Study on Safety of Side Walk ability Facilities In Urban Roads

"A Review Paper"

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Abstract: *Compared to Indian cities 70 percent of side walk facilities are not available In Srinagar city (Srinagar Metropolitan area). According to Master plan of Jammu and Kashmir state, India. And Study on Walk ability Indicators as per 4C rule, segment qualitative, safe Design guide lines of Sidewalks and Comparison of Indian cities with Other Asian cities based On the walk ability Rating analysis. In future there is a scope of study to construct the new lane of Sidewalk facilities within Srinagar city.*

Key words: *Sidewalks, Walk ability Indicators, Segment qualitative, Walk ability ratings, Safety Dimensions (like Connectivity, Convenience , Comfort and Conviviality) .*

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1. Literature review:

Origin of walk ability research and studies: One other significant issue in walk ability measurement has been the origin of the research and studies that form the basis of measurement methodologies. Different cultural and psychosocial contexts result in different attitudes and preferences towards walking. Moreover the urban environment differs greatly from city to city and from country to country. The recent concerns on sedentary lifestyle impacts on public health have been a driver for the increase in walk ability research, and such concerns have come mainly from new world countries, namely USA and Australia. Bourdeaudhuij (Bourdeaudhuij et al. 2005)[5] has noted that only few studies have looked at the built environment-walking behavior relationships in Europe. Although the results of European studies on the psychosocial correlates of physical activity have been found to be similar to findings from the USA, Australia and Canada, India the physical environment in Europe differs greatly from that in those other parts of the world.

2. Previous research of Multiplicity Sidewalk Indicators:

The variations found in the urban environment have also contributed to the remarkable quantity of built environment features being addressed as indicators for walk ability measurement. A review of a small sample of walk ability measurement methodologies has identified approx.34 different indicators that illustrate the multiplicity of approaches.

Some of the listed indicators may express local concerns or simply the researcher's perspective of what factors were more relevant to the walk ability assessment. As referred previously, not all of the reviewed methodologies that use these indicators have been validated, and there hasn't been, to date, sufficient scientific evidence to support such indicators. Nevertheless, in the scope of this research, the indicators of the model developed and presented from the indicator list. The indicators are classified according to the walk ability dimensions, or in other words, to the 4Cs table no1.It has been shown, in this table, the relevance of walk ability measuring for urban management, as it can provide factual data for planning practitioners and policymakers (and for population in general) in terms of benchmarking, monitoring and decision analysis.
Although being a relatively recent field of work, the development of walk ability measurement methodologies has been gaining worldwide attention, resulting in a considerable variety of approaches. The lack of sufficient theoretical frameworks and scientific evidence on the relative importance of the different built environment features that influence walking has not been seen as a constraint for the development of walk ability measurement methodologies.

A multiplicity of indicators has been used in the literature but more research was considered needed in order to understand their importance given below table1

Dimension	Subgroup	Indicators	Reference
Connectivity	Sidewalk	Availability of sidewalk Pedestrian facility provided Pedestrian network coverage Sidewalk continuity Sidewalk density	Maghelal 2010[8] Dixon 1996[6] Steiner et al 2004[5] Maghelal 2010[6] Moudon 2006
		Maintenance Maintenance and cleanliness of walking path	Dixon 1996 [6] Krambeck 2006[2]

Convenience	Side walk	Number of curb cuts per intersection Obstructions Path width Permanent and temporary obstacles on walking paths Sidewalk slope Sidewalk width Sidewalk with special pavement (%) Street width Width of outside lane Width of outside lane Width of shoulder or bike lane Average width of walking zone Average, Maximum and Minimum width Deviation around obstacles Existence and quality of facilities for the blind and disabled Footway accessibility Footway quality Footway width Hazards (surface, tripping)	Maghelal 2010[9] Gallin 2001 Gallin 2001 Krambeck 2006[2] Maghelal 2010 Landis 2001[7] Park 2008[1] Evans 2009 Landis 2001[7] Landis 2001 [7] Landis 2001[7] Park 2008 [1] Abley 2011[4] Abley 2011 [4] Krambeck 2006[2] Space Syntax 2003[9] Space Syntax 2003[9] Evans 2009 Abley 2011
Comfort	Side walk	Location of sidewalk (distance from edge of the road) Surface quality Average width of landscape trip Average width of on street parking Buffer width Average length of off-road path	Landis 2001[7] Gallin 2001 Park 2008[1] Park 2008[1] Maghelal 2010[8] Maghelal 2010[8]
Conviviality		Sidewalk length with fence (%)	Maghelal 2010 [8]

Table1: Walk ability indicators related to the Connectivity, Comfort, Convenience and Conviviality dimension

3. Methodology:

i).Indicator selection and Operationalization

It is common to find in the literature the term "indicator" referring to the elementary viewpoint descriptors. The indicators can be understood then as the operational measurement of the concerns, and a long list of concerns may result in an equally long list of indicators. As noted in Park's research, the selection of candidates of possible walk ability indicators tried to be as inclusive and detailed as possible, to the point when the question arose of how many attributes and how much detail could be measured without losing objectivity (Park 2008),[1].

The MCDA literature states that the selection of fundamental and elementary viewpoints (and therefore, indicators) should be consensual, exhaustive, non-redundant, and as concise as possible (Bana e Costa and Beinat 2005),[3]. It should be concise in order to include only the essential in the model; non-redundant in order to avoid double-counting and exhaustive to avoid leaving out important viewpoints.

The model should also be concise in order to avoid the common temptation of taking everything into account, generating the "information pollution" (Hobbs & Meier 2000 cit Bana e Costa and Beinat 2010), [3].In which the information generated is in such quantity that it cannot be digested by the actors. Accounting for too many criteria is pointed out as a common weakness found in multi criteria analysis. (Bana e Costa and Beinat 2010),[3].

ii).Segment qualitative:

In terms of street level walk ability assessment, the segment qualitative techniques have been known as "street auditing" and have been widely used, greatly to its simplicity and implementation ease (when compared to the quantitative technique). In this technique, for each of the considered relevant factors that affect walking, a set of qualitative judgments is indicated, usually in verbal expressions or by the means of pictures/illustrations. Within each factor, each set of judgments has a score associated. The factors may or may not have an associated weight. The Pedestrian LOS Performance Measures, developed by Dixon (Dixon 1996),[6].

iii). Safe Design guide lines of Sidewalks:

Sidewalks are walkways parallel to the roadway and designed for use by pedestrians. Sidewalks should be provided along both sides of roadways that are in or within one mile of an urban area. If sidewalks are constructed on the approaches to bridges, they should be continued across the structure. If continuous sidewalks are constructed on only one side of the street, pedestrians should be provided access to facilities and services located on the opposite side of the street.

The minimum width of a sidewalk is 5 feet when the sidewalk is separated from the back of curb by 2 feet or more. If the sidewalk is located adjacent to the curb, the minimum width of sidewalk is 6 feet. Wider sidewalks are appropriate in locations where higher levels of pedestrian activity are expected.

Grades on sidewalks must not exceed 5% when not adjacent to a travel way unless accessible ramps are provided. There should be enough sidewalk cross slope to allow for adequate drainage; however, to comply with ADA requirements, the maximum cross slope is 2%. A clear 1-foot wide graded area with a maximum 1:6 slope should be provided adjacent to the sidewalk. Edge drop-offs should be avoided. When drop-offs cannot be avoided, they should be shielded as discussed in Section 8.8.Provide a 5-foot wide (minimum) sidewalk that connects a transit stop or facility with an existing sidewalk or shared use path. Evaluate the appropriate termini for pedestrian facilities (i.e., connect to existing sidewalk, pedestrian crossing or access point). Contact the District sidewalk/Pedestrian/Bicycle Coordinator for input on making a determination regarding continuous passage. For roadways with flush shoulders, place new sidewalks in the following order of desirability: (i) As near the right of way line as possible. (ii) Outside of the clear zone. (iii) Five feet beyond the limits of the full width shoulder. (iv) At the limits of the full width shoulder. Sidewalks are not to be constructed directly adjacent to the roadway or shoulder pavement. Nearing intersections, the sidewalk should be transitioned as necessary to provide a more functional crossing location that also meets driver expectation. Further guidance on the placement of stop or yield lines and crosswalks is provided in the MUTCD, Part 3and the Design Standards, Indexes 17344 and 17346,[11].

4. Comparison of Indian cities with Other Asian cities:

a. Based on the Availability of Walking paths.

City name	Rating(out of 100)
Average of Indian cities(A.I.C)	45
Average of Other Asian cities(A.O.A)	58
Average of Hong Kong city(A.H.K)	75

b. walking path Modal conflict.

City name	Rating(out of 100)
Average of Indian cities(A.I.C)	52
Average of Other Asian cities(A.O.A)	65

Average of Hong Kong city(A.H.K)	80

Source: Walk ability of Indian cities.

5. Results and conclusions:

The below graph results shows based on The Availability of walking paths and walking modal conflict- rating analysis, Average of Indian cities are very poor walk ability.

a. Based on the Availability of Walking paths.

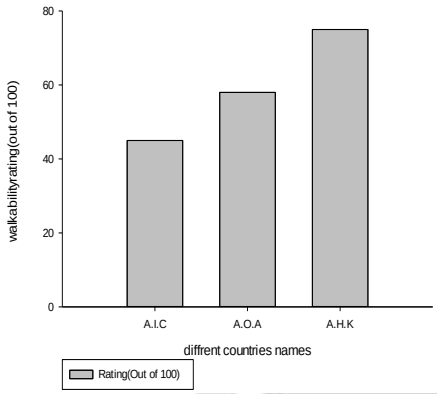

Figure i

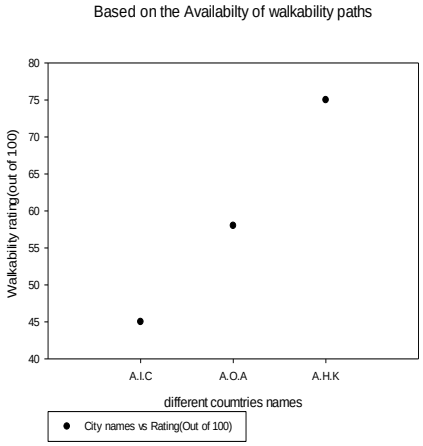

Figure ii

b. walking path Modal conflict.

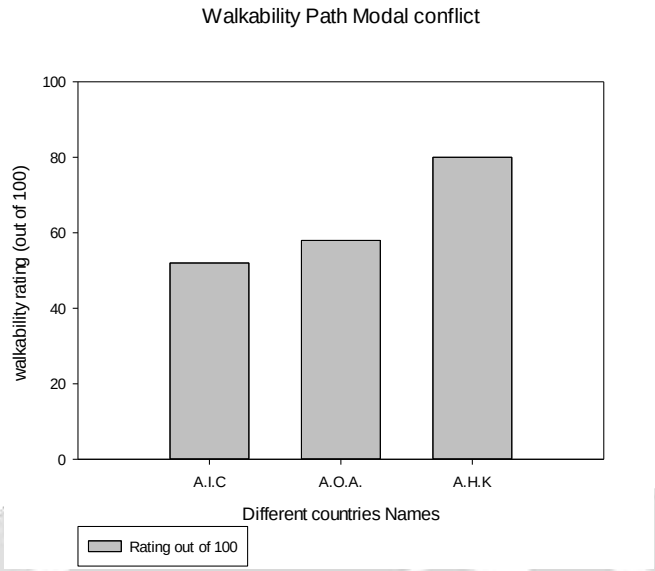

Figure iii.

Note: A.I.C means Average of Indian cities, A.O.A Means Average of Other Asian Cities, A.H.K means Average of Hong Kong Cities.

Conclusion: compare to Indian cities the availability of walking path rating & Modal conflict is more for other Asian cities and Hong Kong city. Indian cities are very poor sidewalk facilities in Urban Areas.

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