The Jahangirnagar Review: Part II: Social Science, Vol. 49, No.2. June-2025
ISSN 1682-7422 © Jahangirnagar University

Evaluation of the Spatial Accessibility and MRT Ridership in Dhaka

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Abstract: *Accessibility is an essential factor in determining ridership in account of MRT enables individuals with a range of abilities to get involved in society and access opportunities, accessibility is crucial for public transportation, particularly for Mass Rapid Transit (MRT) systems. Analysing five operational metro stations—Motijheel, Bangladesh Secretariat, Shahbagh, Shewrapara, as well as Mirpur 10—this study assesses spatial accessibility and its link to Mass Rapid Transit (MRT) Line 6 ridership in Dhaka. These transit hubs are fully operational elements of the city's transport system, not only "proposed." To evaluate the effects of road facilities, footpaths availability, intersection density, spatial connectivity, and accessibility to important urban services on commuter behaviour and station-level ridership, the study combines quantitative and qualitative methods. Indicators such as shortest path distances, the quantity and kind of facilities (such as commercial, healthcare, and educational), road width and length, and the existence of footpaths were examined employing ArcMap-based network analysis to create accessibility scores for every station. Motijheel dominated in passenger traffic, however Mirpur 10 did not have the largest ridership, even though it had the highest accessibility ranking based on service count. Shahbagh, on the other hand, earned an inferior accessibility score yet still had a high commuter volume. These discrepancies imply that trip intent, land use context, including modal preferences (like walking) are important factors that influence ridership in addition to accessibility. The results show that in order to increase MRT efficiency and promote inclusive urban mobility, a multifaceted understanding of urban connectivity is required.*

Keywords: Accessibility, Network Analysis, MRT Ridership.

Introduction

Dhaka which is known as a capital city of Bangladesh with 14 million population. This city is characterized by spontaneous development. Overcrowding has been a problem in Dhaka city as a result of its fast population growth in the past several years. The addition of the mass transit system will also increase foot traffic, which is already a major problem in station areas due to the high land value and volume of foot traffic there. In 2020, across its route (from Uttara to Motijheel), the proposed MRT Line-06

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will transport about 61,000 commuters per hour in each direction (JICA, 2011). There will be inefficient passenger transfers and congestion at the stations if the metro is not well-connected to the surrounding urban fabric, particularly the roadways and land uses. The accessibility of different MRT station varies widely because of their spatial nature.

In this study, "accessibility" refers to the ease with which pedestrians can move around. A city's sustainable transport system relies on the pedestrian movement, the principal mobility paradigm (JICA, 2016). Not only do issues with the pedestrian environment's spatial character impact convenience, comfort, and human wellness, but they also reduce the number of people using the transit system. According to the configurational strategy for transportation, the efficiency of each stop is affected by its position in the network structure, which in turn impacts how pedestrians behave in the spatial system (Karst Geurs, 2006). Therefore, it is of the utmost importance to evaluate the spatial network in connection to local pedestrian circulation when locating each metro station, especially the entrance positions. Some cities are shifting their focus from cars to pedestrians as part of a larger effort to improve sustainable mobility. These include Berlin, Colombia; Madrid, Spain; Chengdu, China; Brussels, Belgium; Bogota, Columbia; and Hamburg, Germany. The success of the Metro 3 system and the viability of the city as a whole depend on the stations' ability to accommodate pedestrians in a way that respects their individuality and fulfils their needs and wants (Duangporn and Pawinee, 2009).

Furthermore, it is critical to establish accessibility performance objectives, define access, and identify influencing factors in order to guarantee accessibility at the local level. This study aims to measure the current level of spatial accessibility of MRT Stations along MRT line 6 and also evaluate the relationship between MRT ridership and spatial accessibility to available services.

The goal of this study has grown to include making sure that the metro stations will be easy for people to get to in the central business district of Dhaka city. The study is based on the idea that how the space arrangement is set up might have an impact on movement that changes the way things can be accessed (Hillier, B, Iida, S, 2005). To understand that the study only looks at the spatial part in terms of how people move around and use land locally. This study did not look into specific building-based issues like the

number of floors, the number of users, etc. This study looked at two big changes that would happen in areas like the study area of 5 MRT Stations that have available services and a lot of foot traffic. The study results, on the other hand, this study will give people some motivation and direction to figure out where the development is needed so that it is easier for people with disabilities to get to.2.

Methodology

In this study, an inductive research approach. Mix method approach is used to fullfill the objectives of this study. The research design for a study on metro station service availability, accessibility, and user perception. Quantitative data will quantify service shortest distances, while qualitative data will examine user impressions, travel purposes, as well as requirements for alternative modes of transportation. The first objective is to find the accessibility condition where shortest path is a measuring indicator which is going to be done quantitative approach by using Arc Map network analysis to measure distances. For the second one, to determine user perception of these services, particularly travel reasons, requirements for other transportation modes, including relationship between them qualitative methods like metro station user interviews and surveys has been used.

Five case stations along MRT line 6 corridor: Motijheel, Bangladesh Secretariate, Shahbagh , Shewrapara, and Mirpur 10 are selected based on different features. Such as, Motijheel is known as CBD, Bangladesh Secretariate is known as a destination zone on the other hand, Shabagh hold a different feature both of commercial and educational . Shewrapara is known as residential along with Mirpur 10 can also introduced as residential and mixed used area. No of Available services Shortest Path, Category of Available Services, Road width, Road Length, Footpath Length are used as the indicators for measuring accessibility. Trip Purpose, frequency, Transport Mode, Boarding and alighting data of MRT are used to analyze the users perspective relevant to MRT accessibility an dridership.

Results and Findings

Table 1 provides the details about five Dhaka metro stations: Motijheel, Bangladesh Secretariate, Shahbagh, Shewrapara, and Mirpur 10. Whether a station is a passenger's final destination or starting point is indicated by its type. Because of their status as

destination locations, all five stations serve as the last stop for a large number of passengers. A variety of services are at the station and its surrounding areas. The eight main categories of these services are as follows: public, commercial, educational, emergency, financial, healthcare, land use, along with government. Out of all the districts in Bangladesh, Mirpur 10 has the most accessible facilities (487), next to Motijheel (150), Shewrapara (86), along with Shahbagh (55).

Table 1: Measuring accessibility using network analysis

Station	Available Services	Service Category	Average Distance(m)	Road Length(m)	Road Width(m)	Foothpath(m)	Accessibility Score = services /average distance
Mirpur 10	487	1.Commercial (Shop, supermarket, restaurant, tourism, office). 2.Education (School, College, University). 3.Emergency (Police Station) 4.Financial (ATM, Bank) 5.Government (Govt. Office) 6.Healthcare (Hospital) 7.Landuse (Park, stadium) 8.Public (Library, Community Center, Place of worship)	352.03	79.04	5.58	2.2068	1.38
Shewrapara	86		330.28	49.29	2.75	2.60	0.26
Shahbagh	55		324.47	160.34	7.85	1.41	0.17
Bangladesh Secretariate	114		310.80	131.57	7.72	0.18	0.37
Motijheel	150		340.29	148.51	7.16	0.320	0.44

The primary role or objective of the services in the vicinity of the station is defined by the service type. Retail, food service, and sightseeing are all examples of commercial services. Universities, colleges, and high schools are all part of the education service. Firehouses and police stations are examples of emergency services. Bank corporations and automated teller machines are examples of financial services. Ministries and government offices are part of the government service sector. Facilities such as hospitals and clinics provide healthcare services. A few examples of land use services are gardens and parks. Public spaces such as libraries, gathering places, and houses of religion are essential to society. What kind of land development is most common in the area surrounding the station is shown by the land use. The presence of buildings that are residential as well as commercial is indicative of residential as well as mixed land

use. A combination of commercial along with mixed land use indicates that the region is home to both commercial and residential structures.

The table measures spatial accessibility using services that are accessible, type of service, use of land, road as well as walkway quality, distance, and services. Each indicator affects accessibility differently. Accessibility increases when distance is shorter and facilities are more plentiful and decreases when roads and pathways are shorter (Wu et al, 2019). Each station in the chart has an accessibility score based on available services and average distance. Scores indicate station accessibility. This score shows how stations compare and where they can improve. The average distance is the number of meters between the station and the closest crossroads. When the distance between the station and the road network is little, it indicates that the station has good connection. Shahbagh (324.471 m), Motijheel (340.293 m), Shewrapara (330.282 m), along with Mirpur 10 (352.029 m) are in order of distance from the Bangladesh Secretariate, which is the shortest at 310.80 m. How easily one may reach the various services surrounding the station is reflected in its accessibility score (Siobhan Murray Laura Bonzanigo, 2015). Divide the total number of facilities through the average distance to get it. The more services a station offers and the shorter its distance, the higher its accessibility score. After Motijheel (0.44), Shewrapara (0.26), and Shahbagh (0.17), the most accessible place is Mirpur 10 (1.38). The Bangladesh Secretariate comes in at 0.37.

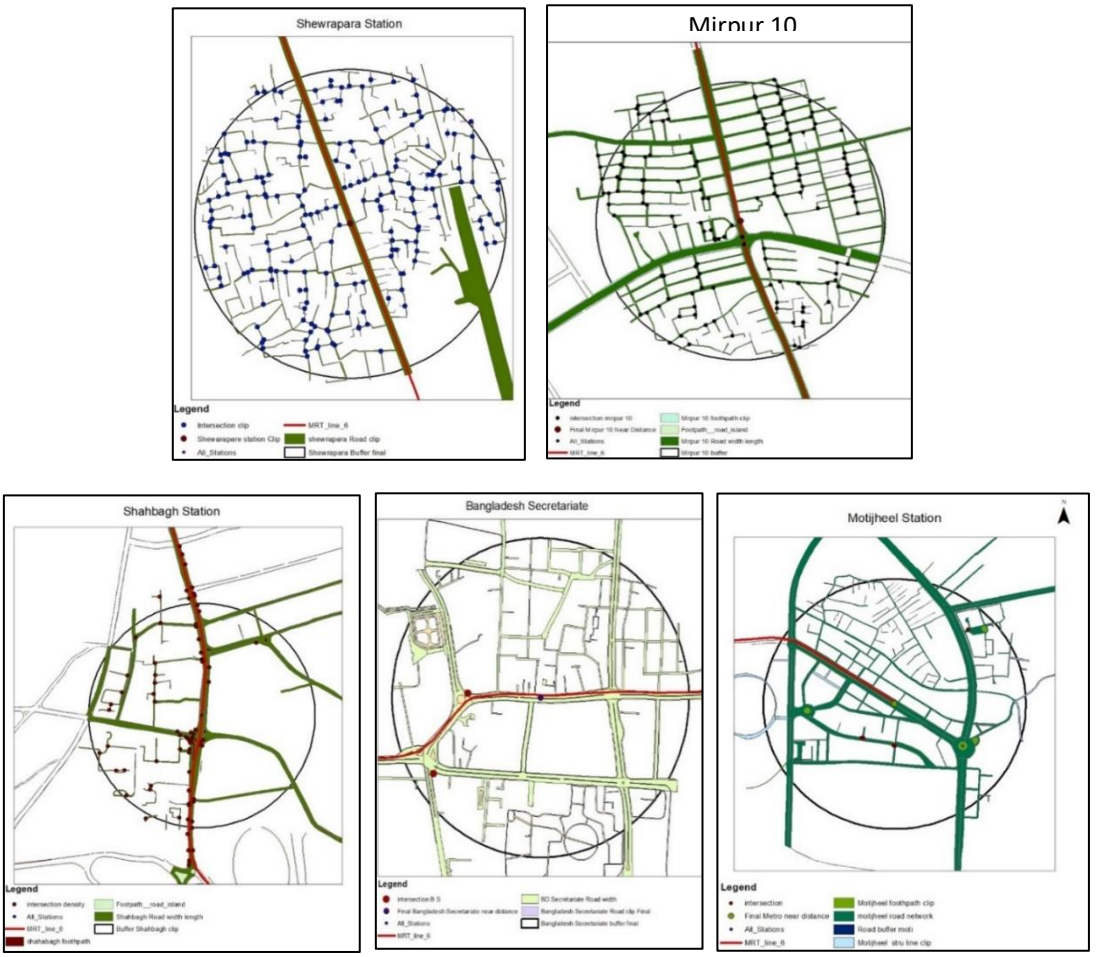

Figure 1: Road Network and Intersection Density of Case Stations

Table 2 represents that the highest no of intersection is found in shewrapara area. On the other hand, the lowest number of intersections is present in the Bangladesh Secretariate area. Following Motijheel, Shahabagh, and Mirpur 10. The total area is about 0.785398 sq. km. As it is said that, the area which has more no of intersection density, will have less average distance.

Table 2: Intersection Density Source: (Author)

Station Name	No of Intersection	Area (Km^2)	Intersection Density
Bangladesh Secretariate	6	0.785398 km^2	7.639 km^{-2}
Motijheel	11		14 km^{-2}
Shahbagh	108		137.50 km^{-2}
Shewrapara	592		753.75 km^{-2}
Mirpur 10	442		562.77 km^{-2}

1. Motijheel

Figure 2 represents the number of available services and distance to avail the desired services from metro stations. The average distance is 340.293 m. If this average distance can compare with the nearest distance which is showed in the figure, it can easily said that commuters need to take de-tour to avail their services. But it's not a long de-tour need to take. Commuters need to take de-tour, this indicate that the road connectivity is in moderate stage. That's why, commuters can not avail their services by linear distance.

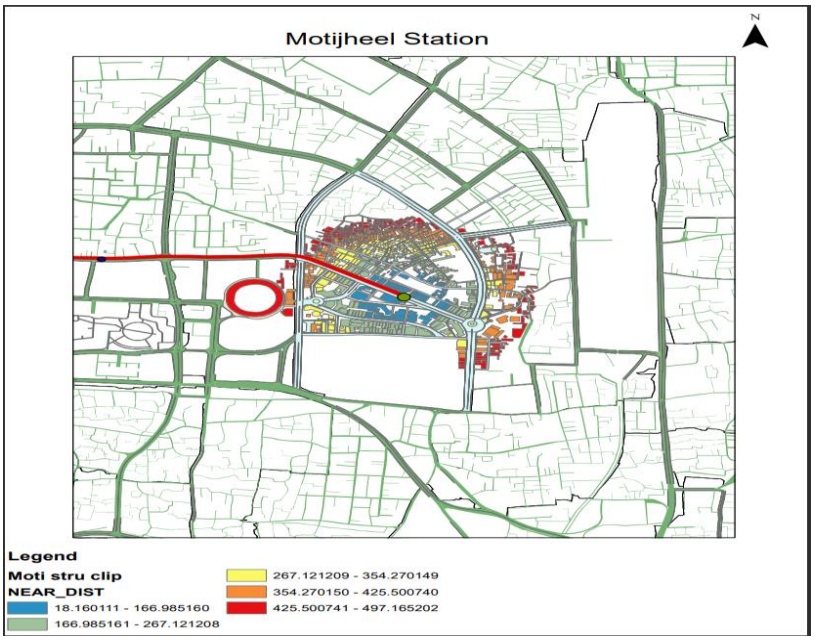

Figure 2: Available Services and Average Distance of Motijheel Station.

Source: Author from spatial analysis

2. BD secretariate

Figure 3 highlighted the available services around the station. Not only that but also it shows the nearest distance to avail services from station. On the other hand, it is found that the average distance is 310.80 m which indicates that from the station commuters can easily avail their services. It is possible because of the good road connectivity or intersection density is available.

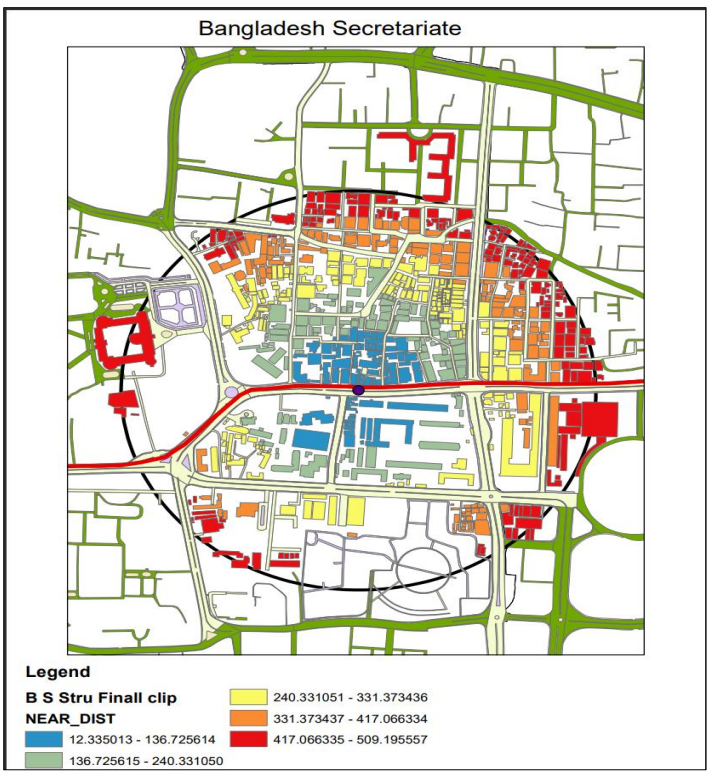

Figure 3: Available Services and an Average Distance of BD Secretariate Station

Source: Author from spatial analysis

3. Shahbagh

Figure 4 represents the number of available services and the nearest distance of every service from the station. In the case of this station, the average distance is a little more than the nearest distance which is 324.471 m. It reflects that road connectivity or intersection density is quite good and commuters do not need to take long de-tour.

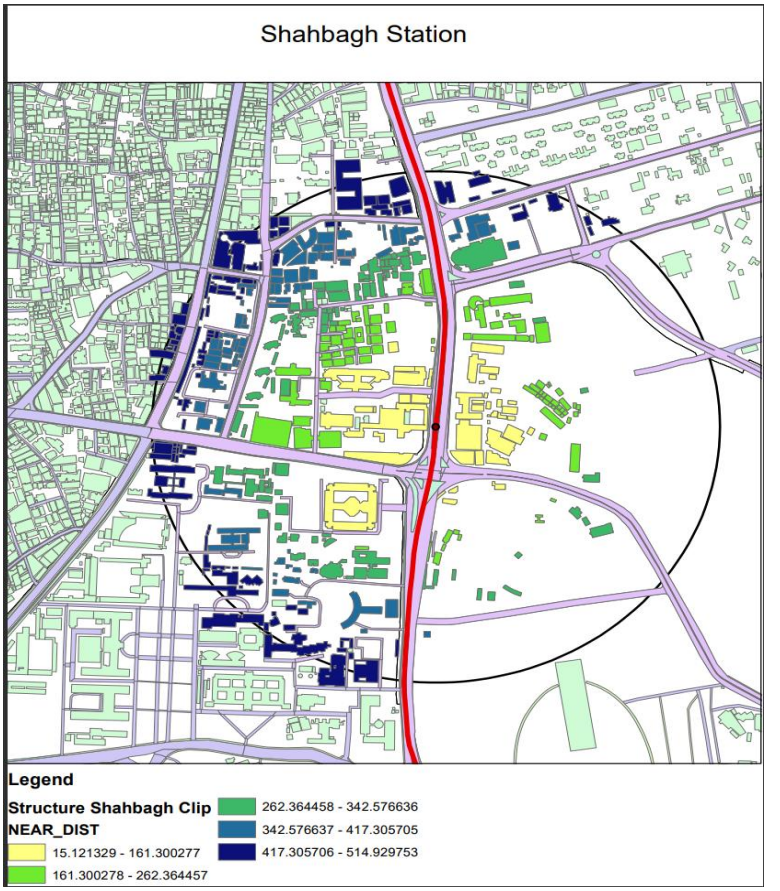

Figure 4: Available Services and Average Distance of Shahbagh Station.

Source: Author from spatial analysis

4. Shewrapara

Figure 5 reflects the service number and nearest distance to avail services from station. Total average distance is 330.282 m which is in average quite more than nearest distance. It means, commuters need to take long de-tour to avail service. Along with the linear road connectivity and intersection density is not well polished.

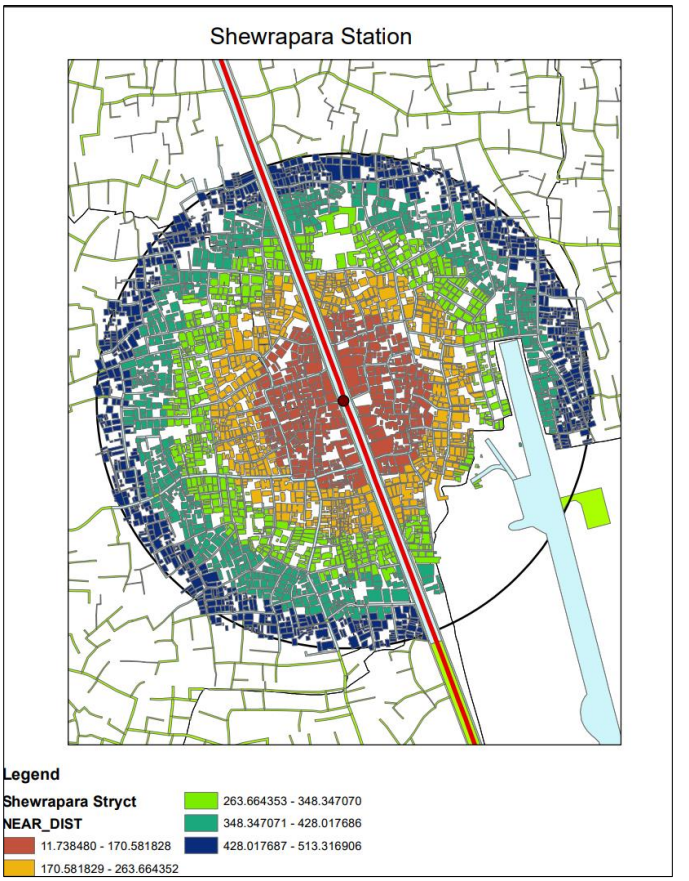

Figure 5: Available Services and Average Distance of Shewrapara Station.

Source: Author from spatial analysis

5. Mirpur 10

Figure 6 represent that there are around 487 services around the station. But the average distance is 352.029 m which is higher compared to nearest distance. It reflects that commuter need to take long de-tour from station to reach their services. Intersection density and accessibility of this station is not good in respect to it's available services.

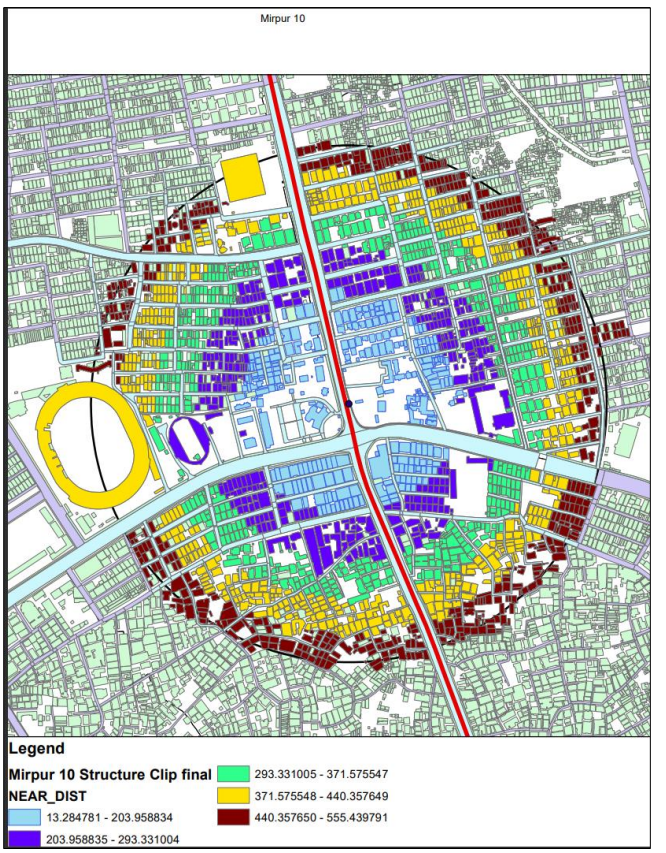

Figure 6: Available Services and Average Distance of Mirpur 10 Station.

Source: Author from spatial analysis

Relationship between Accessibility Score and Ridership Data

Table 3, represent the summary of ridership data .In this table the major indicator of ridership are mentioned with comparison between 5 stations. From this table, it can be said that Bangladesh Secretariate's travel goal is job, although most stations are education and hangout. The highest boarding and alighting data is from Motijheel. The lowest one is from Bangladesh Secretariate. The travel mode is mostly used among these stations is Walking.

Table 3: Ridership Data Analysis

Station Name		**Mirpur 10**	**Shewrapara**	**Shahbagh**	**Bangladesh Secretariate**	**Motijheel**
Trip purpose	Education	20 %	16%	32%	24%	32%
	Hangout	37.3%	29.3%	25.3%	5.3%	9.3%
	Job	20%	22.7%	42.7%	66.7%	43.9%
	Others	22.7%	32%	-------	4%	14.8%
Trip Frequency	1 -2	47%	60%	33%	32%	
	More then 2	53%	40%	67%	68%	
Transport Mode	Walking	66.7%	69.3%	65.3%	62.7%	73.3%
	Bus	6.7%	9.3%	12%	25.3%	24%
	Bike	5.3%	1.3%	12%	2.7%	-
	Others	21.3%	20%	10.7%	9.3%	2.7%
Intersection Density	Good	69.3%	50%	58.7%	44%	36%
	Need Improvement	30.7%	46.7%	41.3%	56%	64%
	Bad	---------	2.7%	--------	----------	--------
Boarding & Alighting Data		137005	18426	41786	30634	414444

Source:(Author).

Table 4 depicts the comparison between Accessibility score and boarding and alighting data , considering the Road length , Road width and footpath length. The range of accessibility score is from 0 to 1. Here 1 indicate the highest score which represent the

bad accessibility score. From 1 to 0, the score represents from bad to good score of accessibility.

Table 4: Relationship between accessibility score and ridership data

Station Name	Boarding & Alighting Data	Accessibility Score	Road Length(m)	Road Width(m)	Foothpath Length(m)
Motijheel	414444	0.44	148.52	7.17	0.33
Shahbagh	41786	0.17	160.35	7.85	1.41
BD Secretariate	30634	0.37	131.57	7.72	0.18
Shewrapara	18426	0.26	49.3	2.76	2.6
Mirpur 10	137005	1.38	79.04	5.59	2.2

From the table 5, it can be found that the accessibility score of Mirpur 10 is greater than 1, it is 1.38. Theoretically, this represent the bad accessibility score. On the other hand Shahbagh has lowest accessibility score among the station . It's about 0.17. But compared to boarding and alighting data, it explains that Motijheel has the highest commuters but it's accessibility score is medium. But therortically good accessibility score has Shahbagh but it attracts around 41,786 passenger which is in 3rd position.

Table 5: Analysis between accessibility score and Ridership Analysis.

Station Name	Services	Accessibility Score	Average distance	No of Intersection	Boarding and Alighting Data
Motijheel	150	0.44	340.293	11	414444
Shahbagh	55	0.17	324.471	6	41786
BD Secretatriate	114	0.37	310.80	108	30634
Shewrapara	86	0.26	330.282	592	18426
Mirpur 10	487	1.38	352.029	442	137005

- Shahbagh has lowest accessibility score and also it has lowest service and no of intersection is also lowest but average distance is in 2nd position and boarding

and alighting data is in 3rd position. Theoretically, as it as good accessibility score , it would attract more commuters with more intersection density. But in reality, it is in 3rd position from attract commuters with less intersection no and less services. Though, theoretically this station represents good accessibility but in reality it gives us another picture.

- Mirpur 10, this represents the highest accessibility score, theoretically which indicate bad accessibility. But this carries highest number of services than other stations. Not only that attract 2nd highest commuters but also with 2nd position in number of intersection density. Though, in theory, it represents bad accessibility score, due to more services and more intersection it attracts more people. But if we look at the average distance, this number is highest. This is influenced by more services which are present around this station.

- Shewrapara, this station is in 2nd position of accessibility score. This indicates the moderate accessibility condition. But there is a 2nd lowest services and highest intersection density which able to attract less commuters. But theoretically, this station will attract more commuters. But, in reality it showed different picture.

- BD Secretariate, from accessibility score this station position is in 3rd position which represent quite good accessibility condition. But intersection no is in 3rd position and attract moderate commuters. But , theory explain that , this station will attract more commuters. But in reality, it is in moderate condition.

- Motijheel, accessibility score is in 4th position , this indicate moderate good condition but not bad. But, this station attract highest commuters with 2nd lowest intersection number and 4th highest services.

Conclusion

This study is based on the hypothesis that the spatial framework influences mobility patterns and, consequently, accessibility. Data reveals that Shahbagh has the lowest accessibility score, accompanied by the fewest services and intersections. Despite this, it ranks second in average distance and third in boarding and alighting figures. Theoretically, higher intersection density should enhance accessibility and attract more commuters, yet Shahbagh contradicts this expectation. Mirpur 10, which has the highest accessibility score (suggesting poor accessibility by the scoring system), defies

the theoretical model. It offers a high number of services and intersections, drawing a substantial number of commuters. Despite having the highest average distance, the station remains highly attractive due to the abundance of surrounding services.

Shewrapara ranks second in accessibility, suggesting moderate accessibility. Although another nearby service point with more intersections exists, it appears less appealing to commuters. In practice, Shewrapara draws more users than the theoretical model would predict. The Bangladesh Secretariat station ranks third in accessibility, theoretically indicating favorable conditions. It has a moderate number of intersections and attracts a modest number of commuters. However, it does not perform as strongly as the theory would suggest. Motijheel ranks fourth in accessibility, indicating a fairly good score. In reality, it is one of the most popular stations, driven by its high commuter volume and a wide range of services.

References

Alom, M. (2022). *Transit Ridership of Dhaka Metro Rail*.

Bell, M., & Iida, Y. (2017). *TRANSPORTATION NETWORK ANALYSIS*.

Briggs, D. J., Collins, S., Elliott, P., Fischer, P., Kingham, S., Lenret, E., Pryl, K., Van Reeuwijk, H., Smallbone, K., & Van Der Veen, A. (2007). Mapping urban air pollution using GIS: a regression-based approach. *International Journal of Geographical Information Science*, *11*(7), 699–718. https://doi.org/10.1080/136588197242158

Calthorpe, P. (2014). The Next American Metropolis: Ecology, Community, and the American Dream. In *Google Books*. Princeton Architectural Press. https://books.google.com/books/about/The_Next_American_Metropolis.html?id=WtKU5L0ajA8C

Chalermpong, S, Sony, S. and Wibowo. (2008). *Transit station access trips and factors affecting propensity to walk to transit stations in Bangkok, Thailand*.

Chidambara . (2019). Walking the First/Last Mile to/from Transit: Placemaking a Key Determinant. *Urban Planning*, *4*(2), 183. https://doi.org/10.17645/up.v4i2.2017

DMDP. (1997). *Dhaka Metropolitan Development Plan (1995-2015) : strcture plan, master plan and detailed area plan for Dhaka City*.

DTCA. (2015). *The Project on the Revision and Updating of the Strategic Transport Plan for Dhaka DRAFT FINAL REPORT*. https://dtca.portal.gov.bd/sites/default/files/files/dtca.portal.gov.bd/page/3e3ae325_4494_4fea_b709_b5729cc8ab43/DFR_C99_All%20(2).pdf

Duangporn, & Pawinee. (2009). *Sustainable Metro Accessibility Performance Indicators: An Integrated Approach to Multi-dimensional Assessment*.

Errampalli, M., Patil, K. S., & Prasad, C. S. R. K. (2018). Evaluation of integration between public transportation modes by developing sustainability index for Indian cities. *Case Studies on Transport Policy*. https://doi.org/10.1016/j.cstp.2018.09.005

Fischer, M. M., & Springerlink (Online Service. (2006). *Spatial Analysis and GeoComputation : Selected Essays*. Springer Berlin Heidelberg.

García-Palomares, J. C., Gutiérrez, J., & Cardozo, O. D. (2013). Walking Accessibility to Public Transport: An Analysis Based on Microdata and GIS. *Environment and Planning B: Planning and Design*, *40*(6), 1087–1102. https://doi.org/10.1068/b39008

Gladwell, P. (2010). Inductive research. *New Scientist*, *208*(2789), 29. https://doi.org/10.1016/s0262-4079(10)63000-x

H J P Timmermans. (2009). *Pedestrian behavior : models, data collection and applications*. Emerald.

Hillier, B, Iida, S. (2005). *Network and psychological effects in urban movement". In: Proceedings of Spatial Information Theory: International Conference, Lecture Notes in Computer Science (Vol. 3693). Springer-Verlag, Berlin, Germany, pp. 475490. http://eprints.ucl.ac.uk/1232/*.

Hillier, B., Penn, A., Hanson, J., Grajewski, T. and Xu, J. (2012). *Natural Movement: Or, Configuration and Attraction in Urban Pedestrian Movement*.

Hillier, B. (2006). Cities as movement economies. *URBAN DESIGN International*, *1*(1), 41–60. https://doi.org/10.1057/udi.1996.5

Indeed. (2023, August 1). *What Is Research Methodology and Why Is it Important?* Indeed Career Guide. https://www.indeed.com/career-advice/career-development/research-methodology

Iqbal Raj, S., & Julker Naem, A. S. M. (2022). *Socioeconomic Impact of the First Mass Rapid Transit (Mrt) in Dhaka. doi: 10.5821/siiu.11977*.

JICA. (2010). *Dhaka Transport Coordination Board (DTCB) Ministry of Communications (MOC) Government of the peoples Bangladesh, Preparatory Survey Report of Bangladesh on Dhaka Urban Transport Network Development Study (DHUTS) in Bangladesh Report EID JR 10-054(1/2)*. https://openjicareport.jica.go.jp/pdf/11996774_01.pdf

JICA. (2011). *Dhaka Transport Coordination Board (DTCB) Ministry of Communications (MOC) Government of the peoples Bangladesh, Preparatory Survey Report of Bangladesh on Dhaka Urban Transport Network Development project environmental impact Assesment study Prepared by Dhaka Transport Coordination Board*. https://libportal.jica.go.jp/library/Data/DocforEnvironment/EIA-EPC/EastAsia-SouthwesternAsian/DhakaMRT/DhakaMRTEIA.pdf

JICA. (2016). *The Project on the Revision and Updating of the Strategic Transport Plan for Dhaka SUMMARY Final Report*. https://openjicareport.jica.go.jp/pdf/12268264.pdf

Karst Geurs. (2006). *Accessibility, Land Use and Transport*. Eburon Uitgeverij B.V.

Kawser. (2012). International Journal of Social Research Methodology: Theory & Practice. *International Journal of Social Research Methodology*, *15*(6), ebi-ebi. https://doi.org/10.1080/13645579.2012.735809

Li, L., Ren, H., Zhao, S., Duan, Z., Zhang, Y., & Zhang, A. (2017). *Two dimensional accessibility analysis of metro stations in Xi'an, China. Transportation Research Part A: Policy and Practice, 106, 414-426. doi: 10.1016/j.tra.2017.10.014.*

Liu, R., Chen, Y., Wu, J., Xu, T., Gao, L., & Zhao, X. (2018). Mapping spatial accessibility of public transportation network in an urban area – A case study of Shanghai Hongqiao Transportation Hub. *Transportation Research Part D: Transport and Environment*, *59*, 478–495. https://doi.org/10.1016/j.trd.2018.01.003

Liu, S., Yao, E., Cheng, X., & Zhang, Y. (2017). Evaluating the impact of new lines on entrance/exit passenger flow of adjacent existing stations in urban rail transit system. *Transportation Research Procedia*, *25*, 2625–2638. https://doi.org/10.1016/j.trpro.2017.05.316

Ma, X., Chen, X., Li, X., Ding, C., & Wang, Y. (2018). Sustainable station-level planning: An integrated transport and land use design model for transit-oriented development. *Journal of Cleaner Production*, *170*, 1052–1063. https://doi.org/10.1016/j.jclepro.2017.09.182

Md Tariquzzaman. (2019). *STUDY ON THE ACCESSIBILITY OF PROPOSED METRO STATIONS IN CBD AREAS OF DHAKA CITY IN RELATION TO THE SPATIAL STRUCTURE OF LOCAL URBAN GRID*.

Morales, J., Flacke, J., Morales J. and Zevenbergen J. (2017). *Mapping Urban Accessibility in Data Scarce Contexts Using Space Syntax and Location-Based Methods*.

News24. (2018, October 2). *Motijheel Commercial Area . Dhaka – bdnewsnet.com*. https://bdnewsnet.com/wiki/motijheel-commercial-area-dhaka/

Nilufar, F. (2007). "The Spatial and Social Structuring of Local Areas in Dhaka City - A Morphological Study of the Urban Grid with Reference to Neighbourhood Character within Naturally-grown Areas".. *Ph.D. Dissertation, University College London (UCL), University of London, UK*. https://www.academia.edu/18939790/_The_Spatial_and_Social_Structuring_of_Local_Areas_in_Dhaka_City_A_Morphological_Study_of_the_Urban_G

rid_with_Reference_to_Neighbourhood_Character_within_Naturally_grown_Areas_

Nyunt, K. T. K., & Wongchavalidkul, N. (2020). Evaluation of Relationships Between Ridership Demand and Transit-Oriented Development (TOD) Indicators Focused on Land Use Density, Diversity, and Accessibility: A Case Study of Existing Metro Stations in Bangkok. *Urban Rail Transit*. https://doi.org/10.1007/s40864-019-00122-2

Öztürk, O., Gülgen, F., Bilgi, S. and Kilic, B. (2018). *Accessibility Analysis of Street Networks Using Space Syntax*.

Parvin, A., Ye, A.M. and Jia, B . (2007). *Multilevel Pedestrian Movement: Does Visibility Make any Difference? Proceedings, 6th International Space Syntax Symposium, İstanbul*.

Perry. (2018, November 15). *The 5-minute walk*. MORPHOCODE. https://morphocode.com/the-5-minute-walk/

Prasertsubpakij, D., & Nitivattananon, V. (2012). Evaluating accessibility to Bangkok Metro Systems using multi-dimensional criteria across user groups. *IATSS Research, 36*(1), 56–65. https://doi.org/10.1016/j.iatssr.2012.02.003

Rahman, M. H., Ashik, F. R., & Mouli, M. J. (2022). *Investigating spatial accessibility to urban facility outcome of transit-oriented development in Dhaka. Transportation Research Interdisciplinary Perspectives, 14, 100607. doi: 10.1016/j.trip.2022.100607.*

Rahman, M. S. (2008). *FutureMassRapidTransitinDhakaCity-OptionsIssuesandRealities.pdf.*

Rahman, M. S. (2022). *Understanding the Linkages of Travel Behavior with Socioeconomic Characteristics and Spatial Environments in Dhaka City and Urban Transport Policy Applications.*