and hedonic housing prices. Land Economics, 56 (2), 125-141.
17. Maddala, G.S. (2001). Introduction to econometrics (2nd Ed.). New York, Macmillan Publishing Company.
18. McMillen, D and McDonald, J.F.(1998). Suburban subcenters and employment density in metropolitan Chicago. Journal of Urban Economics, 43(1), 157-180.
19. Nunns, P., Hitchins, H. and Balderston, K. (2015). The value of land, floor space and amenities: a hedonic price analysis of property sales in Auckland 2011-2014. Auckland Council technical report, TR2015/012. Retrieved from: http://knowledgeauckland.org.nz/assets/publications/TR2015-012-Value-of-land-floorspace-and-amenities-Auckland.pdf on 22/8/2016.
20. Rodriguez, M. and Sirmans, C.T. (1994). Quantifying the value of a view in single-family housing markets. The Appraisal Journal, 62, 600–603.
21. Rohani, M. (2012). Impact of Hauraki Gulf amenity on the land price of neighbourhood properties. An empirical Hedonic Pricing Method case study North Shore, Auckland. Auckland Council Working Paper 2012/001.
22. Rosen, S. (1974). Hedonic prices and implicit markets: Product differentiation in pure competition. Journal of Political Economy, 82(1), 35-55.
23. Shimizu, C. (2014). Estimation of hedonic single-family house price function considering neighborhood effect variables. Sustainability, 6, 2946–2960. DOI: 10.3390/su6052946.
24. So, H.M., Tse, R.Y.C. and Ganesan, S. (1997). Estimating the influence of transport on house prices: Evidence from Hong Kong. Journal of Property Valuation & Investment, 15(1), 40-47.
25. Soderberg, B. and Janssen, C. (2001). Estimating distance gradients for apartment properties. Urban Studies, 38(1), 61-79.

26. Srour, I.M., Kockelman, K.M. and Dunn, T.P. (2002). Accessibility indices: A connection to residential land prices and location choices. Paper Presented at the 81st Annual Meeting of the Transport Research Board, March-April 2002, Washington. Retrieved from: citeseerx.ist.psu.edu /viewdoc/download?doi=10.1.1.80.7338&rep=rep1&type=pdf on 16/1/2014.
27. Town Planning Organization. (1975). The Master Plan for Dimapur, Department of Urban Development, Government of Nagaland.
28. Tse, R.Y.C. (2002). Estimating neighbourhood effects in house prices: Towards a new hedonic model approach. Urban Studies, 39(7), 1165-1180.
29. Tse, R.Y.C. and Love, P.E.D. (2000). Measuring residential property values in Hong Kong. Property Management, 18(5), 366-374.
30. Vessali, K.V. (1996). Land use impacts of rapid transit: A review of the empirical literature. Berkeley Planning Journal, 11(1), 71-105.
31. Waddell, P.(2011). Integrated land use and transport planning and modelling: Addressing challenges in research and practice. Transport Review, 31(2), 209-229.
32. Welch, T.F. (2010). Estimating the effects of transportation infrastructure proximity using multiple longitudinal regression methods: The case of Atlanta (Master's dissertation), Florida State University.
33. Wooldridge, J.M. (2015). Introductory econometrics: A modern approach. Nelson Education.
34. Zou, G. (2015). The effect of Central Business District on house prices in Chengdu Metropolitan area: A hedonic approach. Paper Presented at the International Conference on Circuits and Systems, August 2015, Paris, France. Retrieved from: www.atlantis-press.com/php/download_paper.php?id=23016 on 22/8/2016.