A case study on walkability by GWI method to estimate the pedestrian walkability in Dilshad Garden: New Delhi

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ABSTRACT - *The main objective of this study is to calculate and analyze the Pedestrian Walkability and the specified steps to improve it on the basis of the data found during the study. There are various methods through which we can find out the Walkability Index, but in this study "Global Walkability Index Method (GWI)" has been taken into action. Global Walkability Index method is abbreviated as GWI method. As the name suggests "Global", this method is used worldwide to find out the walkability Index. World Bank uses this method for urban planning. This method quantifies the pedestrian walking conditions. This method was developed by H. Krambeck for both World Bank and Clean Air for Asian Cities (CAI – Asia). This walkability method has certain key parameters which should be taken into consideration, and genuinely this report has been prepared by taking care of those parameters. Some the key parameters are availability, maintenance, & continuity of the footpaths, safety towards crime, infrastructures for disables, car parking facilities, road cleanliness, road crossing safety for the pedestrians etc.*

Keywords: CAI – Asia, Global Walkability Index Method, H.Kramback, Pedestrian Walkability, Urban Planning, World Bank

1. INTRODUCTION

1.1. Walking

Walking is the minimum human function which is in action from the early ages of human civilization. In earlier days, humans walked in search of food, shelters and to protect themselves from animals and to travel one place to another. Before invention of wheels, humans used walking as a mode of transport to move from one place to other place. As humans civilized him from primitives to urban culture, walking duration of humans per days has been reduced as human use cars to travel to the larger distances. Now a days, walking is only restricted to home to office, or home to school/college or vice versa.

2. WALKABILITY

Walkability is a measure to find out that, how much the roads are favourable of walking of pedestrians. Factors which can influence the walkability are, footpaths, walkways, cycle tracks, traffic flows, density of residential areas, arboriculture, gaps between the buildings, entrance and exit of roadways, intersections, road markings, signalizations, parking of vehicles etc.
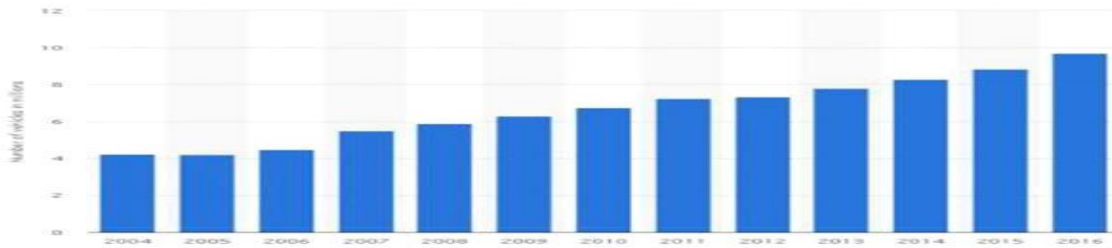
Chart – 1: Rise of Vehicles in Delhi in millions *(Source: Google, statista.com)*

3. WALKABILITY INDEX

Walkability index in a tool which was developed in lab to determine the walkability in a particular region for the pedestrian. It is used to measure the how the road environment and its physical conditions are suitable for pedestrian movements. It is also used to generate the walkability surfaces using GIS, generation of walkability values, land use percentage in transportation planning, it can also relate environment to the pedestrian movement flow.

3.1. Components of Walkability Index

Connection of streets – It is calculated by the number of road intersections in any particular junction.

Usage of land – It is measured by the different types of land which are used for the different purpose in the road, such as land for parking, land for residential colonies, lands for commercial use, lands for industrial purposes.

Density of commercial infrastructures – The quantity of area which is assigned to the usage for commercial purposes, such as retail shops, restaurants, commercial office etc.

Density of residential infrastructures – The quantity of area which is occupied by the residents, who are living in any particular area. Its value determines the number of people staying in that particular place.

3.2. Method of calculating Walkability Index

Global Walkability Index (GWI) – Global Walkability Index method is abbreviated as GWI method. As the name suggests "Global", this method is used worldwide to find out the walkability Index. World Bank uses this method for urban planning. This method quantifies the pedestrian walking conditions. Survey areas are selected in such a way that, entire major and important roads get covered. This survey should be conducted during the peak hours, because it is a public based survey. In this survey total number of people walking and riding vehicles are counted on one side of the street for 5 minutes of time. Traffic count survey length should be of minimum 200 m. This is a field survey method, where field surveyor has pre-defined questionnaire on his hand and he asks the pedestrians to rate the selected road stretch on a scale of 1 to 5. Where, (1 is the lowest and 5 is the highest value), in each selected area. The average of each variable then converted into a rating system from 0 to 100. Walkability rating in different types of area are derived by taking the average of the individual variable averages.

S. NO.	PARAMETERS	WEIGHTS
1	Walking Path Model Conflict	15
2	Security from crime	25
3	Crossing safety	10
4	Motorist behaviour	10
5	Amenities	5
6	Disability Infrastructures	10
7	Maintenance and cleanliness	10
8	Obstructions	10
9	Availability of crossing	5
	TOTAL	100

Chart – 2: Weights for different parameters (Source: CAI – Asia)

4. EQUIPMENT, MATERIALS, AND EXPERIMENTAL SETUP

Walkability Index method is abbreviated as GWI method. As the name suggests "Global", this method is used worldwide to find out the walkability Index. World Bank uses this method for urban planning. This method quantifies the pedestrian walking conditions. There are some factors and constituents which comes under the considerations of Global Walkability Index method.

- ➢ Chances of fatal accidents.
- ➢ Walkability Path Model.
- ➢ Safety at intersections/junctions.
- ➢ Driver's perception towards pedestrians.
- ➢ Conveniency of road amenities for pedestrians
- ➢ Maintenance and cleanliness of walkways.
- ➢ Facilities for blind pedestrians.
- ➢ Sitting facilities. Obstacles blocking pedestrians flow.
- ➢ Availability of zebra crossing at junctions.

4.1. Experimental Setup

Survey areas are selected in such a way that, entire major and important roads get covered. This survey has been conducted during the peak hours, because it is a public based survey. In this survey from each of the road, 30 pedestrians has been surveyed & taken feedback from each of them. In this field survey method, surveyor has pre-defined questionnaire on his hand and he asks the pedestrians to rate the selected road stretch on a different scales for each of the parameters mentioned on the questionnaire.

The average of each variable then converted into a rating system from 0 to 100. Walkability rating in different types of area are derived by taking the average of the individual variable averages.

Fig – 1: Map showing the full street view where total field survey has done
(Source: GoogleMap)

Chart – 3: Field survey questionnaire format *(Source: CAI – Asia)*

5. OBSERVATIONS & CALCULATIONS

Table Showing Walkability Index of each of the Streets, Traffic Rotaries & Intersections

S. NO.	PARAMETERS	Road - 1 (OVER ALL AVERAGE)	Road - 2 (OVER ALL AVERAGE)	Road - 3 (OVER ALL AVERAGE)	Road - 4 (OVER ALL AVERAGE)	Road - 5 (OVER ALL AVERAGE)	Road - 6 (OVER ALL AVERAGE)	Road - 7 (OVER ALL AVERAGE)	Road - 8 (OVER ALL AVERAGE)	Road - 9 (OVER ALL AVERAGE)	Road - 10 (OVER ALL AVERAGE)	Traffic Rotary - 1 (OVER ALL AVERAGE)	Traffic Rotary - 2 (OVER ALL AVERAGE)	Intersection - 1 (OVER ALL AVERAGE)	Intersection - 2 (OVER ALL AVERAGE)	Intersection - 3 (OVER ALL AVERAGE)
1	Walking Path Model (15)	11.28	13.67	13.33	12.99	13.22	13.6	11.55	12.92	13.25	13.83	4.42	10.45	10.66	11.95	13.33
2	Security from Crime (25)	12.29	19.65	20.69	20.88	22.24	22.3	15.98	13.73	19.51	23.2	19.82	21.06	22.37	18.96	20.73
3	Crossing Safety (10)	4.06	7.13	6.97	5.3	6.69	8.06	7.94	5.69	8.27	8.8	3.67	6.39	7.59	7.1	6.46
4	Motorist Behaviour (10)	4.78	7.01	5.3	5.95	6.17	7.61	7.46	6.9	7.73	7.25	3.27	6.4	6.98	7.4	6.25
5	Amenities (5)	3.87	4.06	4.14	2.93	4.15	3.24	3.91	3.58	3.56	3.77	2.6	4.25	3.89	3.13	2.91
6	Disability Infrastructures (10)	1.29	1.7	1.66	1.1	1.3	1.2	1.16	1.1	1.03	1.1	1.08	1.03	1.3	1.3	1.2
7	Maintenance & Cleanliness (10)	8.25	8.8	8.73	6.43	6.99	7.68	6.08	8.44	8.16	9.06	5.98	8.53	7.98	7.55	6.25
8	Obstructions (10)	7.55	9.23	6.45	5.12	5.66	7.7	5.65	8.45	6.94	7.24	7.29	7.17	7.04	7.4	6.08
9	Availability of Crossing (5)	2.32	3.35	4.26	5.74	3.09	3.69	4.02	3.84	3.92	4.27	2.53	3.79	4.06	3.38	3.28
	WALKABILITY INDEX IN SCALE OF (100)	55.69	74.6	71.53	66.44	69.51	75.08	63.75	64.65	72.37	78.52	50.66	69.07	71.87	68.17	66.49

Chart – 4: Chart Showing Walkability Index of each Streets, Rotaries & Intersections

Graphical representation of the Walkability Index of each Street, Traffic Rotary & Intersection
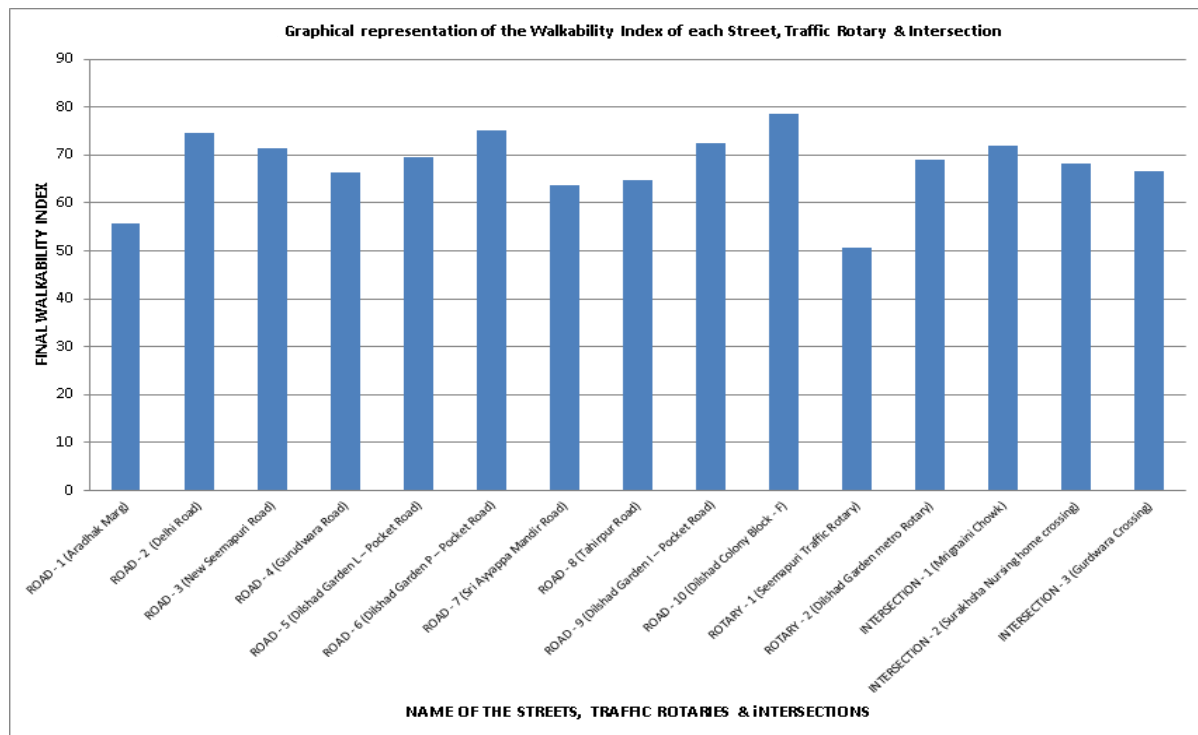
Chart – 5: Graphical representation of the Walkability Index of each Street, Street Rotaries & Intersections

6. CONCLUSION OF THE CASE STUDY

1. **Based on the calculations, the walkability Index of Dilshad Garden has turned up 67.89 out of 100.**

2. According to the pedestrian response received, the condition of traffic rotaries and intersection are more better than the straight streets.

3. Response on the disability infrastructures section on all the streets, traffic rotaries & intersection are almost NIL.

4. Public rating on Security from crime is also not very impressive, where as it consists the highest points among all the parameters.

5. Walk Path Model performs lower in the traffic rotaries & intersections as compared to streets.

6. Although according to the response it found that, road pavements are more maintained than walkways in terms of cleanliness and tidiness.

7. Performance of crossing safety is more or less same in every type of road for the pedestrian. Low performance of crossing safety leads to difficult for aged pedestrians to cross the road safely.

8. Due to lack of walkability facilities more aged pedestrians like above 70 or above 80 doesn't roam around for morning and evening walk.

9. Due to littering of sellers and beggers on footpath, sometimes pedestrians are bound to walk on the roads.

10. Due to poor traffic facilities intersections and rotaries gets more conjusted during the peak hours.

11. Behaviour of motorist towards pedestrians are not so impressive, according to pedestrians response it varies from (6 to 7) in scale of 10.

12. According to the survey result, Government has provided walkways for the pedestrians, but due to bushes, tresses somewhere, sellers, parking of cars and bikes, illegal constructions causes obstructions for the pedestrian walk flow.

7. SUGGESTED SOLUTION FOR THE CASE STUDY

1. Pedestrian facilities for disables should be taken into consideration. Provision for handicapped walkways should be implemented.

2. Speed breakers and stop line is recommended before any crossing or intersection.

3. More traffic police booths should be implemented on the busy roads to avoid and to reduce the attacks of vagabonds.

4. Beggers and illegal sellers on walkways should be banned to improve the pedestrians movement flows.

5. Movement of large vehicles should be restricted in a specific time interval somewhere after mid-night to reduce fatal accidents.

6. Illigal parking on the side of the roads should be banned and should be reserved for the residents staying in that area.

7. Wrong side movements of vehicles should be heavily fined to avoid the unwanted traffic jams and which causes accidents in peak hours.

8. Provision of right of way should be implemented because during peak hours, roads becomes highly conjusted and chances of fatal accidents may occur.

9. Width of the traffic rotaries should be increased for the smooth turning of the medium and big vehicle.

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