

Socioeconomic equity in TOD planning: Challenges of Transit induced gentrification in Dhaka

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Abstract: *Transit Oriented Development (TOD), adopted by different cities of the world as a solution of numerous urban problems like sprawling development, air pollution, regulating land development, car-oriented development, traffic congestion, etc. very little work has considered how transit system may impact social equity through land use changes. Theoretically, TOD can upsurge accessibility by transit proximity, which reflect in the high price of housing and land around the stations. This study shed a light on the transit-induced gentrification, a threat developing city face in planning TOD. Socioeconomic context of a developing city is quite different from the developed one. No rigorous empirical studies have looked specifically on the TOD association with gentrification, among the few, most are on developed cities. Using data on social, demographic, housing and travel behavior, this study has tried to evaluate the challenge of gentrification that Dhaka is going to face in TOD planning and implementation. Through evaluating relevant policies, the study has also tried to find the policy gap that needs immediate attention for effective TOD planning and minimizing the threat of gentrification in the context of Dhaka.*

Keywords: TOD, Land price, Housing affordability, Gentrification.

Introduction

Transit oriented development are gaining momentum around the world to integrate transit and land use. Development around transit stations is a widely promoted strategy where the basic idea is to develop relatively high density-built environment with mixed urban function (Calthorpe, 1993; Dunphy et al., 2004; Zhang, 2007). TOD as a planning tool integrates the land use and transit system, thus creates lively, sustainable, pedestrian friendly areas and neighborhoods with high densities, mixed and diverse land uses (City of Calgary, 2004). Metropolitan areas in United states adopt the concept of TOD for challenging dispersed growth pattern or sprawl development's and its environmental and social impact (Douglas, 1997). Research reveals great influence of

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TOD in reducing automobile use, increasing transit ridership, and increase sense of community in a neighborhood (Cervero, 1996; Newman & Kenworthy, 1999). In the European context where automobile use is low, high population density and have longer experience to integrate transit-land use, TOD adopt for both to encourage urban renewal in city central (e.g. the ABC location policy in Netherland) and to provide leverage for the reconfiguration of the outskirts of city (Luca Bertolini & Spit, 2005; Peek, Bertolini, & De Jonge, 2006). In Asian cities, TOD superimposed upon an already existed culture of transport-land use integrated planning (Doulet, Delpirou, & Delaunay, 2017) through urban intensification and relocating the urban functions mostly to combat traffic problem.

Literature evidence a wide range of benefit from TOD. In addition to the transport effect, Banister and Thurstain-Goodwin (2011) argue about TOD impact at three separate levels. At macroeconomic level it can impact on the economy as measured through the output and productivity change; at the meso level impact related to agglomerative economics and labor market effect with some external environmental consequences; at the micro level, the impact is determined by land and property market affect (Banister & Thurstain-Goodwin, 2011). The new or constantly upgrading transport infrastructure forms land use patterns like spatial structure, density and diversity or design via the concept of ‘accessibility’ (L. Bertolini, Le Clercq, & Kapoen, 2005; Farber & Marino, 2017; Hansen, 1959; Ho & He, 2011). This evidence ranges from suburban to built-up city center, new town to and even potential to regenerate historical center (Li, 2012). Cities around the world, including Copenhagen (Knowles, 2012; Suzuki, Cervero, & Iuchi, 2013), Hong Kong (Cervero & Murakami, 2009; Tang, 2017), Stockholm (Cervero, 1998), Queensland (Kamruzzaman, Baker, Washington, & Turrell, 2014), Seoul (Cervero & Kang, 2011; Sung & Oh, 2011), Bogota (Bocarejo, Portilla, & Pérez, 2013), Tokyo (Chorus & Bertolini, 2016), etc. have a significant upsurge and ingenuities concerning TOD. However, every greater benefit come up with some social cost. One of the social costs of TOD planning is, housing affordability that results in gentrification.

Public investment often underpin gentrification (Zuk et al., 2015) through increasing cost of living. Research find that brownfield redevelopments (Bryson, 2012), charter school (Davis & Oakley, 2013), as well as housing programs (Bridge & Butler, 2011) can potentially catalyze gentrification. Large-scale infrastructure investment improved

transit accessibility, encouraged transit-oriented development (TOD) which associated with increasing housing and land price in TODs (Debrezion, Pels, & Rietveld, 2007; Hess & Almeida, 2007; Yeh, Wu, Huang, & Tasi, 2005). Middle- and lower-income group often fails to keep pace with the rising land price especially where there are no inclusive housing policies for TOD planning (Chava & Newman, 2016). Research reveals that most TODs are undergoing various forms of social cost and gentrification through excluding the working and attracting the affluent who replace housing opportunities for the poor (Dawkins & Moeckel, 2016; Dong, 2017; Kahn, 2007). Gentrification is increasingly permeating in the cities of Global south (Shaw, 2008). Cities of global south are expecting high rate of development (Habitat, 2011). What is more striking in these cities is the extent to which socio-economic inequality is captured in spatial segregation, for example vivid image of high rises and shantytown coexisting together (Cervero, 2013). Within East Asia, mega cities particularly capital cities emerged through rapid urbanization, facing challenges of cost of urban primacy from both efficiency and equity grounds (McGregor, 2008). Dhaka is a city of 143 km² with over 14 million population, with about 43,500 people per square kilometer (BBS, 2011; BIGD Report, 2017 and RAJUK, 2016), characterized by spontaneous development, high population density and unaffordable housing market (B. Ahmed, Hasan, & Maniruzzaman, 2014; S. Ahmed & Bramley, 2015; Kabir & Parolin, 2012; Khan & Siddiqua, 2015; Mowla, 2012). As being the 11th largest megacity, (UN, 2015) Dhaka accommodates almost 46 percent of the total urban population of the country (BBS, 2011) and has transformed from a rural settlement to a mega city without proper planning or regulatory measures (Ahmed & Bramley, 2015; Nilufar, 2010). For combating with excessive traffic demand, Dhaka Transport Coordination Authority (DTCA) formulated a 20-year strategic transport plan (STP) in 2005. A revised RSTP has been developed in 2016 with a proposal of constructing: 3 Bus Rapid Transit (BRT) Lines, 3 Mass Rapid Transit (MRT) Lines (shows in Figure 1), Elevated Expressways and 2 Bypass Roads (DMTCL,2020). Development authorities encouraging TOD around the mass transit stations. However, TOD implementation here is more challenging than others. Moreover, there is no previous TOD not even mass transit experience before. Therefore, the context specific forces need to be addressed very carefully at the planning stage of TOD.

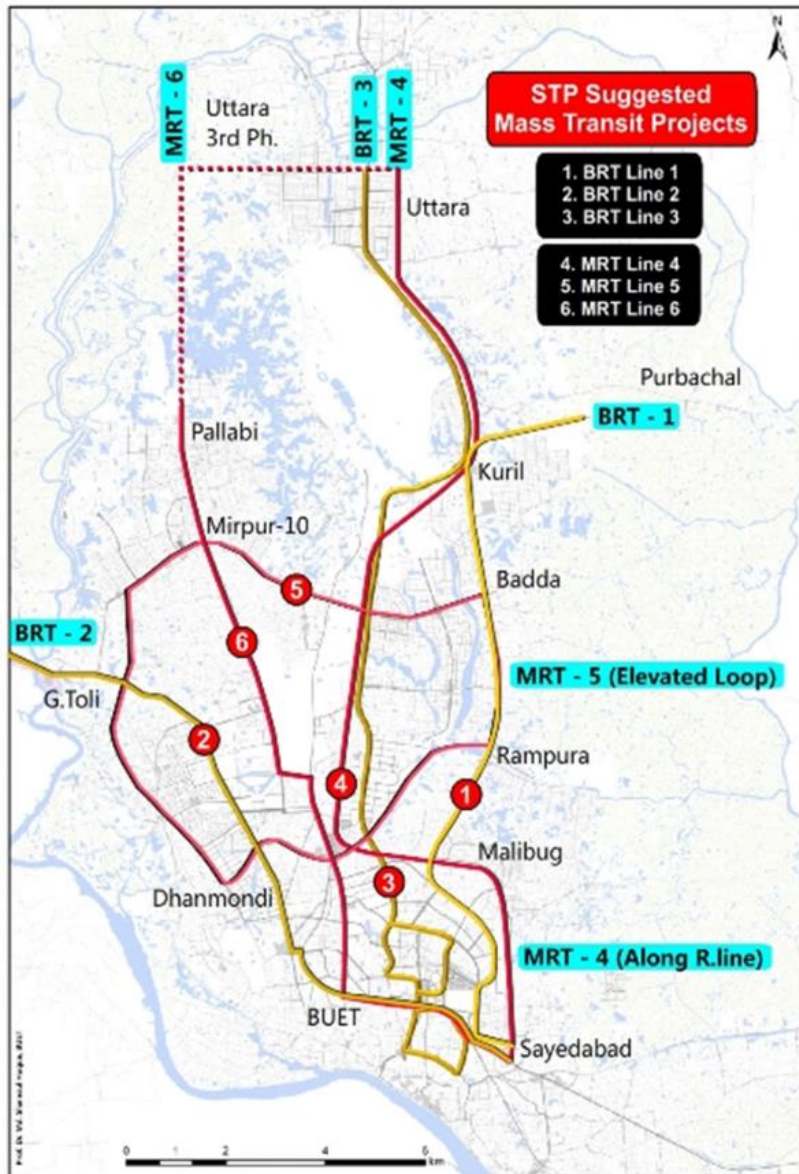


Figure 1: Mass transit projects in Dhaka

Source: JICA 2015

For an equitable and sustainable TOD planning it is essential to understand the transit induced gentrification. This will be interesting to investigate, in the developing city context where a major part of society falls below middle-income group and planning practice are weak, whether transit induced gentrification works at same way as developed ones or not. Considering Dhaka's context, this research revolved around the

question, how much social threat TOD could induce through gentrification and what are the possible policy interventions to reduce that threat? Overall, the aim of this paper is to determine whether the areas around MRT stations are susceptible to gentrification by evaluating four indicators: rental pattern and housing affordability, redevelopment potentiality, transit cost for offsetting housing cost and policy intervention.

Literature Review

Concept of Gentrification

Gentrification defined as a process of influx where wealthy residents (gentrifiers) replace working class in the central city. Gentrification provides a clear idea about the process of urban transformation by which different function of cities especially living spaces for local residents and also public arenas have been reduced, particularly for those with limited means (Lees, 2014). The concept was originally coined in London by Ruth Glass (1964) as a process of class succession and displacement in areas broadly characterized by working class and unskilled households. This leading to direct displacement of low-income inhabitants, and socio-economic upgradation of the neighbourhood (Glass, 1964). Since then, the concept undergone a significant expansion in both meaning and form.

According to Marcuse (1985), gentrification happens in the cases when comparatively modern, young residents who are mostly professional, technical and marginal workers replace older, lower income, poor and minority groups of people tremendously.

Gentrification is a pre-eminently illustrated as a complicated process with negative results, that brings attention into the probable displacement of lower income group, birth of amplification of regional confrontment through residential burdens, increased retailer prices and damage of the social cohesion of community (Clagett, 2015).

Landis (2016) defined four factors which can be used to measure the neighborhood changes and extent of gentrification: 1) entire demographic and socio-economic changes of residents and businesses; 2) structural, occupancy and financial features of the building stock; 3) characteristics of neighborhood newcomers based on their numbers and occupation; and 4) constitutional as well as capital investment flows of inner and outer neighborhood.

Neil Smith (1986) defines gentrification as ‘the rehabilitation of working class and derelict housing and the consequent transformation of an area into a middle-class

neighborhood'. There are long theoretical and ideological argument regarding the cause of gentrification, which often summarized in the dichotomy of 'economic' vs 'cultural' (Choi, 2016). Even the form of gentrification includes new-build developments that not necessarily involve displacement directly, which was an essential component of original definition of gentrification. Initially focus of gentrification was on direct displacement of the poor (Atkinson, 2000) that has evolved gradually. Currently, gentrification extended to the displacement of existing residents and socio-economic upgradation of the area (Chava, Newman, & Tiwari, 2018). The original residents experience their sense of place and belonging being undermine by the changes brought into their neighborhood (Davidson & Lees, 2010). In an apolitical policy climate of the global north, the term 'gentrification' with its negative inferences has been replaced by more neutral and positive term 'regeneration' and 'renewal' (Lees, 2003; Slater, 2006). Policy makers around the world are highlighting the positive effect, such as rehabilitated neighborhood or rent increase and the detrimental effect of gentrification evicting from such discussion considering it as natural process (Lees, Slater, & Wyly, 2013). Former studies generally explain the physical concept of gentrification due to the modernization of aged buildings, enhancement of rent and property values as well as tenure switching (Dong, 2017).

Association of TOD with Gentrification

For the hypothesis, linking transit to gentrification intellectual support dated to LeRoy and Sonstelie (1983). According to their model, residents live around CBD, where employment is concentrated and different income groups choose to locate at some distance considering longer commutes for cheaper land and vice versa (LeRoy & Sonstelie, 1983). Rich lived at the edge and poor live in the core city, was a long characteristic of American cities, which began to change in 1970's. Rich households move into city center, displacing the poor. Reason behind this was means of commuting to work. When the car first become practical gave the rich access to the cheaper suburban land than the city center. The falling cost of commuting by car gave the poor access to suburban location and the comparative advantage rich once had in those locations has been eroded. Thus, the rich began to return to the city centers (LeRoy & Sonstelie, 1983). Lin (2002) also argue about presence of transit in combination with declining automobile cost, leads to gentrification of inner city considering residential property value as an indicator of gentrification.

Establishment of TOD plays significant role to stimulate economy and investments which can change spatial patterns and apparently urban visual settings. Newly developed structures or accommodation can enhance the decrease of housing affordability and displacements (Padeiro, Louro & da Costa, 2019). TOD emergence motivates people to stay in a modern facilitated and livable environment. According to Marx's "Rent Gap" theory, land value uplift and capital investments generate gentrification in well infrastructure-based areas. Although gentrification might happen with or without TOD, it has been found from several cases that enhancement of pre-existing rent gaps might increase from the starting of new transit lines (Revington, 2015). With the expansion of rent gaps, investments in housing or residential projects turn into profit which leads to the loss of affordability for lower-income groups.

As urban neighborhood, TOD is viewed as desirable amenities due to the accessibility (Zuk et al., 2015). Improved accessibilities enhance land values and thus raised costs also convert in house rents. Through the process of residential gentrification, only two choices left to people, as- (1) those who can't afford the increased costs usually leave neighborhoods, and (2) they decide to stay with higher rent with the expectations of getting better employment opportunities or they would reduce transportation expenditure which will offset higher residential expense (Baker & Kim, 2020). However, displacement takes place or not, it is obvious that the situation of lower income households would worse in terms of other costs as transportation costs isn't always decrease enough to make up the differences if income remains standstill (Gandelman, Serebrisky and Suárez-Alemán, 2019).

However, TOD cannot be realized solely by introducing mass transit as a mode of transportation; it must also be associated with effectively integrated urban areas along the transit corridor with a corresponding lifestyle shift by the people. Research found that areas adjacent to transit stations often experience thriving commercial development like introducing shops, restaurants and other businesses that leads to higher land values and rent (Debrezion et al., 2007; Dong, 2017; Renne, Tolford, Hamidi, & Ewing, 2016). A considerable amount of study was examined the relationship between transit and urban land use using hedonic (Atkinson-Palombo, 2010; Cervero & Duncan, 2002; Goetz, Ko, Hagar, Ton, & Matson, 2010) or other price models to distinct the impact of transit accessibility on housing price. Positive price effect often focused as a measure of the benefits brought by transit service,

Table 1 summarizes empirical evidence of property value increase as a direct impact of transit in different cities.

Table 1: Summary of rail transit impact on property value

Author	Transit mode	Case study	Findings about transit impact on land value
Cervero and Landis (1997)	Heavy rail	San Francisco Bay Area	Increase of 10-15percent rent for the units within ¼ mile of BART.
Cervero and Duncan (2002)	Light and commuter rail	Santa Clara Country	Land near commuter rail had a premium of 20percent, which is 45percent for the larger apartment within ¼ mile.
Cervero and Kang (2011)	BRT	Seoul, Korea	10percent premium for residence within 300m of stations and more than 25percent for non-residential and retail within 150m buffer of stations.
Duncan (2008)	Light rail	San Diego	17percent premium for condominium and 5percent for single-family homes within ¼ mile of stations.
Diao, Leonard, Sing, and Economics (2017)	Mass Rapid transit	Singapore	7.8percent housing costs increase within 600m of stations.
Gatzlaff and Smith (1993)	Heavy rail	Florida	5percent increase of real estate sales value.
Goetz et al. (2010)	Light rail	Minneapolis	Premium for single-family homes was \$5229 and multi-family \$15755 within ½ mile of stations.
Hess and Almeida (2007)	Light rail	Buffalo, New York	2 to 5percent increase of land premium.
Kahn (2007)	Light rail	Multiple (14) cities	Home value increased more than 5percent in last ten years near the 'walk-and-ride' stations.
McDonald, Osuji, and economics (1995)	Southwest side rapid transit	Chicago	17percent value increase for properties within ½ mile of station over 10 years.

Source: Author, compiled from above sourcesEconomic theory reveals that the value of decrease travel time should be reflected in home prices (Hess & Almeida, 2007).

The literature of gentrification emerging from developed countries accuses TODs as more susceptible than the neighborhood located away from transit stations (Chava & Newman, 2016; Kahn, 2007; Lin, 2002). According to Lin (2002) property adjacent to transit shows a 20 percent higher increase in value which significantly supports the hypothesis that transit was a spur to gentrification.

Literature examined gentrification from both demand and supply side. The rent gap theory explains the supply side activities whereas demand side explanation largely depends on socio-demographic aspect (Baker, Lee, & Research, 2019). Gentrification often occurs when land is transformed to meet its potential value. Large infrastructural investment like public transportation can certainly be added to the list (Baker et al., 2019). Transit improvement helps undervalued areas to meet their potential value and thereby induce gentrification. This potential value gain largely stems from the transit induces accessibility, as well as increase density, land use diversity and good design (Revington, 2015). This accessibility increases then capitalized into land and housing value, potentially cause displacement of low-income residents from the station areas (Dawkins & Moeckel, 2016). Every year, capital Dhaka has to bear intolerable pressure for new housing provision, due to higher rate of migration and attraction of better facilities (Uddin & Mohuyab, 2013). From this continuous experience, it can be said that the new transit developments may increase the threat of displacement due to gentrification.

Data and Method

To answer the research questions, existing housing affordability and travel behavior were considered as indicators to explain the possible extent of gentrification threat or the vulnerable group who could be gentrified. This study focuses on existing socio-economic characteristics: income, occupancy type, and house rent, travel behavior, transport cost, etc. characteristics of proposed TOD area for predicting the susceptibility of gentrification near TOD. However, there is no such official data, which urge door-to-door survey. Structured interviews of 100 households using pre-designed questionnaires were conducted to collect detailed information on demographic, socio-economic, housing and travel behavior characteristics of the study area. The study has applied modified H+I index to measure the affordability. This version of the H+T Index uses the ordinary least square and simple variable transformations to accomplish the

regression. The list of independent variables has also been simplified and excludes variables that are highly collinear to give greater significance to the remaining variables.

$$H + T \text{ index} = \frac{\text{Housing costs} + \text{Transportation Costs}}{\text{Income}}$$

Total transportation costs can be calculated as the sum of the three cost components as follows:

$$\begin{aligned} &\text{Household Transport Costs} \\ &= [C_{AO} * F_{AO}(X)] + [C_{AU} * F_{AU}(X)] + [C_{TU} * F_{TU}(X)] \end{aligned}$$

Where:

C = cost factor (i.e. dollars per mile)

F = function of the independent variables (FAO is auto ownership, FAU is auto use, and FTU is transit use)

Transit and land development policies were evaluated to identify the policy support and barriers dealing with gentrification threat for TOD planning.

Case Selection

The threat of gentrification always associated with brown field development. Thus, the stations along MRT line 6 were selected as case stations to assess the gentrification possibility. Researcher have varied in their approaches to studying gentrification or induced displacement, both qualitative and quantitative methods to answer variety of questions ranging from nature to causes and consequences of gentrification. Gentrification generally associated with variety of things, including alterations from renter occupied to owner occupied housing, multifamily to single family units, demography and race changes, property value increase, etc. which make gentrification measurements complex (Zuk, et al., 2015; Wardip, 2011; Smith, 1987 and Rayle, 2015). One of the approaches is change in housing market such as price, renovations, permits or sales and the other is focusing in socio-economic or demographic characteristics. Considering the above indicators 800 m radius area around five case stations (Pallabi, Mirpur 10, Mirpur 11, Kazipara, Shewrapara) which are already built-up were selected because of their dominating residential character, Figure 2.

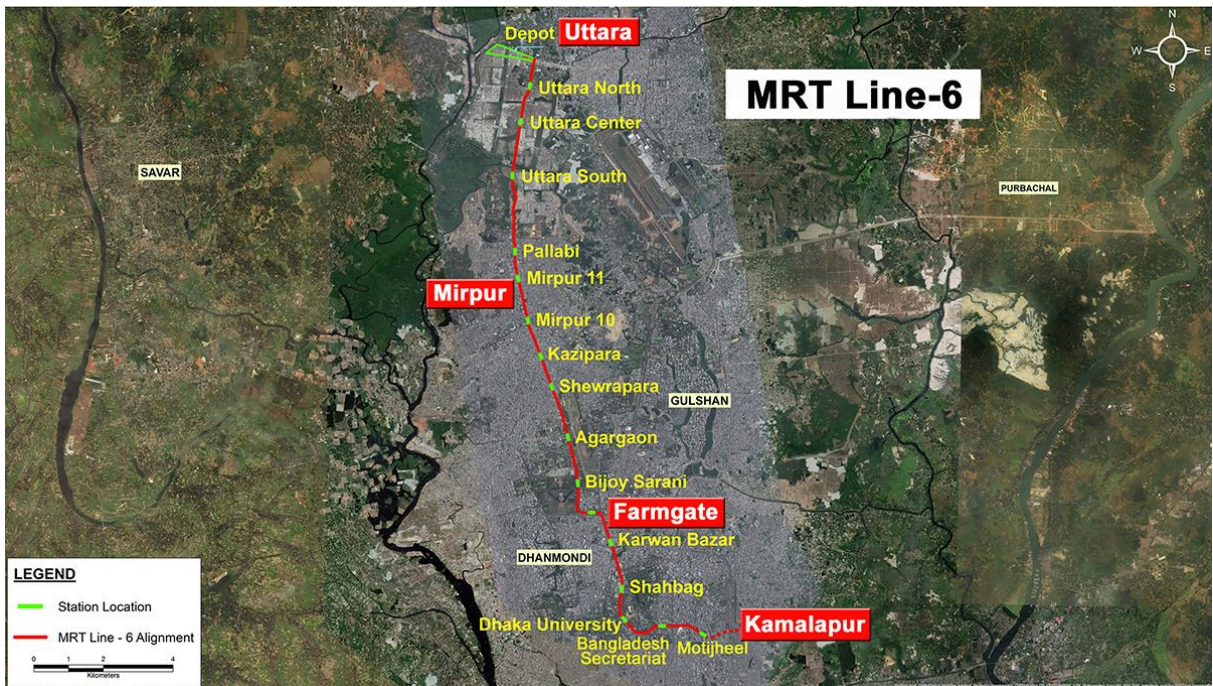


Figure 2: Route Map of MRT line 6 in Dhaka

Source: Dhaka Mass Rapid Transit Company Limited (DMTCL, 2020)

Empirical Analysis

To investigate the threat of gentrification, a study tried to compare different theoretical aspects of transit-induced gentrification with the current context of Dhaka from both demand and supply side under four hypothetical statements.

Rental Pattern and Housing Affordability will Influence Extent of Gentrification

Table 2 shows the socio-economic characteristics of the respondents which reveal that, the major share of the residents belongs to middle to upper middle-income group. Kazipara and Shewrapara station has comparatively more share of lower middle-income group. Mirpur 11 holds significant share of middle-middle income group of people which is around 90 percent. Among all the respondents only 19 percent have their own houses, 81 percent currently live in a rented house.

Table 2. Descriptive statistics: characteristics of the respondents (N= 100)

Indicators	Average	Mean Comparison				
		Pallabi	Mirpur 11	Mirpur 10	Kazipara	Shewrapara
Household size (Person)	4	4	4	4	4	4
Monthly Income		%	%	%	%	%
1. Low income (5000 to 13199)	4.6	6.5 2.6	1.3 -	- 2.6	7.8 10.3	7.7 9
2. Lower-middle income (13200-24999)	4.9	32.4 48	9 90	35.1 62.3	32.4 32.4	35 36.4
3. Middle-middle income (25000-49999)	28.8	10.4	-	-	16.9	11.7
4. Upper-middle income (50000-99999)	53.7					
5. Higher income (100000+)	7.8					
Occupancy Type						
Owner	19	34	18	4	18	22
Rented	81	66	82	96	82	78

* All values are rounded to one decimal place

Existing rental pattern of the study area reveal that 44 percent of the household within TOD precinct are fall under affordable range in terms of housing rent considering the benchmark of 30 percent share of income. In regard to transportation cost, 81 percent households within the TOD precinct of MRT line 6 is affordable in comparison with the benchmark of 15 percent share of income, shows in Figure 3 (a) and (b). Additionally, following the recent practice of H+T, the study identified 64 percent of the household can't meet the affordability limit using the benchmark of 45 percent share of income for the combined (Housing + Transport) purpose (figure 4).

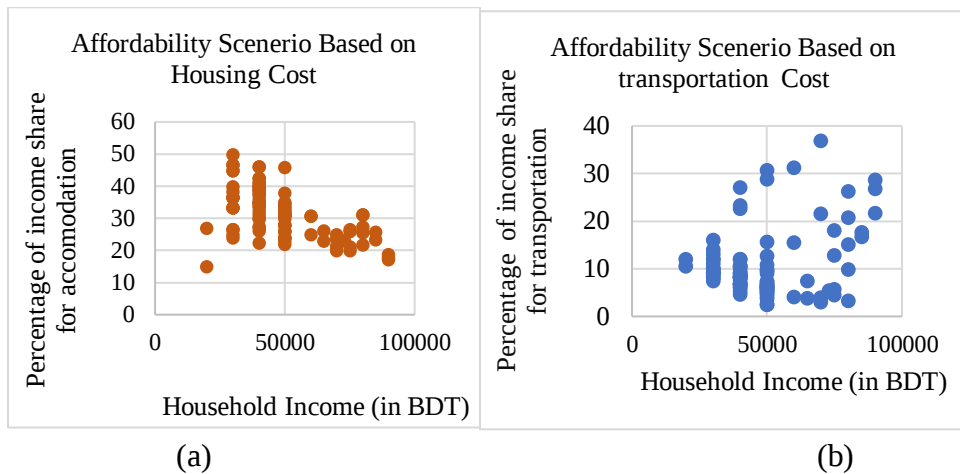


Figure 3: Affordability scenario considering housing cost (a) and transportation cost (b)

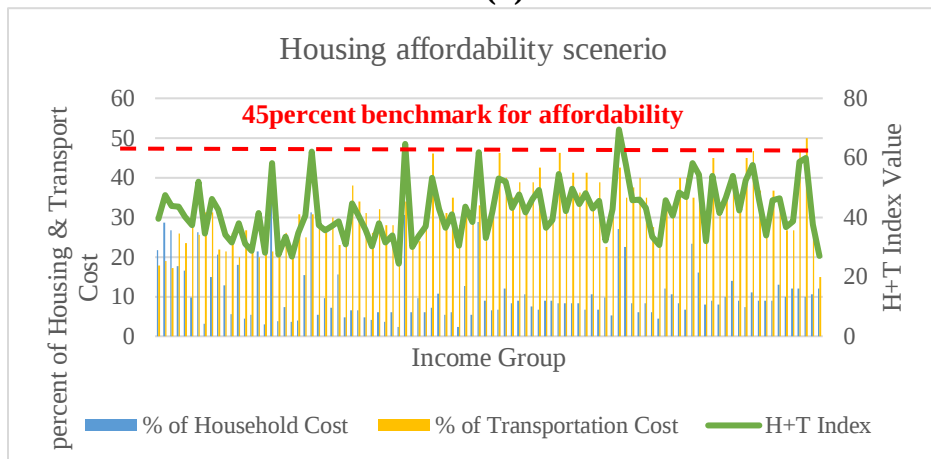


Figure 4: Affordability range based on H+T index

For N. Smith (2010), gentrification is the structural product of land and housing markets. The rent gap is the difference between the actual value and the potential value of the parcel (Neil Smith, 1987).

The above affordability scenario is based on the current actual value which has a huge potential to raise after the completion of the MRT. As data find people residing in these areas are mainly fall into the lower to upper middle-income range. That could be a huge

threat to underpin gentrification considering the current rental pattern and affordability scenario.

More Redevelopment Potential will Cause More Threat of Gentrification

Transit induced gentrification or displacement issues arises in already urbanized area where major redevelopment take place (Rayle, 2015) for developing high density neighborhood with diverse land use and good pedestrian friendly urban design. TOD around existing transit stations is quite complicated. However, TOD always implies certain type of development in qualitatively different form structure it replaces, hence serve to designate areas for investment and coordinate policies to create compact development (Rayle, 2015). Spatial analysis found that, all the five case stations has huge potential for redevelopment. About 61 percent structures can be categorized for redevelopment because of its temporary building material and for being only one storied, shows in following figure (Haque et al, 2019). Existing policy allows 12 stories for housing in TOD precinct (RAJUK, 2018). Since average number of floors in study area is around 3 storied and policy guideline shows direction for increasing building height. It is predictable that redevelopment in this case study area is admissible and certain redevelopment could be possible through collective initiatives from land owners, developers and development authorities. Based on the potential (re)developable criteria such as building material, construction type (fully permanent material used as semi pacca or totally temporary material based as katcha), among 2555 structures from the marked area, 1775 structures are potential for immediate (re)development.

Table 3: Existing (Re)developable Land in Case Study Area

Potential (Re) development criteria	Selected 5 Case stations of MRT line 6				
	Pallabi	Mirpur-11	Mirpur-10	Kazipara	Shewrapara
Number of Vacant Plots	88	67	70	124	95
1-3 storied structures	7864	9572	6227	8060	7462
Structures of temporary materials	5411	6996	4421	6181	5960

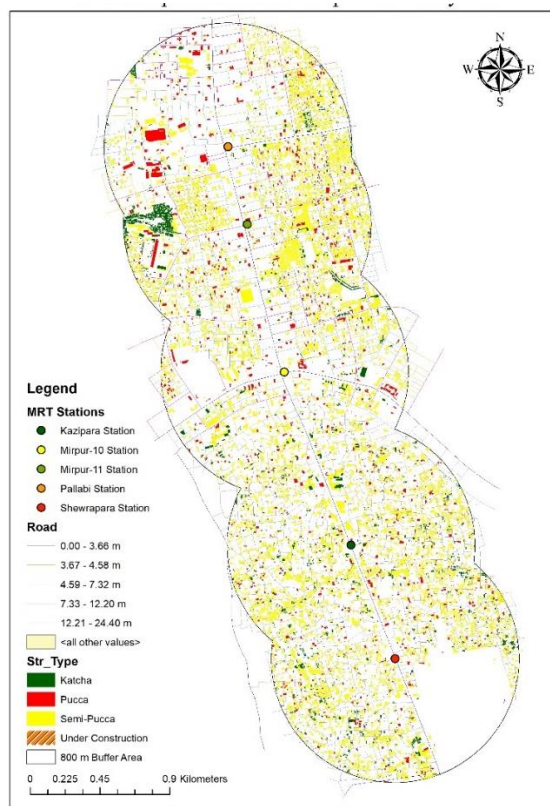


Figure 5: Available (Re)developable Land in Case Study Area

According to the rent gap theory, (re)development of the area may help the underdeveloped land to meet their potential value and areas with less development potential may results in very few displacements, which may promote gentrification (Haque et al, 2019). Table 3 shows the redevelopment potential for each five stations. In terms of vacant land Kazipara and Shewrapara has the maximum potential. Mirpur 11 and Kazipara has the maximum number of buildings which are 1-3 stories height. Moreover, all the case stations have significant number of structures with temporary material (shows in Figure 5) that can be redevelop immediately. These high amounts of redevelopment potential may result in more gentrification unless inclusionary development/redevelopment plan is being adopted.

Transit Cost will Offset Housing Cost that may Lessen Gentrification

Another possibility that put forward by Rayle (2015) is that, extra housing cost sometime offset by lower transportation cost which may not displace low-income residents. A significant study reveals a paradox that TOD neighborhoods are more expensive by accommodation costs but more affordable than hybrid and transit-adjacent-development neighborhoods due to the lower transportation cost offsets housing costs (Renne et al., 2016). Theoretically, household with easy access to public transit are able to spend less on transportation and thus can spend more for housing (Kilpatrick, Throupe, Carruthers, & Krause, 2007). Residents near the city center pay comparatively more for housing and less for transportation as well as they choose the location through trade off housing cost for commuting cost (Conventional location theory: Alonso, 1964; O'sullivan, 2007). TOD literature proves that the introduction of rail transit likely to underpin the upward pressure on house prices (Marlon G Boarnet et al., 2017). So, the H+T index affordability range which implies that 36 percent housing that are affordable now probably will not be affordable in future after introducing the MTR. Here comes the issue of travel behavior; people are likely to use mass transit or not. The travel behavior pattern of the study area reveals about modal choice, willingness to spend for transport cost (Figure 6 a and b) is a vital criterion for measuring the probable offset. Study found around 82 percent respondents use public transportation as their major mode of travel. 11 percent of them have their own automobile and use that. Beside this around 7 percent of them use different ride sharing like Uber, Pathao, etc. Though people are interested in using MRT for several reasons like safety (31 percent people), saving time (95 percent people), for avoiding traffic congestion (88 percent people), the ultimate number of rideshare will depend on the fare as well. Study also revealed that 61percent people are willing to pay 0.12 to 0.25 USD (converted from local currency: 1USD = 80 BDT) fare for per kilometer. However, it is still unclear whether people will use MRT or not if the fare rate exceed their current cost of travel though public bus.

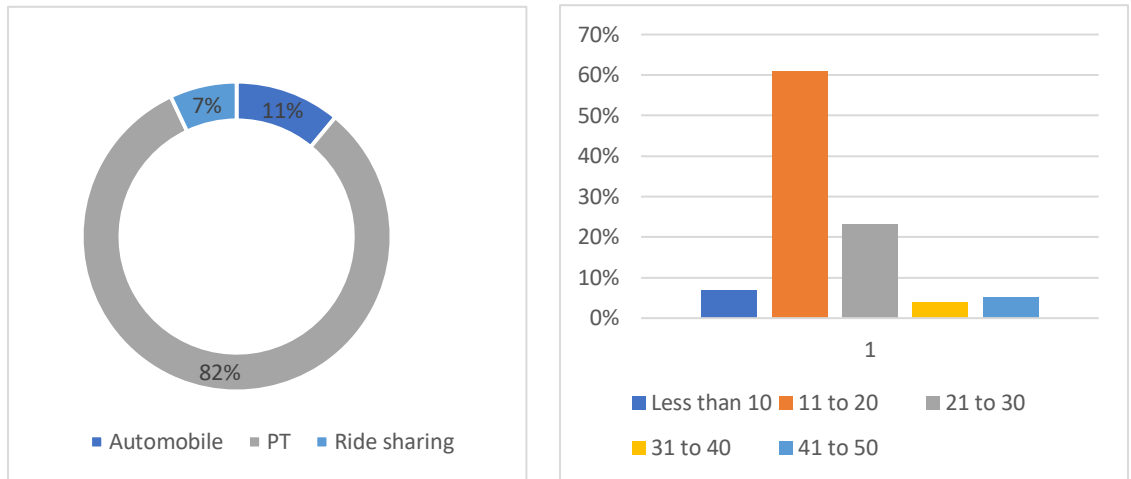


Figure 6: (a) Modal Share and (b) Willingness to Pay for MRT (at Local Currency)

If the new transit improves accessibility, then the existing residents will need to pay less for their transport, or they may have greater access to jobs that will increase their income. This effect may not always be sufficient to offset the increases in housing cost (Rayle, 2008) and will depend on the market response and socio-economic feature of that particular context.

Inclusive Policy may Reduce Gentrification or Vice Versa

Most of empirical studies indicate that TOD increase land value close to station areas and transit corridors (World Bank, 2019). Many communities have incorporated different affordable housing and inclusive policies into TOD plan to ensure affordable housing within TOD precinct (Dawkins & Buehler, 2010). However, in the context of Dhaka city, housing policy and even public housing projects were never being able to go for inclusive approach.

Dhaka housing market currently serves primarily the upper and upper middle-income households. Most of the people in the city do not own any land and managing by renting in unplanned urban periphery or by illegal occupancy (RAJUK, 2016). According to current housing market price over 78 percent of the lower middle-income group as well as 71 percent of the middle-income group families is being unable to afford housing in the city (RAJUK, 2016). Only 5 percent of lower-middle income group and 22 percent of middle-middle income group have access to affordable housing (Jahan & Kalam,

2012). Annually against the 120,000 new housing demand, the units of supply are only 25,000 (Zahur, 2016). Moreover, housing sector is dominated by private developers who share 93 percent of the total supply, public sector's share is only 7 percent including government quarters (BIGD, 2017; RAJUK, 2016). Low-income groups receive a minimum share in public housing project. About 3.5 million low-income people are living in 4000 slums and squatters and about 52,000 floating people without any shelter (BBS, 2011). National Housing Authority of Bangladesh (NHA) has provided 15,704 housing units for lower income groups but the recent projects area being unaffordable (RAJUK, 2016). Housing price and allotment mechanism is being hardly accessible for lower income group as they are getting minimal share (RAJUK, 2016). Table 4 represent the three major housing projects of RAJUK that fail to ensure the share of lower income people.

Table 4: Lower Income Housing Share in Planning Initiative

Housing projects in Dhaka city	Share for lower income people (in percent)
Purbachal	4.3 (110.46 acres)
Uttara 3 rd phase	7.5 (40.51 acres)
Jhilmil	1.2

Source: RAJUK, 2016

Dhaka Structure plan defines housing affordability by considering low to moderate income people's paying capacity along with other living costs. National Housing Policy, 2016 specifies housing strategy by linking priority of housing in national level development plans as well as land supplying in reasonable price by assisting and promoting housing finance institutions. Though NHP, 2016 initiated for affordable housing for lower and middle income people, still now there is no ray of such kind of problem addressing by government (BIGD, 2017). On the other hand, RAJUK took initiative for housing development for privileged portions like government officials, ministers, MPs and high income groups (BIGD, 2017).

Government's failure of providing affordable housing for fastest growing population has created logjam as well as power exercising by informal sector for housing delivery. According to BBS, the backlog of dwelling units in 2015 is 0.76 million (RAJUK, 2016). An analysis on urban slum reveals that 89 percent of urban poor of the city are living in one bedroom houses on an average floor space of 13 ft for per person (BIGD,

2017). The SOC housing survey, conducted by BIGD also depicts that 32 percent of formal residential households are owner occupied, and the rest 68 percent residents are living in rented properties. World Bank emphasizes that improvement of accessibility and productivity are key external gains from transit investment and capitalized into land values near transit facilities which often leads to gentrification (World Bank, 2019). It is essential to mitigate the negative impact of gentrification by providing affordable housing in areas well connected to transit. An inclusive approach of policies may speed up TOD strategy to help existing workers adjust to new job demand by developing job opportunities and training suitable for them as well as responding to the needs of a TOD community (World Bank, 2019). World Bank suggests state and local government's initiatives to preserve the federally subsidized affordable housing stock in gentrifying areas (World Bank, 2019).

Discussion and Conclusion

MRT line 6 can be an effective tool for accomplishing redevelopment and results in potentially gentrification. Proximity to transit theoretically associated with higher land price and property value (Banister & Thurstain-Goodwin, 2011; Dueker & Bianco, 1999; Kilpatrick et al., 2007; Lakshmanan & Chatterjee, 2005; Sagar, 2010; Wardrip, 2011; Yeh et al., 2005). Yet, context matters: overall impact of transit on housing price underpin by different factors like housing tenure and type, reliability of transit system, strength of housing market, nature of surrounding development and so on (Wardrip, 2011). Area with strong housing market and reliable transit system will bring higher premium than average, furthermore impact may vary for different stations. For example, may have little or no impact in some neighborhood but a significant impact on others (Wardrip, 2011). Even some time simply transit expansion plan could drive increases in property values before anything is built (Knaap, Ding, Hopkins, & Research, 2001). The findings from this study be interpret from different point like the current socio-economic status, housing situation and affordability, future development possibilities as well as policy gap that need to be addressed properly to ensure effective planning of TOD. Data set reveal low housing ownership. Despite the poor quality of the current transport, a significant number of people use public transport for their regular commuting. This could be good sign for future mass transit ridership whereas different countries struggle to reach their threshold rider. However, this scenario could change if the fare system doesn't meet the market expectations. The shadow price for this fare ranges between current automobile using cost to as low as zero. Another interesting

finding is the vulnerability of the lower-middle and middle-middle income group to be gentrified. Rather than lower income class, lower middle and middle-middle income group show more unaffordable characteristics in terms of H+T index. As lower income group are more likely to use public bus or walking, the combine cost of housing plus transport is lower for them comparing to the lower middle or middle-middle income groups. On the other hand, housing policy of Dhaka always fails to ensure affordable housing for all income groups.

There are different driving forces that will decide the intensity of transit impact on land value of Dhaka. However, considering the empirical scenario we cannot deny the fact that there is a huge chance of gentrification that need urgent consideration for effective TOD planning. As the cities of developing countries are rapidly growing, opportunities for linking land development and transport infrastructure should not be ignored (Harumain & Morimoto, 2013). TOD literature unveils that in many developing cities land use change, including rapid growth, rising real income, enhance congestion level are the prerequisite if mass transit investments are to trigger meaningful way (Suzuki et al., 2013). This of course assumes that there is supportive planning, public sector leveraging and the capacity to control the land use are put into motion by transport infrastructure investment (Cervero, 2013).

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