Transport Accessibility of Housing: Perspectives of House Rental and the Tenants' Housing Choice

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Abstract

Transport accessibility is a very important criterion which influences rental value and housing preference of the tenants. This paper analyzes the relation between transport accessibility and house rental as well as the relative importance of transport accessibility indicators to the tenants for rental housing decision choice. This research analyzed data collected from 200 sample residents of rental housing from the middle-income areas of Dhaka city. This research found that transport accessibility is an important factor for the variation of house rental and there is a significant variation in the relative importance of different transport accessibility attributes to the tenants in Dhaka. Proximity to bus stop is the most important criterion for the tenants followed by the condition of front road, distance to major road, width of front road, distance to market and distance to the CBD. However, many households of middle-income bracket in Dhaka usually compromise their housing preference due to limited affordability. This study suggests for appropriate land use planning along with housing planning so that transport accessibility could be improved within the affordability level of the tenants.

Introduction and Context of the Research

Almost half of the urban population in most developing countries is the tenants (UN-HABITAT, 2003). Globally, the problems related to housing and transport are increasing in developing cities due to increasing trends of urban population and urban growth. The percentage of tenants is increasing mainly due to reasons such as lack of affordability, to stay mobile and flexible, to accommodate in transitory period and to avoid long-term commitments (UNESCAP - UN-HABITAT, 2008). Housing preference of the tenants in relation to transport accessibility of housing is less addressed in research, especially in the context of developing cities. Poor integration of housing with transport planning and lack of transport investment but growing need for housing are mainly responsible for poor transport accessibility to housing, especially in rapidly growing urban Global South.

Transport accessibility of housing is a very crucial physical criterion for convenience and mobility of the residents. Geurs and Wee (2004) defined transport accessibility as the context to which land use and transport systems enable people to reach activities or destinations by means of transport modes. Transport accessibility provides an aggregate measure on how accessible a location is from different services compared to other locations. For example, Schellekens and Timmermans (1997) described accessibility in terms of distance or travel time whist Louviere and Timmermans (1990) measured accessibility by the distance of facilities such as primary school, bus stop, shopping center, and recreational facilities. Land use patterns and transport accessibility influence

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each other (Molin and Timmermans, 2003). However, there is a research gap to explain transport accessibility of housing with the aspects: access road, distance to public transport, and distance to economic opportunity.

Miller (1982) reviewed some research conducted on the effects of transport on housing values and found a clear negative relationship. The trade-off theory suggests that travel time and land prices are negatively correlated (Alonso, 1964). However, this theory is overturned by many researchers (e.g. Cheshire and Sheppard, 1995; RICS, 2002; Yiu and Wong, 2005) and showed that an improved transport can increase property price and thus rental value. Bid-rent analysis of Alonso and Muth explains the land pricing where a rent gradient declines with distance from the central business district (CBD) for sites that yield equal utility (Alonso 1964; Mute 1969). Hansen (1959) found the locations with good accessibility have a greater chance to be developed than remote ones. This is mainly because accessible areas are facilitated by locational advantage of availability of civic services, reduction of commuting cost and time and thus convenience. The relationship between travel time and rental prices is more sensitive in the poor cities, where residents cannot afford to own private cars and are captive users of public transport (Lau and Chiu, 2003). However, Du and Mulley (2006) argue that relation of transport improvements and property value is not consistently treated.

The tenants usually have a wide range of choices for selecting rental housing. It is commonly believed that individuals prefer the housing location considering not only their daily activities but also the easiness to move from their home. In developed countries, where the car ownership rate is very high, accessibility is not significant criterion compared to the neighborhood amenities, demographic factors, dwelling attributes, social and economic ties in explaining residential location choices (Zondag and Pieters, 2005; Molin and Timmermans, 2003; Louviere and Timmermans, 1990). On the contrary, low car ownership rate affects the housing choice of dwellers in developing cities. Some people live in urban slums and accept very precarious living conditions to be able to get access to work (World Bank, 2001). Nevertheless, the impact of transport accessibility on residential choice is relatively limited when residents can afford flexible means of transport (Molin and Timmermans, 2003). According to Timmermans and Noortwijk (1996), although accessibility is the least important variable for the owner-occupied houses, it is more important for the rental sector as this sector is usually dominated by households of low or middle-income brackets.

A number of factors interact with housing choices of the dwellers' for decision-making about the housing location. It is assumed that people in developing cities usually prefer the housing location with good transport accessibility and availability of travel modes. However, availability of these attributes usually increase house price that shrinks the affordability. Therefore, housing decision is not only influenced by housing preferences, but also by housing constraints and imbalance in the housing market (Molin and Timmermans, 2003). Good transport accessibility of housing increase house rental that widen up the gap between the preferences and affordability of tenants.

Research documents available on house rental and rental housing preferences due to transport accessibility in the context of developing cities is very limited. This paper aims to answer the research question whether the transport accessibility influence housing rental and housing location choice of middle-income tenants in developing cities. This

research was conducted in Dhaka city, as a representative of developing cities, as a case study. As the largest segment of population (60 percent) in Dhaka are of middle-income bracket (Islam, 2005); this study particularly focused on the tenants of middle-income group.

Methodology

A quantitative approach was followed and data from both primary and secondary sources were collected. A total 200 sample residents of rental housing from middle-income study areas were interviewed in 2009 using a pre-determined questionnaire. The middle-income residential areas of Dhaka were determined on the basis of land price, as defined by Shohag *et al* (2005), and four study areas were selected based on spatial location and distance from the CBD (Motijheel), as seen in Table 1. Fifty samples tenants were drawn from each of the four study locations using snow-ball[1] sampling technique. While selecting the sample, following criteria were considered:

- Live in a private rented house;

- Middle-income bracket(household income, as STP (2005) stated, Tk[2] 12,500- 55,000 per month); and

- Do not own a private car and often use public bus as the main mode of travel.

Table 1: Study areas in Dhaka

Study Area	Location	Distance from CBD	Geographic Location	Development Pattern
A	Circular Road (DCC ward 33)	1 km	South East	Spontaneous
B	Free School Street at Kathal Bagan (DCC ward number 50)	5 km	Central	Spontaneous
C	Mirpur Section 11 and 12 (DCC ward number 3 and 5)	15 km	North West	Planned
D	Uttara Sector 6, 7 and 13	25 km	North	Planned

Many countries use infrastructure-based accessibility measures for developing the transport policies, i.e. European countries (see Ypma, 2000) and the United States (see Ewing, 1993). To delineate transport accessibility of housing in Dhaka, by analyzing research papers (i.e. Zondag and Pieters, 2005; Lau and Chiu, 2003; Molin and Timmermans, 2003), this study considered infrastructure-based following attributes:

- Width of the access road;

- Condition of the front road;

- Distance to major road (basically tertiary road);

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[1]Snowball sampling technique is one in which the researcher collects data on few members of the target population (s)he can locate, then asks those individuals to provide information needed to locate other members of that population whom they know. It is a non-probability technique.

[2] Tk is Bangladeshi currency; conversion rate in 2015 is approximately US$1 = Tk 80.

- Distance to CBD;
- Distance to market; and
- Distance to public transport services specially the bus stop.

In this research, the correlation between house rental and transport accessibility criteria was determined by using Pearson correlation coefficient. This might be criticized that all attributes of transport accessibility may equally correlate with housing rental and thus multiple regression analysis would have more useful. However, to interpret the impacts of each variable on house rental in a very straight forward manner and given the resource constraints to work out with the context of available data, this research applied correlation coefficient. Nevertheless, there is scope to determine the multiple correlations of the variables with housing rental in further research. Though several researchers (e.g. Miller, 1982; Yiu and Wong, 2005) have utilized hedonic price index (HPI) methods to relate transport and housing price, due to lack of data this research could not apply HPI method.

Literature shows that researchers have used various methods to determine housing choices. For instance, Louviere and Timmermans (1990) introduced the method of hierarchical conjoint choice models; Timmermans and van Noortwijk (1995) developed a context-dependent stated preference (SP) model; Kauko (2007) used the Analytical Hierarchy Process (AHP)[3].The AHP was applied in this research for measuring the relative importance of the transport accessibility criteria of housing for determining the preference of the respondents.

Profile of the Case Study City and Demography of the Sample

Dhaka is a rapidly growing urban conurbation accommodating more than 10.7 million residents (BBS, 2003). Most of the people in Dhaka cannot afford a house with habitable environment. *Owner occupied* dwellings *of* the city is only 30 percent (UNCHS-World Bank, 1992) and the rest live in rented houses. Most of the residential areas in Dhaka have developed spontaneously. The city is currently facing transport crisis such as poor transport access, lack of transport mode, poor transport services.

The sample data reveal that the average household size is 5.6 and half (52 percent) of the respondents are male. A quarter (26 percent) of the respondents belongs to age group 31-40 years. Most of the respondents are well educated; such as, attained Bachelor and Masters degree respectively 25 percent and 28 percent. Three quarters (77 percent) are employed; mainly in service sector, business, and teaching. Monthly household income is a very important determinant for housing quality and location, affordability to travel modes, and quality of life. Monthly household income Tk 12,500 - 25,000 is for 12 percent, Tk 25,001 - 35,000 is for 29 percent, Tk 35,001- 45,000 is for 34 percent, and Tk 45,000 -

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[3]AHP enables the decision makers facing a complex problem with multiple conflicting and subjective criteria to express their qualitative judgments in a quantitative format. Ishizaka and Labib (2009) mentioned many researchers (e.g. Forman and Gass, 2001; Ho, 2008; Golden, Wasil et al. 1989; Kumar and Vaidya, 2006; Liberatore and Nydick, 2008; Omkarprasad and Sushil, 2006; Saaty and Forman, 1992; Shim, 1989; Vargas, 1990; Zahedi, 1986) have utilized AHP in different fields.

55,000is for 25 percent of the sample.

House Rental and Transport Accessibility Condition of the Respondents

The tenant households in Dhaka city paying house rental is a major portion of their monthly expenditure. Almost half of the sample families (46 percent) monthly pay Tk 10,000-15,000 whilst a very few (1 percent) pay less than Tk 5,000 for house rental. House rental per sq feet usually depends on a number of spatial and design attributes. This study found that average monthly rental per sq feet is Tk 7.36 where less than Tk 7 is for 30 percent, Tk 7-7.5 is for 34 percent, Tk7.5-8 is for 21 percent, and more than Tk 8 is for 15 percent of the families.

The width of front road needs to be sufficient to allow easy access and convenient movements of residents to/from the housing unit. As the study area C and D are in planned residential area, the front roads of the sample houses are comparatively wider. For instance, only 8 percent households live adjacent to a road with a width less than 10 feet, 17 percent to 11-20 feet, 38 percent 21-30 feet, 27 percent to 31-40 feet, and 10 percent more than 40 feet. However, overall 56 percent of the sample households are not satisfied about the condition of front road whilst only 21 percent are satisfied and the remaining 23 percent are moderate.

In general, it could be hypothesized that the increase in distance to major road does reduce the transport accessibility of housing. Proximity to a bus stop does increase convenience and mobility of the households. Market is also an important facility; required for the residents to purchase daily commodities. Most of the sample households, as seen in Table 2, live within a distance of 2 km from the major road, the nearest bus stop and the market.

Table 2: Percentage of the households and their distance to various attributes

Attributes	Percentage of the Households			
	Less than 1 km	1-2 km	2-3 km	More than 3 km
Distance to the nearest major road	21	39	23	17
Distance to the nearest bus stop	19	41	24	16
Distance to the nearest market place	23	39	24	14

Source: Household Questionnaire Survey, 2009.

Table 3: Availability of travel modes and percentage of weekly travel

Travel modes	Availability of travel modes	Percentage of weekly travel
On foot	NA	32.31
Rickshaw	82.3	27.51
Bus	46.7	26.62
Tempo	6.8	3.51
Auto-rickshaw	12.4	1.09

Source: Household Questionnaire Survey, 2009.

Availability of access to travel modes in proximity of home does increase the residents' comfort as well as provide travel time and cost savings. STP (2005) data shows, buses serve almost 70 percent of the city dwellers and provide almost half (44 percent) of the daily total trips in Dhaka. However, the sample data of this research show (as seen in Table 3) that rickshaws are the most available mode close to the house (82 percent) whilst walking is the dominant mode (over 32 percent) for travel. A high percentage of trips are on rickshaws and bus because of the availability of rickshaws and buses close to the housing.

Correlation between Accessibility and House Rental

Despite the limitation of empirical evidence for Dhaka, this study found that transport accessibility of housing is an important factor for variation of housing rentals. Housing with a better accessibility has more demand among the tenants; consequently, it is more expensive. Figure 1 shows the correlation between house rentals and the selected transport accessibility attributes in the study areas of Dhaka city based on the overall values of the respondents.
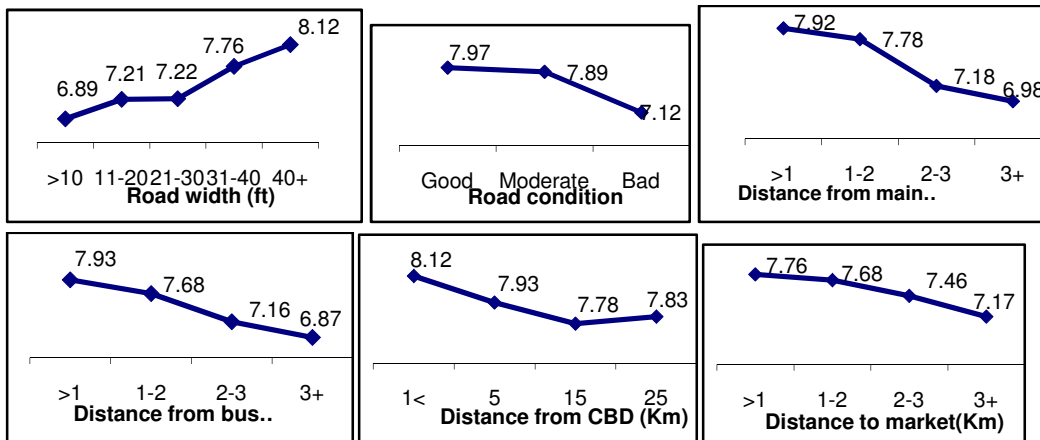
Source: Household Questionnaire Survey, 2009.

Fig. 1: Rental (Tk) per sq feet with respect to transport accessibility indicators

Width of the front road is a significant determinant to vary the house rental. Wider roads increase attractiveness of the housing as they enhance convenience of dwellers due to availability of travel modes. This study found that if the width of front road increases, so does the house rental. For instance, house rental in Dhaka increases significantly where the width of front road is more than 30 feet (in general, road width more than 30 feet is only in planned residential areas where the house rental is also higher compared with the unplanned areas). This information is consistent with the findings of Islam *et al* (2007) where they claimed that road width is an important factor which influences land price. Therefore, the residents do consider road width while selecting their housing location.

This study further found that the quality of front road of the housing can influence the house rental. As the poor road condition increase sufferings of the residents, they strongly consider quality or condition of the front road while selecting the location of rental housing. Average rental is generally higher for the housing with a good quality front road. For instance, rent per sq feet for housing with good quality front road is Tk 7.97 compared to Tk 7.12 with a bad quality front road.

Distance from the major road is a significant attribute that determines the competitiveness of housing. Proximity to the major road provides better accessibility of the residents for different services or areas of the city. Residents living close to the major road generally have easy access to public transport and community services (e.g. workplace, shops, educational institutions, etc). This study found that the distance to major road influences the house rentals; per sq feet rental is comparatively higher for the housing which is located close to a bus stop.

Researchers (e.g. Kauko, 2007) pointed out the importance of access to transport and convenient transport facilities for the city dwellers. Among the available public transport modes in Dhaka, buses are one of the most favorable modes in terms of trip cost. Proximity to a bus stop reduces the residents' travel time and cost as they do not require any access or egress legs except walking between home and bus stop. This study found that distance to nearby bus stop influences the house rental: proximity to bus stops increases the rental.

This study selected four residential areas located respectively less than 1 km, 5 km, 15 km and 25 km away from the main CBD of Dhaka (refer to Table 1). It was found that average monthly house rental per sq feet is reasonably higher (Tk 8.12) for the housing situated within 1 km from CBD (study area A) than the other residential areas (study areas B, C and D). However, house rental is not heavily fluctuated that are located more than 5 km away from CBD.

Distance to the market can be defined as the distance of housing to the nearest *kutcha* bazaar, shopping center, departmental store or other shopping facilities in Dhaka. Bender *et al* (2007) identified that proximity of market is perceived as an important factor for housing quality as it increases the availability of daily grocery requirements for the residents. This study found that within a residential area the location of market influences the house rental, though not very significant, varies with respect to the distance between nearest market and housing.

Tenants' Housing Choices

The tenants usually have a wide range of decision choice factors in selecting their rental housing. However, the tenants often need to adjust or trade-off their preferences according to their affordability while selecting the rental housing. Relative importance of the accessibility factors for the respondents in Dhaka city are shown in Figure 2.
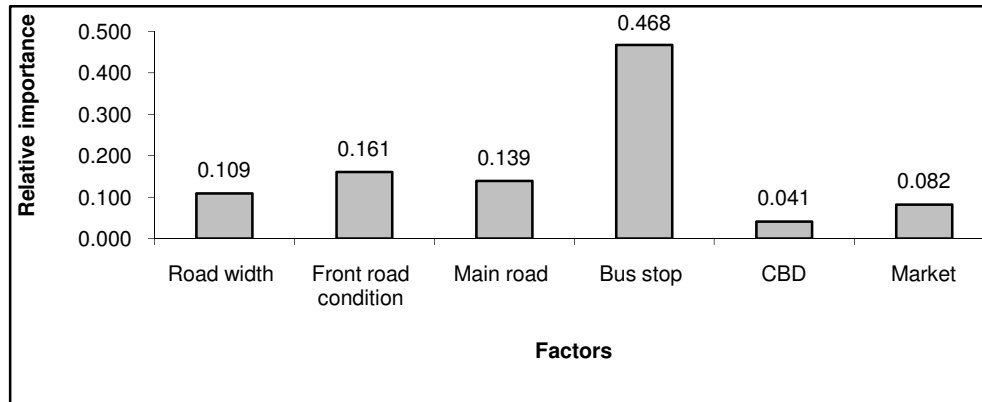
Source: Household Questionnaire Survey, 2009.

Fig. 2: Relative weight of the housing choice attributes

Figure 2 depicts that the relative weight of the proximity to bus stop is 0.468. The relative importance between two attributes could be determined from the weighted values of the attributes. The respondents consider proximity to the bus stop as the most important factor (4.29 times than the width of road, 2.9 times than the condition of front road, 3.67 times than the proximity to major road) in Dhaka. Proximity to CBD holds the least relative weight among the respondents for housing choice in Dhaka city.

Impact of Transport Accessibility in Tenants' Housing Preference

Transport accessibility indicators have a close relation with tenant's housing preference, as seen in Figure 2 and discussed in previous sections. The width of front road influences tenant's housing preference as they prefer housing located with a wider front road. Most of the respondents prefer to live beside a road of 21-30 feet wide whilst only 10 percent prefer the width more than 40 feet. Though a very wide road may increase the accessibility, negative externalities such as noise and air pollution from high volume of traffic reduce the preference to live beside major roads.

All the respondents mentioned they would prefer to live beside a road with good condition. However, about 56 percent of the respondents are not satisfied with the condition of front road of their house whilst only 21 percent are satisfied. This information indicates that a large portion of tenants compromised with the criterion 'front road condition' of the housing while selecting the location for renting a house.

The tenants consider the distance to major road from housing while renting as the proximity to major road increases accessibility. Usually they want to live within walking distance from the major road. For instance, about 23 percent respondents prefer to live within 1 km while 39 percent prefer a distance of 1-2 km from the major road. However,

none prefer living adjacent to a major road because of high level of noise and emissions from traffic.

Location to bus stop is an important factor to the middle-income households for choosing the rental housing. This should be obvious in Dhaka as the majority of trips are on buses. About 26 percent of the respondents usually travel by bus and they prefer walking to and from bus stop. Proximity to bus stop provides easy accessibility; therefore, almost half of the respondents mentioned they want to live within 2 km of bus stop. However, higher house rental close to bus stop compelled some tenants to live far away from the bus stand. For instance, 16 percent of the respondents compromised with this criterion and living more than 3 km away from the nearest bus stop.

Administrative and commercial importance makes Motijheel as a CBD of Dhaka. Research such as Kauko (2007) and Bender *et al* (1997) showed the location of jobs has influence on residential location choice. As many people prefer living close to work, proximity to workplace is another important criterion of rental housing location choice.

This study found that the distance to market is one of the major determinants of tenants' housing location choice. About 62 percent of the respondents prefer housing within 2 km from the nearest market. However, a few (14 percent) have compromised with this criterion (proximity to market form home) and living more than 3 km away from the nearest market.

Discussions and Conclusions

This paper showed the significance and influence of transport accessibility on house rental and house preference of middle-income tenants in Dhaka. Accessibility attributes such as wider front road, good quality of front road, proximity to major road, proximity to bus stop, proximity to CBD and proximity to market increase the house rental as these ensure easiness of mobility and convenience.

However, there is a significant variation of the relative importance of transport accessibility attributes among the middle-income tenants. The respondents most importantly consider the proximity to bus stop followed by condition of the front road, distance to the major road, width of the front road, distance to nearest market and distance to CBD. Most of the tenants prefer living beside a road of 21-30 feet wide, with a good condition and within walking distance of the major road. However, none prefer living adjacent to the major road because of negative externalities of traffic. Most of the tenants want to live close to bus stop; however, higher house rental close to bus stop compelled some of them to live further from bus stop.

The impact of transport accessibility on house rental and housing preference of tenants is not identical all over in Dhaka city. There is a disparity of house rental in study area C and D, even though both locations are planned residential area with wider roads. This indicates, beside the transport accessibility, some other attributes have cumulative impacts on house rental. For instance, the distance to bus stop was reported by a large portion of the respondents to be more important than the distance to major road while selecting the housing location.

Although the house rental is comparatively higher in the areas close to CBD, the attribute 'distance to CBD' has very minimal impact on rental value as it gets the least relative

weight (as seen in Figure 2) as a housing choice attribute. On the other hand, it is somewhat contradictory or inconsistent that although the distance to market is the second least important attribute of rental housing choice, the house rental trend line declines while the distance to market increases (see in Figure 1). The higher rental in study area A and other advantages in planned residential areas (e.g. study area C and D) might be the reasons.

The tenants usually prefer transport accessibility of housing for comfortable and convenient movement to/from the housing as well as for access to services and facilities. Proper transport planning can optimize the proximity of bus stop to the dwelling units. Efficient mass transport system can increase accessibility and thus convenience of the tenants. However, better accessible housing may not be affordable by the tenants of middle-income bracket as transport accessibility increases the house rental. Therefore, due to higher rental tenants in Dhaka compromise their preference of transport accessibility attributes. Hence, it is important to control housing rental market by the concerned authority.

As the major portions of the dwellers in Dhaka are tenants, their requirements and choices need to be recognized and considered in national housing planning. Moreover, it is important to have effective transport accessibility in the residential areas as the tenants usually want to be mobile and flexible. Public and private housing planning (both at national and local level) need to consider transport accessibility aspects. Appropriate land use planning (for spatial distribution of the infrastructure and service facilities) is also very significant for ensuring a high level accessibility. Therefore, housing planning need to be integrated with land use planning; as Molin and Timmermans (2003) mentioned proper land use planning can increase the accessibility of the facilities for residents through ensuring appropriate hierarchy of roads. This study suggests for appropriate land use planning along with housing planning that can provide transport accessibility of housing within affordability level of the tenants in Dhaka.

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