THINKING ACCESSIBILITY TOWARDS EXCELLENCE IN SCHOOL BUILDINGS IN RELATION TO THE EXISTING AND PROPOSED SPATIAL ORGANIZATION USING SPACE SYNTAX

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Abstract: Rajshahi city is the fourth largest metropolitan city of the country experiencing slow and steady urban growth, sharing about 0.5% of the national rural-urban migration. Being one of the most recent City Corporations of Bangladesh, the city is blessed with so many Educational Institute at the centre of its city heart and known as "Educational City" of Bangladesh. But often it is observed that these Institutes are not used to its full potential due to insufficient accessibility to these areas from rest of the city. This paper aims to study the integration and accessibility of the selected Schools of Rajshahi City Corporation with "Space syntax" methodology by using different Urban Intervention Strategies for increasing the integration of the specific area. Through comparison and analysis, this paper thrives to find out some Strategic guidelines to be implemented for the utmost use of the selected Schools and to increase the intelligibility of these educational Institutes within the future Master Plan of Rajshahi City Corporation.
Keywords: Accessibility, Educational Institute, Connectivity, Integration.

Introduction

The city as a collective project exists because its public spaces exist as well (Rubén, 2012). These public spaces have an important role regarding the environmental, economic and social context in the city as well as sources or providers of life, quality and sustainability (Chiesura,2004).Basically, the public spaces are spaces of socialization where the interpersonal relationships are generated and these relationships and different kinds of them or their intensity may vary regarding place characteristics, time of use and frequency of social interactions (Gehl,1956).

Among these public spaces, a large number are Educational Institutes. According to Roger, "A clear articulation of public space connects neighborhoods to connect to each other and link people within localities to their social institutions" (Rogers,1999).In fact, educational institutes which are accessible to general public, provide an integral and necessary part of urban living and an indispensable element within urban region. With a better urban design and environmental quality, the streets may be enhanced as "great streets" (Jacobs, 1996),

facilitating the urban legibility and their own identity (Lynch, 1960) and so, improving an attractive image of the city. In this way, streets as connectors among public spaces should be considered, analyzed, treated and designed as public spaces (Rubén, 2012).

By using 'Space Syntax' this paper intends to identify the Institutional spaces at the central area of Rajshahi City Corporation and to analyze these spaces in terms of accessibility as many of these are not potentially used because of inadequate accessibility (Rajshahi Structure Plan). In order to assess how these areas are connected within the city, this paper will consider the followings:

_ Identifying the Integration Core of the Rajshahi City.

_ Identifying the areas of educational Institutes and their connectivity to the city.

_ Analyzing the integration of some selected schools and to assess the accessibility of these schools using "Space Syntax".

_ Assessing the proposals of Rajshahi Metropolitan Development Plan (volume_01) to increase the potential accessibility and use of these schools.

The present study only focuses on the educational institutes of Rajshahi City Corporation within its limited scope. A sample of eight schools has been selected to analyze with the help of "Space Syntax".

Methodology: Space Syntax analysis

The pedestrian accessibility to public spaces is usually analyzed in terms of time or distance of trips along the pedestrian network. This network and its configuration is a key factor to collect the pedestrian flows at different scales in the city; neighborhoods, quarter, district or city. Therefore, a planning process that analyzes these structural implications on the city could plan public spaces with better criteria (Rubén, 2012). This paper is developed on two key ideas: accessibility and spatial configuration. In application of these ideas or its measures it is going to link other concept, integration. Accessibility refers to the ease to arrive to facilities, activities or goals, which could be appointed in general as opportunities. In addition accessibility could be defined as "the intensity of the possibility of interaction" (Hansen, 1959) and interchange (Engwicht, 1993). The spatial configuration plays a primitive or principal role for the pedestrian mobility (Hillier et al, 1993).

To undertake spatial configuration analysis based on street network, different measures of axial map have been used here as provided by the spatial configuration software Depth Map, developed by Alasdair Turner. Local-global integration and intelligibility are some of

the most interesting measures that could be used to analyze spatial configuration in the Rajshahi city. These measures of spatial configuration in the axial map are put in together with the diversity of public space and their capacity to offer accessibility. Then analysis with Space Syntax has been done on two phases.

Phase 01: The configurational properties of the Rajshahi City have been analyzed by "Space Syntax". Then eight schools have been selected as educational spaces. The location and accessibility of these schools have been analyzed. **Phase 02:** By creating different options of Urban Interventions, results have been analysed. Then the findings of the syntactic analysis are triangulated with some proposals of Rajshahi Metropolitan Development Plan (volume-_01) which offers some Guidelines to increase the integration and accessibility of the selected area.

Case Of Study_ Educational Institutes of Rajshahi City: Often referred to as Silk City and Education City, Rajshahi is located at 24.40°N 88.50°E and is situated on the northern banks of the river Padma. It is one of the division of Bangladesh and consists of nine Upazilas, 14 Pourasavas and seventy one unions. Though an epigraphic record engraved on the Dargah of the famous saint Hazrat Shah Makdhum (Rh.) indicates that the antiquity of Rajshahi goes back to at least 1634 A.D. The town was given importance in 1825, when the East India Company shifted the administrative headquarters of the district of Rajshahi from Natore to then Rampur Boalia, mainly for the ease of communication from Calcutta through the Hooghly river, Bhairab River and Padma river. Besides the City Corporation, a governing body named Rajshahi Unnayan Kortripokhkho (Rajshahi Development Authority-RDA) is there to plan the development of the city and to coordinate all the development related work. Besides the beautiful Mango Orchards and river beaches, it is home to renowned educational institutions covering almost all of professional and cultural fields available within the country. A comprehensive socio-economic household survey revealed that 55% of daily trips in Rajshahi are made by rickshaws/vans and bicycles while another 29% are made on foot. Average journey time within RDA area is around 22 mins and 69% of all trips are related to either home or work, leaving another 15% which are made to schools, colleges and universities. (Source_Rajshahi Metropolitan Development Plan_volume 1)

It has been revealed that major movements within the urban perimeter takes place between certain selected destinations. These are Shaheb Bazar, Harogram, Kazihata, Laxmipur, chhoto Bonogram, Paba, Rajshahi University, Seroil, Binodpur, Budhpara, Upashahar, Hatem Kha, Rajshahi court. The highest no. of trips per day was found to be around 6890 over a

period of 14 hours between Shaheb Bazar and Chhoto Bonogram. (Source_Rajshahi Metropolitan Development Plan_volume 1).

Fig: Location of selected schools

Analysis and findings

a) General spatial character of Rajshahi City: The general spatial character of Rajshahi can be understood by the following Depthmap analysis. The location of selected 8 school is placed here with the marking of green circle. Blue and white circle indicate the most Integrated and Connected roads in Rajshahi city.

Fig: Global Integration (Existing)

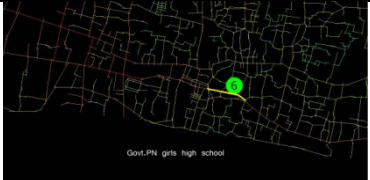Fig: Local Integration (Existing)
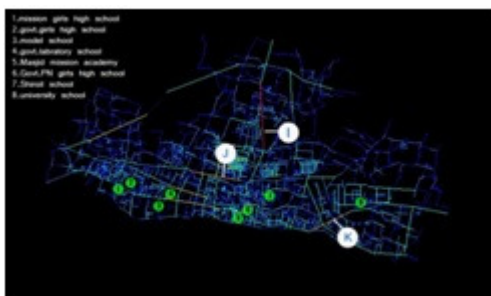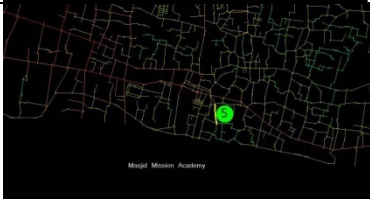

Fig: Connectivity (Existing)
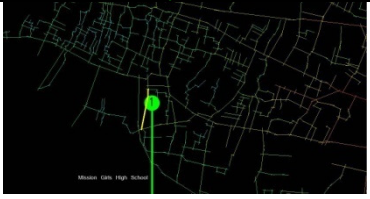
A,B,C,D	Most Integrated Road, R=n
E,F,G,H	Most Integrated Road, R=3
I,J,K,	Roads with maximum connectivity

Table-1.1

The axial map of Rajshahi City has been analyzed by Depthmap and Global Integration (R=n), Local Integration (R=3) and Connectivity measures are considered. The high value lines (marked with red by space syntex) of Global Integration, Local Integration and

Connectivity are compared with corresponding 10% core. It is found that all the red marked lines in Global context (road no.A,B,C,D), in Local context (road no.E,F,G,H) and for connectivity (road no.I,J,K) are within the 10% core of corresponding measure of Rajshahi City.

b) Spatial evaluation of selected schools: Base map has been used to analyze the accessibility to selected educational institutes. The sample area of 8 local schools is identified on the axial map and analyzed through space syntax to identify their position within the Global and Local integration of Rajshahi city.

Area No.	Schools (Sch.)	Sch. No.	Road Ref. No	Global Integration(Existing)	Local Integration(Existing)
1	Govt. PN girls High School	6	4370		
2	Masjid mission academy	5	602		
3	Shiroil School	7	602		
4	Govt. Labratory School	4	2831		
5	Rajshahi model school	3	593		
6	Mission Girls High School	1	3038		

| 7 | Rajshahi Govt.Girls High School | 2 | 4106 | | |
| 8 | Rajshahi Universiy School | 8 | 2276 | | |

Table-1.2

c) Identifying access road to sample area

School No.	Area name	schools	Road	Road Ref.No	HH	HH R/3	Conn-ctivity
1	Saheb Bazar(Ganak Para)	Govt. PN girls High School	1	4370	0.625	2.906	12
2	Shiroil	Masjid mission academy	2	602	0.528	1.868	2
3	Shiroil	Shiroil School	3	602	0.528	1.868	2
4	Lakshipur mor	Govt. Labratory School	4	2831	0.638	2.468	7
5	Mission mor	Rajshahi model school	5	593	0.526	1.402	3
6	Court road	Mission Girls High School	6	3038	0.5	1.814	4
7	Helenabad	Rajshahi Govt.Girls High School	7	4106	0.474	1.33	3
8	Rajshahi University	Rajshahi University School	8	2276	0.528	1.57	2

					0.625	2.906	12
	Max						
	Min				0.474	1.33	2
	Mean				0.543	1.903	4.375

Table-1.3

Integration and connectivity of the access roads of these 8 schools are analyzed to understand how these sample area is integrated to the whole city.

d) Analysis of access road to sample area

d-1. Global Integration of access road: The mean Global Integration is 0.543.Now the Global Integrations of the access roads to the schools are compared below.

Govt. PN girls High School, Saheb Bazar (Ganak Para) _Road Ref. No **4370:** The average integration value of this school is 0.625 that is higher than mean global Integration value (0.543)**.**So this school is well integrated to the whole city. **Masjid mission academy,** Shiroil_ Road Ref. No **602:** The Global integration value of this school is 0.528 that is below mean global Integration value (0.543)**.**So this school should be more integrated to the whole city to attract more students. **Shiroil School ,** Shiroil_ Road Ref. No **602:** The average integration value of this school is 0.528 that is below mean global Integration value (0.543)**.**So this school need more integration to the whole city to attract more students. **Govt. Labratory School**, Lakshipur mor _ Road Ref. No **2831:** The Global integration value of this school is 0.638 that is more than mean global Integration value (0.543)**.**So this school is more integrated to the whole city and attract more students. **Rajshahi model school,** Mission mor_ Road Ref. No **593:** The Global integration value of this school is 0.526 that is below mean global Integration value (0.543)**.**So this school should be more integrated to the whole city. **Mission Girls High School**, Court road_ Road Ref. No **3038:** The average integration value of this school is 0.5 that is below mean global Integration value (0.543). So this school need more integration to the whole city to attract more students. **Rajshahi Govt.Girls High School,** Helenabad_ Road Ref.No **4106:** The average integration value of this school is 0.474 that is below mean global Integration value (0.543)**.**So this school need more integration to the whole city to attract more students. **Rajshahi University School,** Rajshahi University_ Road Ref.No **2276**: This school is situated within the Rajshahi University area. The average integration value of this school is 0.528 that is below mean global Integration value. Need a little bit integration with city to make the school more accessible.

d-2. Local Integration of access road: The mean Local Integration is 1.903.Now the Local Integrations of the access roads to the schools are compared below.

Govt. PN girls High School ,Saheb Bazar (Ganak Para) _Road Ref.No **4370:** The average integration value of this school is 2.903- that is higher than mean Integration value (1.903)**.**So this school is well integrated to the whole city . **Masjid mission academy,** Shiroil_ Road Ref.No **602:** The local integration value of this school is 1.868 that is below mean local Integration value (1.903)**.**So this school should be more integrated to the whole city to attract more students. **Shiroil School,** Shiroil_ Road Ref.No **602:** The average integration value of this school is 1.868 that is below mean local Integration value (1.903)**.**So this school need more integration to the whole city to attract more students. **Govt. Labratory School**, Lakshipur mor _ Road Ref.No **2831:** The local integration value of this school is 2.468 that is more than mean local Integration value (1.903)**.**So this school is more integrated to the whole city and attract more students. **Rajshahi model school,** Mission mor_ Road Ref.No **593:** The local integration value of this school is 1,402 that is below mean Integration value (1.903)**.**So this school should be more integrated to the whole city. **Mission Girls High School**, Court road _ Road Ref.No **3038:** The average local integration value of this school is 1.814 that is below mean Integration value (1.903)**.**So this school need more integration to the whole city to attract more students. **Rajshahi Govt. Girls High School,** Helenabad_ Road Ref.No **4106:** The average integration value of this school is 1.33 that is below mean local Integration value (1.903)**.**So this school need more integration to the whole city to attract more students. **Rajshahi University School,** Rajshahi University_Road Ref.No **2276**: This school is situated within the Rajshahi University area. The average integration value of this school is 1.57 that is below mean Integration value. Need a little bit integration with city to make the school more accessible.

d-3. Connectivity of access road

From table-1.3 we can see that the most connected road is the access road to Govt. PN girls High School, (Saheb bazar road).Second highest connectivity has the access road to Govt. Labratory School. It has higher Global Integration and Local Integration also. So These 2 schools has more accessibility and from local source it is found that they have more students than others. Mission Girls High School has a connectivity of 4 with higher Global and local integration value than mean. This is also well accessible.

Masjid mission academy, Rajshahi University School and Shiroil School has connectivity below mean value.Their Global and Local Integration value is also below mean level. So they supposed to be less connected to the city and that has an impact on their accessibility too.

Proposed spatial interventions and their effect:

Proposal on road network: After invalidation of the first Master Plan, RDA has prepared a new Master Plan named Rajshahi Metropolitan Development Plan (RMDP), 2004-2024. Under this RDA has planned for the construction of some new roads and widening some existing busy roads. Which are:

a. Construction of Road from Shaheb Bazar to Gourhanga Mour

b. Widening of Road from Court to Bypass Road

c. Widening of Road from Natore Road (RUET) to Bypass Road

d. Construction of Road from Airport Road (Shalbagan Morh) to By-pass Connecting Road

e. Construction of Road from Bhodra Morh to Kazipara Rajshahi Bypass Morh

f. Construction of Road from TTC to Silinda Rajshahi By-pass Connecting Road

g. Construction of Road from Meherchandi Morh to Harian Rajshahi City By-pass Road

h. Construction of Road from Ramchandrapur Khorbona (Nator - Nawabgonj Road) via Mirere Chalk to Seroil Shatibagh Morh

Source_Rajshahi Metropolitan Development Plan_volume 1

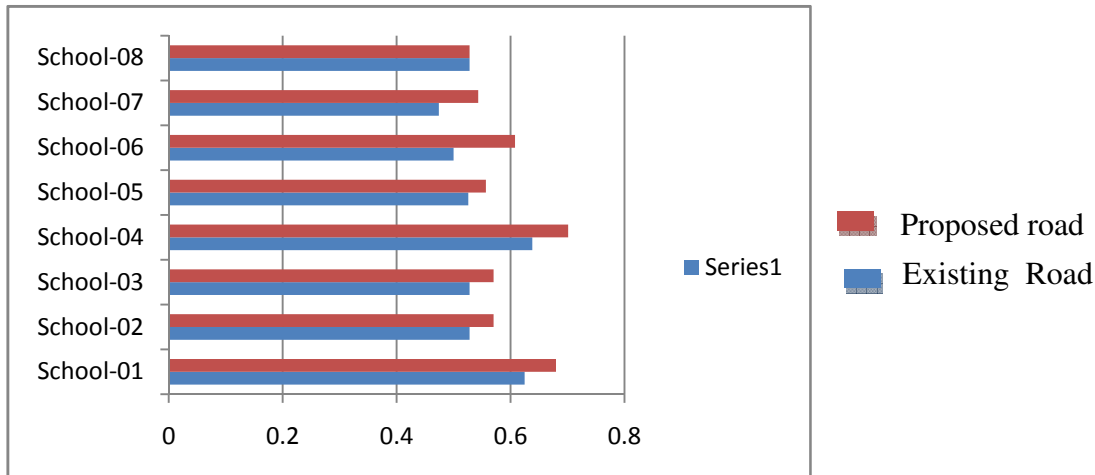

Fig: Global Integration of proposed master plan

Fig: Local Integration of proposed master plan

Fig: Connectivity of proposed master plan

No.	Area name	schools	Road (Rd)	Rd.Ref. No	HH	HH R/3	Connec-tivity
1	Saheb Bazar (Ganak Para)	Govt. PN girls High School	1	4370	0.68	3.103	13
2	Shiroil	Masjid mission academy	2	602	0.57	1.989	2
3	Shiroil	Shiroil School	3	602	0.57	2.398	2
4	Lakshipur mor	Govt.Labratory School	4	2831	0.701	2.869	8
5	Mission mor	Rajshahi model school	5	593	0.557	2.102	3
6	Court road	Mission Girls High School	6	3038	0.608	2.214	5
7	Helenabad	Rajshahi Govt.Girls High School	7	4106	0.543	1.76	4
8	Rajshahi University	Rajshahi University School	8	2276	0.528	1.57	2
	Max				0.701	3.103	13
	Min				0.57	1.76	2
	Mean				0.556	2.003	4.875

From the analysis it is found that proposed road will increase both integration and connectivity as well as accessibility of 8 selected schools.

Fig_Comparison - Global Integration of existing and proposed road

7. Concluding remarks: This paper provides a base of Intervention Strategy for the future Master Plan of Rajshahi City Corporation. If Educational Institutes are located at highly integrated area, these will be within people's daily movement network. So, the accessibility to the Educational Institutes of Rajshahi City Corporation should be improved by implementing intervention of this urban strategy to integrate the eight schools with the city grid. This paper, thus, suggests an Urban Intervention Strategy based on Space Syntax to integrate the Educational Institutes with the city.

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