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Tod for Improved Urban Livability: Opportunities for Dhaka City

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Abstract: Transportation infrastructure often shapes a city's urban form. Thus, the social, economic, and environmental elements, as well as the quality of life, are all influenced by a city's transportation infrastructure to some extent. Considering this subsequent benefit planners and policy makes around the world are adopting Transit Oriented Development (TOD) as an effective mechanism to bring the synergistic benefit to ensure improved accessibility along with improved livable environment around the stations. This study has a quest to explore the relationship between TOD and livability. Furthermore, this tried to look at the livability improvement opportunity of Dhaka through TOD planning around MRT stations. Mirpur 11 were considered as case station to explore the opportunity spatially under the mutually exclusive variables (Density, Diversity and Design) from both TOD and Livability theories. The findings revealed a huge opportunity of livability improvement if the TOD elements are crafted and planned carefully.

Keywords: TOD, Livability, Spatial analysis, Urban form.

1. Introduction

The current trend of socioeconomic development is inducing rapid world urbanization with advanced technological progress in determining the shape of today or even tomorrow cities (Newman, Beatley, & Boyer, 2009; Newman & Kenworthy, 2015). Simultaneously, creating a burden on urban sustainability and livability (Wey & Huang, 2018). As per estimation, more than 60% of the world's population is expected to reside in cities by 2030 (Zhuo et al., 2020). This upsurge of the urban population will put a huge strain on the city's infrastructure as well as the environment. The stress on urban infrastructure and the environment has a negative impact on the livability of cities (Bigio & Dahiya, 2004).

A city's transportation system has a significant impact on the social, economic, and environmental aspects as well as the quality of life (Wey & Huang, 2018). For the past few decades, urban planners have been looking for an appropriate mechanism to handle this pressure in the banner of transportation and land use coordination. (Appleyard, 2005; Moore et al., 2007; Appleyard, 2011b; Cervero, 2013). Transport land use integration is indeed a crucial component of planning strategy for assuring access to livable cities (Appleyard et al., 2014; US EPA, 2016; Moore et al., 2007). Realizing it is subsequent importance, Transit-oriented development (TOD) is creating buzz as an influential planning concept over a few decades (Haque, 2019). Several countries have adopted transit-oriented development as a long-term planning strategy for ensuring viable dense urban form with efficient growth management without sacrificing the quality of life

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(Lang et al., 2020). Transit-adapted development is a key factor for allowing livability and sustainability to grow which makes results like city transformation. By creating mixed-use neighborhoods, TOD emphasizes improving the "quality of life". It accommodates compact growth by a careful mix of housing, public spaces, commercial hubs that helps to attract social diversity and affects positively communities (Smith, 2015).

TOD has the potentiality of livability improvement in any area, whether for the residents of that specific entity or for those who are coming for the amenities being offered due to its emergence (Noland et al., 2014). An efficiently integrated transit system with land use can shape a city with well-designed pedestrian facilities and a livable environment (Calgary, 2004). Besides, TOD ensures well accessibility (Atkinson-Palombo & Kuby 2011; et al.) and a less polluted urban environment that promotes sustainable urbanism (Furlan et al., 2019). This mechanism allows individuals to be independent of the automobile inviting high-density activities around transit stations within walking distance (Furlan, 2015, 2016a; Furlan & ElGahani, 2018; Furlan & Faggion, 2017; Furlan & Petruccioli, 2016). Similarly, this development strategy reduces transportation congestion, fossil-fuel-based energy consumption, and pollution (i.e., carbon emissions and other greenhouse gases), which subsequently improves the livability of cities. Case studies of entities from USA like Cranford, Morristown, and Rahway had observed livability improvements in terms of TOD through several approaches such as- redevelopment, expansion of mixed use (Noland et al., 2014).

According to World Bank, almost 38 percent area of total Bangladesh is now having urban characteristics and right now the capital Dhaka accounts for one third of total country's population, one third of all jobs and one fifth of national GDP. Dhaka is denser than any Mumbai (310 pph) with 440 persons per hector (John et al., 2019; Ede & Mason, 2018). In case of livability of Dhaka city, recent studies of EIU reveals that Dhaka have been ranked 137th among 140 cities based on the parameters as stability, health, culture and environment, education and infrastructure (Alam, 2021). It can be more sordid if EIU added the factor housing (Khan, 2021). Unanimously, Dhaka city shows uncontrolled and spontaneous urbanization and spatial development (B. Ahmed, Hasan, & Maniruzzaman, 2014; S. Ahmed & Bramley, 2015; Kabir & Parolin, 2012; Khan & Siddiqua, 2015; Mowla, 2012). The lower livability of Dhaka is disproportionately affecting vulnerable population. Public transport and inadequate infrastructure making traffic congestion endemic and unbearable for people day by day and contributing to lower livability (John et al., 2019).

For making Dhaka more livable, there is a lot to do in terms of urban services for ensuring the quality of life. To resolve the challenges of planning as- affordable housing, inadequate public transport facility, inflexible regulation and many more, it's needed to apply new kind of approaches as well as investment techniques. TOD is being considered as one of the tremendous concepts for rebuilding the urban fabric of Dhaka (Mason, 2020).

The study is an attempt for emphasizing the potentiality of livability improvement after TOD implementation in the context of Dhaka and has tried to explore the research question; what are the opportunity of urban livability improvement through TOD planning in Dhaka?

4. Research Method

This study adopted both qualitative and quantitative approaches. Various literature on TOD and urban livability has been reviewed to explore the relation between the two. The first part of analysis is based on literature review which is a qualitative one and tried to look at theoretically how TOD can improve urban livability. For the second part of analysis, one of the MRT 6-line station "Mirpur 11" was considered as empirical case. Line 6 is selected because this is the only line under construction and Mirpur 11 is considered as case station because of data availability. This part of analysis focused on spatial elements that are theoretically connected to both TOD and livability: residential density, commercial density, building height, land use diversity, pedestrian and cycling-friendly design, public places availability, etc. to explore the potential of TOD in improving the livability of Dhaka. Spatial analysis tool of GIS 10.5 was used to analyze the data. However, the concept of TOD is very new in Bangladesh. Although the application of TOD is very context sensitive (Haque, 2019), very few studies on application of TOD in Dhaka context can be found. Therefore, lack of secondary data was a major limitation for this study.

3. Quest for Exploring the Relationship Between Tod and Livability

3.1 Concept of tod

The concept of TOD was traced firstly by John Nash in 1811 through the master plan of Blaise Hamlet for Easter worker in Bristol, England. However, Peter Calthrope formally labeled the concept as TOD in his 'the next American Metropolis'. Since then, this approach is being used for countering urban sprawl (Gihring, 2009) and integrating diverse land uses with transit system (Calgary, 2004) especially in the North American context.

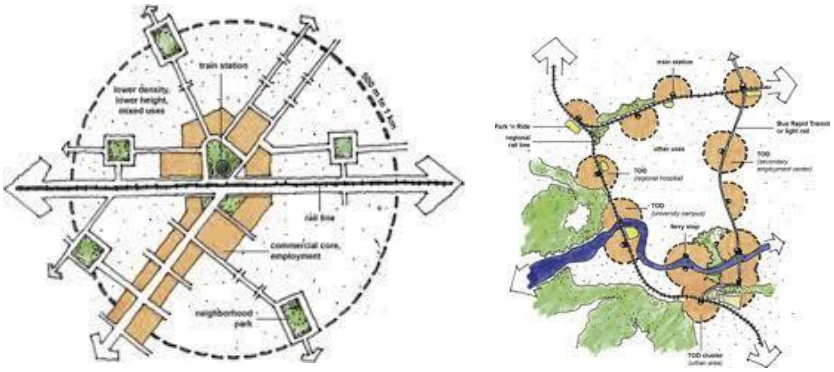


Figure 1: Example of TOD design
Source: Pojani and Stead, 2018

According to Peter Calthorpe (1993), TOD is a mixed-use community located within 2000 feet (ten minutes walking distance) around a transit stop and a core business hub. Here, the maximum distance was the distance from where most people were willing to walk to a station. This is the area where residential and other land uses have a higher chance of using transit (Calthorpe, 1993).

Later, Cervero identified variables of built environment in TOD which are potetial to embrace urban livability goals namely density, diversity and design (Pedestrian and cycling friendly) (Cervero & Kockelman, 1997). Additionally, the performance of TOD are measured in six criteria namely Locational efficiency, value recapture, livability, return on investment, variety, and efficient regional land use patterns (Belzer & Autler, 2002). Dittmar and Ohland (2004), claims that the integration of transit and surrounding development, promotes synergies among possible uses, resulting in a more comfortable community around transit stops.

Recently, definition of Suzuki, Cervero, and Iuchi (2013) explore that TOD as having two primary characteristics: closeness to transit stations and a functional relationship with them, as well as service provision by high-quality public transportation and compact, mixed-use buildings and neighborhoods. They claim that TOD planning isn't only about constructing a new transit-oriented development but also imply TOD facilities to areas where a development already exists (Suzuki et al., 2013). Thus, all definition of TOD is concerning with place making in the name of density (increasing density around stations within a 400-to-800-meter radius), diversity (mix land use, variety of housing and commuting choices) and pedestrian friendly design.

3.2. Concept and Significance of Livability

The concepts of livability, sustainability and resilience are core principles for making better living environment. While sustainability ensures a comprehensive approach to improve quality of life at all levels by maintaining holistic presence of economic, social and environmental goals, resilience comes with survival, adaptation and evolution; livability is considered a subset of sustainability and resilience which impacts the community level with more emphasis on the quality of life. Lack of interconnection among these concepts in policy making and community planning process often hinder community efforts to achieve sustainability, livability or resilience goals. Few cities have been able to ensure great livable communities but only limited to wealthy members, whether a few resilient communities do not offer livable places. Thus, a comprehensive approach is needed to combine each concept (Hamad, 2020).

Sustainability is considered to understand hardly rather than livability due to its critical operational management and implementation, whereas resilience can be accomplished only with specific mechanism. Application of sustainability or resilience is often conflicted where livability consecutively brings sustainability with time. Livability is rather a fluid concept which may bring sustainable and resilient vision with time by balancing long term social, economic, environmental concerns in community level with great values (Gough, 2015; Hamad 2020).

The basic requirement of livable cities assembles the synergy, and the considerations of multiple dimensions respective with the natural and built environment. Higher density, mixed residential tenures, the walkable urban enclosure that provides equal access to services are some pre-requisites for a better-built environment of livable urban space (Kashef, 2016).

Livability comes in modern transport policy in terms of safety, attractiveness, and a delightful environment that reflects the impacts on movement, places, and society as well. In transportation planning, the idea of livability resembles better transportation

facilities for achieving access to affordable housing, employment opportunities, advanced community facilities, etc. (Anciaes & Jones, 2020; Rue et al., 2010). The development of high-quality infrastructure contributes to fostering economic development and urban design which offers people a wide range of commuting options like public transportation, private vehicles, and many more. This attribute strategically connects several modal pieces like roadways, transit services, bikeways, and pedestrian facilities (Furlan et al., 2019).

Several scholars have considered urban livability as a unique design process. The International Making Cities Livable Conference (IMCL) focused on reviving city center with a compact form of urban neighborhood with public accessibility to every single community facility as-market, festival or much more. They have put the limelight regarding livability discussion into the necessity of functional mass transit, individual bike or bicycle lane, child friendly urban space as well as mixed use urban fabrics (IMCL, 2020). According to Economist Intelligence Unit (EIU), the concept of livability is simple which emphasize on the best and worst living condition and thus the assessment is conducted by setting benchmarks in several categories. EIU assign the rating by considering thirty qualitative and quantitative factors across five broad categories: stability, healthcare, culture and environment, education, and infrastructure. The "infrastructure" category complies the quality of road network and public transport of any city (The Global Livability Index, 2021).

The conscious development of public transport or mixed used communities within a 10-minute walking distance (2000 ft) of a transit stop is a comprehensive strategy of urban design. Through these approaches, TODs present a mixture of all types of land usage like residential, commercial, community facilities and open space in one platter with a better accessible environment. This kind of measures are an attempt of enhancing livability and quality of life. In other sense, this type of initiatives also contributes to the prevention of urban sprawl and automobile dependent cities. Thus, the thought of TOD is one of the most convenient ways for successful livable urban development (Calthrope 1993; Furlan et al., 2019). Density, mixed use developments and hierarchy of centers have been applied for sustainable techniques of ensuring livability and quality of standards in countries like Qatar (Doha), USA (Charlotte).

Zhang (2007) and Zhan et al (2016) explore safety, health and convenience as the first-class indicators for measuring livability; Wang (2010) added natural and economic environment, and Wey & Huang, (2018), added urban spatial structure, ecology, traffic system. Mowla (2004), identified pedestrian facilities, public places, affordable housing as the major indicators of urban livability. The indicators and key principles of TOD density, diversity and the pedestrian friendly design (Cervero & Kockelman, 1997) have been elaborated to show the relation between TOD and urban livability; as well as for analyzing the potentiality of livability improvement in the case of Dhaka.

3.3 Association between TOD and Urban Livability

Scholars in the field of urban planning argue that livable cities to promote a healthy environment are founded primarily on two criteria i.e., the basic need (clean air and water, energy, and waste management) needs to be met first, and then the quality of life must be ensured. In developing countries, due to the low standard of living in

metropolitan areas, better livability is a crucial issue that requires attention (Yeun B. and Ooi G.L., 2009). Common indicators of livable cities are- safety, health (Zhang 2007, & Zhan et al. 2016), spatial structure, ecology, traffic system (Huang, 2018) and economy Wang (2010). More specifically it can be said that some attributes of livability are also closely related to TOD key performance. Social interaction places, infrastructure, public services, good connectivity, natural environment, safety, education, healthcare, cultural environment, recreation, shops, housing options, cleanliness, walkability and distinct characteristics are symbol of livability for a community or city explored by the scholars (Ranson, 2013). These attributes can be divided into individuals' preferences or urban environment, but both are related to mobility. A model developed by Gyori and Barona (2019) has considered mobility as a key element that connects TOD and livability. Figure 2 is the graphical illustration of their model which reflects the relation between key principles of TOD as well as can play a role in improved urban livability.

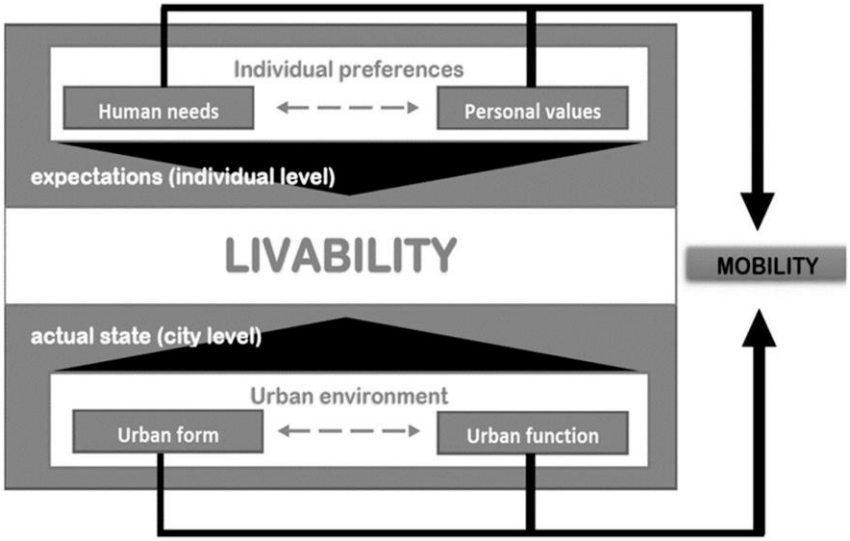


Figure 2: Connection between Urban Livability and Mobility
Source: Adopted from (Kovacs-Györi & Cabrera-Barona, 2019)

Similarly, livability measuring approaches also look at indicators like property values, number of housing units, new housing developments, and business activities which are also associated with TOD impacts. The potentiality of redevelopment characteristics like the existence of vacant plots or underused buildings is a matter of concern that needs to be dealt with carefully for urban sprawl prevention as well as for ensuring livability (Balsas, 2004). TOD also eradicates this challenge through the best usage of this type of parcel by enhancing redevelopment opportunities (Haque et al., 2019).

No matter by what means, people travel and they end up as pedestrian on urban side-walks and therefore ultimate limit on the smooth functioning of an urban area is its provision for pedestrian circulation (Bigio & Dahiya, 2004). Thus, improved livability is another meaning of improved pedestrian facilities. Bigio & Dahiya, (2004), also put strain on feel of community as an important indicator for urban livability. Livability in transportation-related studies has been also described as the introduction of pedestrian-

friendly cities. A case study of Thomas Jefferson Planning District near Virginia, USA addressed some amazing livability indicators as a part of their transportation planning initiative. Community elements like mixed use of buildings, building proximity and scale, internal path, and external connectivity have been measured for assessing the quality of the community. The concentration of new housing units within 5 minutes walking distance of transit station, percentage of commuters using public transit and number of increased pedestrians are the aspects that have been expected to ensure livability (National Research Council, 2002).

Now-a-days transportation agencies are focusing on the relation between transportation and housing in terms of affordability for following the new livability principles. The larger locational affordability thus indicates the greater livability. "The FasTracks steamed project" by the Denver council was an initiative for developing a comprehensive public transit system for promoting livability by incorporating compact, mixed-use developments with a transit-friendly environment with more affordable housing (Rue et al., 2010).

The high density of local commercial economies of scale (Haque, 2019) contributes to an affluent economy in the context of TOD. Besides, smaller blocks, buildings adjacent to the street with entrances that immediately connects to the public walkway, retail on the ground level with businesses and homes above, and easily accessible transport stops with nice waiting areas provide added convenience to pedestrians (Belzer, Autler, Espinosa, Feigon, & Ohland, 2004; Calthorpe, 1993; R. T. Dunphy et al., 2004; Goodwill & Hendricks, 2002). Simultaneously this improves the social interaction, feel of a community.

Diversity of land use increases the ease of access to schools, libraries, public spaces (Cervero & Arrington, 2008), housing affordability and transportation. A high level of variety improves the station's locational efficiency, allowing it to accommodate new development and, as a result, increase transit usage, pedestrian traffic, bicycle traffic and accessibility (Norley, 2015; Sun, Webster, & Chiaradia, 2017). Thus, accessibility to public transport increase and housing cost is offset by reducing transportation cost (Rayle, 2015). In this kind of situation, people become more inclined to walk or bicycle riding by getting a pleasant environment where they feel safe (Haque, 2019) and that is another significant aspect of TOD.

To discourage the use of automobiles or other private modes of transportation, and the potential for inner modality increases parking is typically kept limited (Black, Tara, & Pakzad, 2016) which develop ecological aspect. In a nutshell, it can be said that, in the whole process of TOD, livability around the station is most often a significant concern followed by the reduction of congestion and improved environment (Abdullah & Mazlan, 2016; Luca Bertolini, 1996; Cervero & Sullivan, 2011) as it tries not only to create a transit 'node' but also to make a 'place' to live (Haque, 2019).

4. TOD as key to urban livability of Dhaka

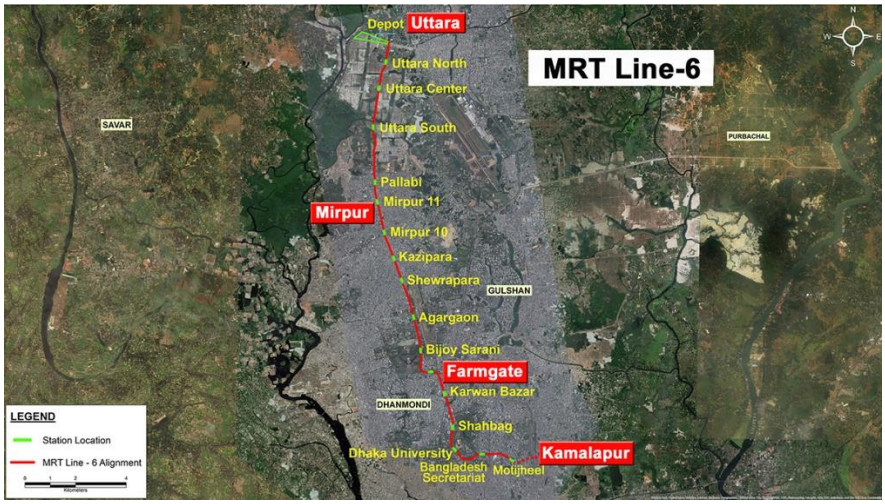
BIGD (2016) conducted a survey to identify the significant reasons behind traffic congestion of Dhaka city which outlined the causes as such- haphazard parking, private vehicle occupying pattern, and violation of enormous traffic rules. Lack of traffic

management, consecutive rising demand of private transport due to safety and comfort issue, overlapped involvement of 30 agencies for transport management has made the overall scenario critical (BIGD, 2016). This study recommended the inclusion of high-capacity public transport along with the governance of the transport sector with extensive traffic management measures for reducing the uninhabitable condition of Dhaka.

Making the streets of Dhaka "livable" is challenging due to the struggle for finding a solution that can improve space and safety, by which walkability can be enhanced for pedestrians. In an already congested traffic patterns, interim approach is essential for launching elements that would bring favorable public space and travel behavior simultaneously by not bringing any hard limits. The prevailing nature of mobility, heavy interlink with social, economic and cultural contexts forces to consider detail design and strategic approach (Belinda & Vallejo, 2018). Experiences on TOD from countries like United States reflects the inclusion of land use and transportation planning with supportive policies and funding that enabled a livability raise by ensuring sustainable growth of job, housing and transportation economically (Department of Transportation, U.S. 2009).

TOD is the kind of mechanism being suggested for solving this travel obstructions along with for safeguarding the remaining contexts. For resolving the traffic problem of Dhaka, TOD has been recognized as primary tool (STP, 2005). Dhaka can be a great context for TOD establishment due to its dense urban characteristics as more than 800 persons per acre in inner urbanized districts. Since TOD is a concept of modern urbanism for bringing residential, commercial and recreational activities in one individual platter, the very famous congested nature of Dhaka justifies the inclusion of this mechanism (RSTP, 2015).

The draft Structure Plan (2016) proposes TOD around the stations along the line 6 corridor (RAJUK, 2016). MRT line 6 will connect the northern peripheral area to the CBD through 16 stations (RSTP, 2015; STP, 2005) which is under construction. The completion of the mass transit is expected to bring a huge land use changes around the stations. Although all the 6 proposed MRT lines would be constructed as per the recommendations from RSTP (2015), MRT line 6 is comparatively the most accomplished route in terms of construction which has completed almost 88.94% of the total construction work from Uttara to Agargaon station part (DMTCL, 2021). This progress has already required appropriate planning initiatives for the completed TOD stations to avoid scattered growth or minimizing the risk of uninhabitable conditions.



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

5. Case Study for deriving TOD as the technique of livability improvement

Empirical studies on case station (Mirpur-11) 800-meter buffer zone reveals that the major issue of livability lying in these areas is housing affordability, lack of open space and parks, lack of pedestrian facilities, absence of cycling facilities, etc. Transport and communication includes only secondary and access road with width of 3-15 meter (Haque et al., 2019) and absent of dedicated lane for cycling. Spatial analysis shows that, residential density is of these case stations are 41601 dwelling per sq.k.m (using entropy method), diversity level is 0.69 and walkable/cycle road length is 58.36 k.m., Average building height (number of floors) is 2.31. Commercial density is around 1314 which reflect a good number.

Table 2: TOD indicators value from spatial analysis

Variables	Measuring indicators	Mirpur 11
Density	Residential density (DU/km²)	41601.10
	Commercial density (number/km²)	1314
	Building height (average stories)	2.31
Diversity	Land use diversity (entropy)	0.69
	Percentage of plaza, park and open spaces/ km²	1.93
	Percentage of others facilities/ km²	3.12
Design	Total road length (in km)	65.28
	Average road width (in km)	0.00204
	Walkable and cycle able path (in km)	58.36
	Footpath length (in km)	42.07

Source: Spatial analysis based on DAP dataset, 2019

On the other hand, empirical investigation (according to RAJUK, 2016 guideline) around case station reveals that open space, health facilities, community facilities, institutional spaces and commercial spaces are respectively, 1.24%, .03%, .81%, 2.71% and 4.97% of the total area which is below the standard.

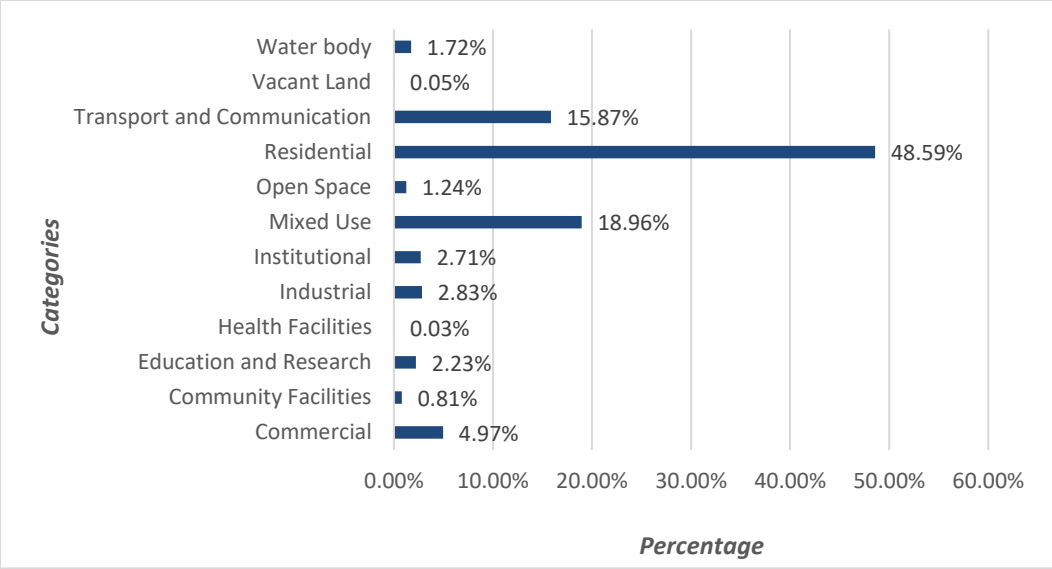


Figure 4: Percentage of Various Land use around Mirpur 11 station

Source: DAP, 2019

Low average building height, lack of walkable road, higher land use diversity, less amount of commercial, institutional, and open space in the study area shows a greater opportunity to redevelop as TOD that may further results in improved livability of the area. Housing study of the Mirpur 11 area shows the current unaffordable situation which is at the same time a good opportunity for real estate development. Detail Area Plan (2016-2035) allows flexibility for building height, land use diversity, pedestrian roads in TOD area. Haque, 2020 through 77 household interviews revealed that the study area has only 18 percent of housing ownership. The rest 78 percent lives in rented house and the average per square feet house rent is 1180 which is quite high.

Table 2: Housing scenario of Mirpur 11

Occupancy Type	In percentage
1. Owner	18
2. Rented	78
Average house/flat size (in sq. ft)	1,310.39
Average space (in sq. ft./person)	327.59
House rent per 100 sq. ft. (in BDT)	1,180

Source: Haque, 2019

Under the cultural context of Dhaka people are more likely to stay in the same neighborhood as they share a good bondage with the community or neighbors around (Satu, 2014). Transit accessibility will tend to attract more people from the other part of the city, which along with the current residents combinedly will help to achieve desirable density. Thus, could be positive sign for densification within future TOD precinct. Existing rental pattern of the study area reveal that, the share of house rent to the total household's income is more than 30 percent for 55 percent of the respondents. Therefore, 45 percent of the households within TOD precinct are within the affordable range in terms of house rent (Haque, 2019). Globally much evidence confirmed that, transit has a positive impact on land value, commercial rent and trend of development (Debrezion et al., 2007; D. B. Hess & Almeida, 2007; Kilpatrick, Throupe, Carruthers, & Krause, 2007; Olajide, 2015; Salon & Shewmake, 2011; Xue & Sun, 2018). Thus, drive the real estate market (Belzer & Autler, 2002; Curtis et al., 2009). According to the economic theory, users will be willing to pay more to locate nearer to the stations (O'Sulivan, 1996). Private real-estate developers are the primary contributors to the housing supply in Dhaka which is around 93 percent of the total (RAJUK, 2016). Unaffordable housing markets indicated huge potential for real estate development and redevelopment around case stations which may lead to the better living environment or improved livability if planned in proper way.

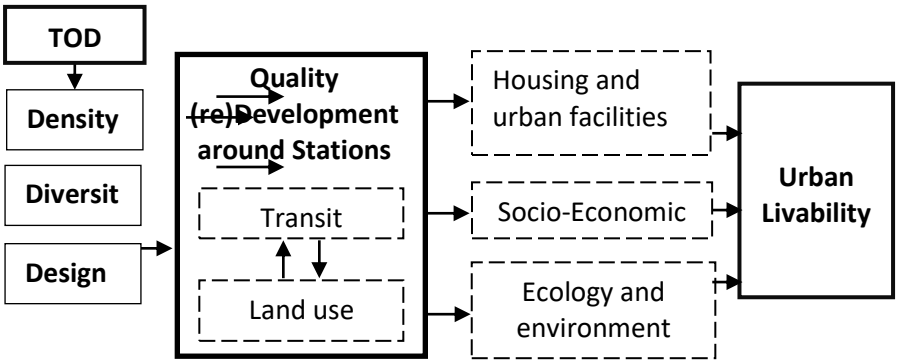


Figure 5: How TOD Embrace Livability

Source: Author adopted from literature

Planned transit projects around MRT stations and surrounding aspects like jobs, affordable housing set stable oasis which supplements public and private infrastructure and thus it supports livability. Transit station surrounding areas often offer a great variety of choices to residents like mobility needs for personal business, job and recreational purposes through TOD planning. Thus, the multi-use developments by TOD contribute to the long-term sustainability and enhance livability.

6. Conclusion

Inclusive TOD can counter poor condition of cities that are suffering from lack of greenery, ecological problems, traffic congestion, sprawling, and unaffordable housing and so on. Traffic congestion in roads significantly impedes the accessibility, resulting in

declining livability impact of land use change. Introduction on of new infrastructure through TOD may increases supply of affordable housing, optimum level of density, land use diversity with adequate park, playground, pedestrian facilities which are the core concern of TOD planning. The case station shows opportunity of TOD. Effective TOD planning will improve the density, diversity, design and housing supply. Thus, in turn will result in improved livability.

References

Anciaes, P., & Jones, P. (2020). Transport policy for livability–Valuing the impacts on movement, place, and society. *Transportation research part A: policy and practice*, *132*, 157-173.

Atkinson-Palombo, C. (2011). Comparing the capitalization benefits of light-rail transit and overlay zoning for single-family houses and condos by neighborhood type in metropolitan Phoenix, Arizona. Urban Studies, 47(11), 2409-2426.

Balsas, C. J. (2004). Measuring the livability of an urban centre: an exploratory study of key performance indicators. *Planning, Practice & Research*, *19*(1), 101-110.

Belinda Tato, & Vallejo, J. L. (2018). How to make streets livable in the traffic-packed city of Dhaka. Retrieved from https://ecosistemaurbano.org/urbanism/urban-design-scheme-dhaka/

BIGD. (2016). Traffic Congestion in Dhaka City- Governance Perspectives. In BIGD (Ed.), *STATE OF CITIES*. Dhaka, Bangladesh: BRAC Institute of Governance and Development.

Bigio, A. G., & Dahiya, B. (2004). Urban Environment and Infrastructure. In *Urban Environment and Infrastructure* (Issue January 2004). https://doi.org/10.1596/0-8213-5796-4

Calgary, T. C. o. (2004). Transit Oriented Development: Best Practice Handbook the City of Calgary

Department of Transportation, U. S. (2009). Livability in Transportation Guidebook, Planning Approaches that Promote Livability: Federal Highway Administration.

DMTCL. (2020). Dhaka Mass Transit Company Limited. Dhaka

EDE IJJASZ-VASQUEZ, & MASON, D. (2018). Toward a livable Dhaka. Retrieved from https://blogs.worldbank.org/endpovertyinsouthasia/toward-livable-dhaka

Furlan, R. (2015). Liveability and social capital in west bay, the new business precinct of Doha.Arts and Social Sciences Journal', 6(3), 1–11.

Furlan, R. (2016a). Modern and vernacular settlements in Doha: an urban planning strategy to pursue modernity and consolidate cultural identity.Arts and Social Sciences Journal, 7(2), 171–176

Furlan, R., & Faggion, L. (2017). Urban regeneration of GCC Cities: Preserving the Urban Fabric's cultural heritage and social complexity.Journal of Historical Archaeology Anthropological Sciences, 1(1), 1–16.

Furlan, R., & ElGahani, H. (2018). Post 2022 FIFA World Cup in the state Qatar: Urban regeneration strategies for Doha'.Journal of Urban Regeneration and Renewal, 11(4), 1–16

Furlan, R., & Petruccioli, A. (2016). Affordable housing for middle income expats in Qatar: strategies for implementing livability and urban form. International Journal of Architectural Research-ArchNet-IJAR', 10(3), 138–151.

Furlan, R., Petruccioli, A., David Major, M., Zaina, S., Zaina, S., Al Saeed, M., & Saleh, D. (2019). The urban regeneration of west-bay, business district of Doha (State of Qatar): A transit-oriented development enhancing livability. *Journal of Urban Management*, *8*(1), 126–144. https://doi.org/10.1016/j.jum.2018.10.001

GERALD OLLIVIER, P. M., ABHISHEK BEHERA, ALINA FLORENTINA BURLACU. (2021). Achieving sustainable cities: The link between Transit-Oriented Development (TOD) and road safety. Retrieved from https://blogs.worldbank.org/transport/achieving-sustainable-cities-link-between-transit-oriented-development-road-safety

Gihring, T. A. (2009). The value capture approach to stimulating transit oriented development and financing transit station area improvements

Haquea, A., Sharnab, F. K., & Khanc, A. (2019). Transit Oriented Development (TOD) in Dhaka: Opportunities and Challenges for (Re)development around Stations. *Journal of the Eastern Asia Society for Transportation Studies*, *13*, 1249–1260.

Gough, M. Z. (2015). Reconciling Livability and Sustainability: Conceptual and Practical Implications for Planning. *Journal of Planning Education and Research, 35(2)*, 145-160.

Hamad, S. (2020). Creating Sustainable, Liveable,and Resilient Communities, *The Sustainabilist*.

International Making Cities Livable (IMCL) Conference (2020). Retrived from http://www.livablecities.org/

JOHN ROOME, ANNIE GAPIHAN, & LEE, H. (2019). An upper middle-income Bangladesh starts with a livable Dhaka. Retrieved from https://blogs.worldbank.org/ endpovertyinsouthasia/upper-middle-income-bangladesh-starts-livable-dhaka

Kashef, M. (2016). Urban livability across disciplinary and professional boundaries. *Frontiers of Architectural Research*, *5*(2), 239-253.

Kovacs-Györi, A., & Cabrera-Barona, P. (2019). Assessing urban livability through residential preference—An international survey. *Data*, *4*(4). https://doi.org/10.3390/data4040134

Lang, W., Hui, E. C. M., Chen, T., & Li, X. (2020). Understanding livable dense urban form for social activities in transit-oriented development through human-scale measurements. *Habitat International*, *104*(August), 102238. https://doi.org/10.1016/j.habitatint. 2020.102238

Mason, D. (2020). Retrieved from https://blogs.worldbank.org/endpovertyinsouthasia/planning-more-livable-dhaka.

National Research Council (2002). *Community and Quality of Life: Data Needs for Informed Decision Making*. Washington, DC: The National Academies Press.

Newman, P., Beatley, T., & Boyer, H. (2009).Resilient cities: Responding to peak oil and climate change.Washington: Island Press.

Newman, P., & Kenworthy, J. (2015).The end of automobile dependence: How cities are moving beyond car-based planning.Washington, DC: Island Press

Noland, R. B., Ozbay, K., DiPetrillo, S., Iyer, S., & Center, A. M. V. T. (2014). *Measuring benefits of transit oriented development* (No. CA-MNTRC-14-1142). Mineta Transportation Institute.

Ranson, A. (2013). *Examining the Concept of Livability in the Crosstown Community of Memphis*.

Rayle, L. (2015). Investigating the connection between transit-oriented development and displacement: Four hypotheses.

RSTP. 2015., *Revised Stretegic Transport Plan (RSTP)*. Dhaka Transport Co-ordination Authority, Dhaka, Bangladesh.

STP. 2005. *Strategic Transport Plan for Dhaka-Final Report*. Dhaka Transport Co-ordination Board, Dhaka, Bangladesh.

Smith, M. E. (2015). Moving Towards a Greener Future: An Investigation of How Transit-Oriented Development Has the Potential to Redefine Cities around Sustainability.

The Global Livability Index 2021. How the Covid-19 pandemic affected livability worldwide: The

Economist Intelligence Unit.

Wey, W. M., & Huang, J. Y. (2018). Urban sustainable transportation planning strategies for livable City's quality of life. *Habitat International*, *82*(June), 9–27. https://doi.org/10.1016/j.habitatint.2018.10.002

Yogi, R. J., Kavina, J., & Darji, P. V. (2017). Transit-Oriented Development: Lessons from Indian Experiences. *Urban Studies*, *41*(January), 299–315. www.cept.ac.in/cue

Zhang,W. Study on Intrinsic Meanings of the Livable City and the Evaluation System of Livable City. Urban Planning Forum, no. 03, pp. 30-34, 2007

Zhuo, Z., Hu, Y., & Wen, J. (2020). *Exploration of Sustainable and Livable City Construction : a Case Study of Chengdu*. *Icembe*, 323–328. https://doi.org/10.25236/icembe.2020.068

Zhan, D., Zhang, W., Yu, J., et. al. Areal Research and Development. Areal Research and

Development, vol. 35, no. 04, pp. 68-73, 2016

Wang. Livable City. Journal of Urban Regeneration and Renewal, no. 03, pp. 30-34, 2010.

Haque Afsana. (2019). Theoretical Aspects of Transit Oriented Development: Fact and Forces for Successful TOD. Planning Review. Jahangirnagar University. Savar. Dhaka.

https://www.thedailystar.net/backpage/news/liveability-index-dhaka-fourth-least-livable-city-world-2107997

https://blogs.worldbank.org/endpovertyinsouthasia/toward-livable-dhaka

https://thefinancialexpress.com.bd/editorial/dhakas-falling-liveability-1599406351

https://blogs.worldbank.org