

# Enhancing Walkability in Brick & Mortar Retail Markets: Case Study of Chaura Bazar, Ludhiana

Raminder Kaur\*, Mahendra Joshi

School of Architecture of Design, Lovely Professional University, Phagwara, Punjab, India

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**Abstract** Purpose – In success of brick and mortar (B&M) retail markets, pedestrian friendly urban design plays a pivotal role. Variables affecting walkability have significant social, economic and environmental benefits in B&M retail markets. Through qualitative analysis from field and public agency survey, this paper evaluates the walkability index of retail markets in and along, Chaura bazar road, Ludhiana. Design/ methodology/ approach – Safety, Comfort and Convenience are three important pillars for sustainable urban design for pedestrian in B&M retail markets. Multiple methods including Global walking Index (GWI), Pedestrian Environment Data Scan (PEDS) and Ministry of Urban Development (MoUD) are available to measure urban environment related to walking in particular region. For analysis of selected market, GWI method was chosen owing to the fact that it is the best worldwide applicable method to perform walkability qualitative analysis. Findings – Irrespective of the fact that pedestrians are the most important users in B&M retail markets, Walkability Index of study area is 27, which is minimal walkable range. Thus, to increase walkability, it is much needed for architects, planners and policy makers to implement actions to improve safety, comfort and convenience of pedestrian in all potential B&M retail markets. Originality – Walkability is one of the important concepts in urban planning and this paper highlights influencing factors to promote walking in B&M retail market. Indeed, in cities like Ludhiana, huge potential in retail industry is available, thus qualitative analysis of B&M retail markets is needed to attain a sustainable urban environment. Under scope, in terms of walkability,

existing markets in Chaura bazar, Ludhiana have been analyzed.

**Keywords** Pedestrians, Comfort & Convenience, Safety, Urban Planning, GWI and B&M Retail

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## 1. Introduction

### 1.1. Walkability- A Step towards Sustainable Urban Environment

Traditionally, Asian cities were planned which supported walking and it was one of the main means of urban transport [1]. Eventually with advancement in technology, urban planning shifted from pedestrian to motor-oriented designing, but keeping future in mind for sustainable urban environment, attention should be given to pedestrian friendly urban planning. Considering pedestrian friendly design well-established literature is available which depicts that along with social, economic, environmental benefits, it has positive impact on physical and mental health of user in urban environment. For health benefit of population, planners should create environment which rely on walking and cycling rather on private motor vehicles [2]. In urban environment face-to-face contact is very important for efficient communication, socialization, solving incentive problems and provides psychological motivation [3]. Pedestrian oriented, mixed used neighborhood design enhances social capital by increasing

interaction among users [4]. For B&M retail markets, urban environment should be designed keeping pedestrian user safety, comfort and convenience on priority for sustainable design. In pedestrian oriented markets, social interaction is the maximum and customer feels connected with surroundings.

Walkability is a measure to find the condition in favor of walking. It improves drastically when users feel command over the streets they walk; contrarily pedestrian users feel discomfort when streets seem to be commanded by no one [5]. To promote walkability, steps should be incorporated in policies which will enhance tourism [6]. In retail market factor like, footpaths, walkways, traffic flow, entrance and exit of streets, shaded path etc., effects walking behavior of customer. In urban environment factors like enclosure, edge condition and block length are significant to understand inner quality of walkable neighborhood [7]. By enhancing quality of pedestrian environment with regard to safety, quality of path, path context etc., user would be encouraged for walking over other means of motorized mode [8].

### Walkability Index

Significant evidence assist link between urban environment and physical activity. Walkability index score rely on physical characteristics of urban environment including density, sidewalk presence, intersection density and like, and its calculation is helpful in creating better urban environment for physical, social and environmental benefits. Although, plethora of walking audit tools, from highly subjective to highly objective, are proposed and tested, but selecting method to calculate walkability index depends on audit participants, data needs and available resources. Before selecting method to measure walkability index of selected markets, review of some walkability analysis was done.

Firstly, measurements of access to destinations are popularly illustrated by website WalkScore.com and it supports only the United States, Canada, and Australia. Although it also can be applied in other countries, results

are not reliable. It was created by Jesse Kocher and Matt Lerner, launched in 2007, works on bases of its distance to the nearest amenity in each category. Quality aspect is not considered in this method, thus making its use limited to particular research only. Pedestrian Environment Data Scan [9] is well-established proposal among plenty of tools for measuring pedestrian infrastructure, which consider 36 items, to assess quality of the walking environment at street level. It was also designed with context of the United States in mind but in contrast Global Walkability Index [10] was developed for global application. It was designed and applied in USA, Washington, DC and in Ahmedabad, India. In 2008 walkability index was thrived by Ministry of Urban Road Development, Government of India, in which calculation is based on ease of access for pedestrian and their facility standards. Limitation of this method is that it is strenuous to evaluate which parameters like, safety, comfort, convenience, disability infrastructure, etc. needs enhancement. In 2008 MoUD [11], calculated the walkability index in 30 major cities in India. As per report mean walkability of India was 0.52 and Chandigarh was ranked on top with walkability index 0.92.

The walk score, which is calculated on the basis of selected method of calculating walkability index will provide the number between 0 to 100. Generally, the range as mentioned below will assess the study area and will provide information for planners and policy makers to implement various actions to be incorporated for improvement in walkability.

- 90 to 100 Walker's paradise
- 70 to 90 Efficient for walking
- 50 to 70 Moderately walkable
- 25 to 50 Minimal Walkable
- 0 to 25 Uncomfortable for walking

### Global Walkability Index

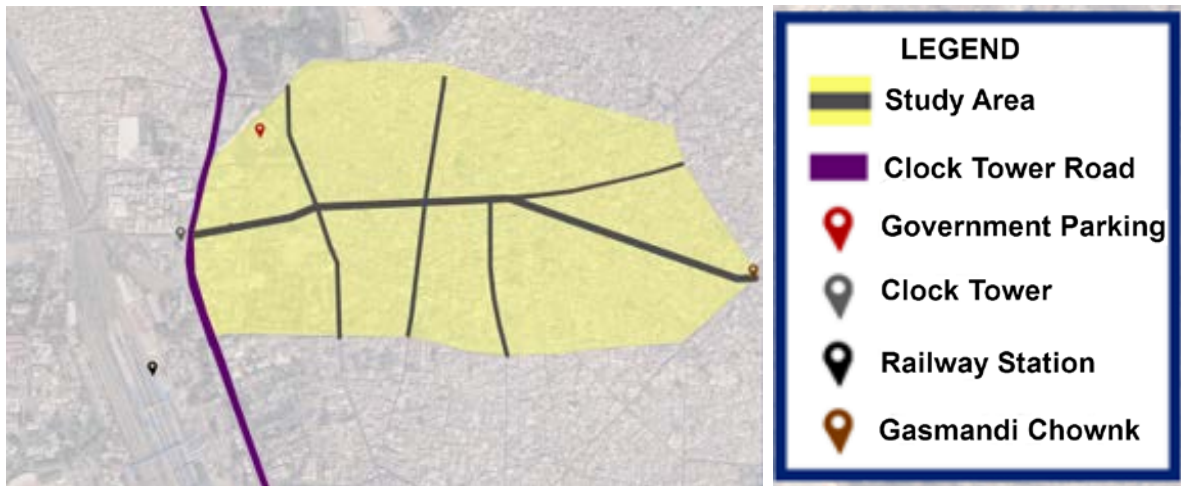
Walkability index under this method include three components i.e., safety, convenience and policy support. Overview of components and variables is provided in Table 1.

**Table 1.** Overview of components and variables, Source: [10]

Component	Variable
Safety & Security	<ul style="list-style-type: none"> <li>• Proportion of road accidents that resulted in pedestrian fatalities</li> <li>• Walking path modal conflict</li> <li>• Crossing safety</li> <li>• Perception of security from crime</li> <li>• Quality of motorist behavior</li> </ul>
Convenience & Attractiveness	<ul style="list-style-type: none"> <li>• Maintenance and cleanliness of walking paths</li> <li>• Existence and quality of facilities for blind &amp; disabled persons</li> <li>• Amenities (e.g., coverage, benches, public toilets)</li> <li>• Permanent and temporary obstacles on walking paths</li> <li>• Availability of crossings along major roads</li> </ul>
Policy Support	<ul style="list-style-type: none"> <li>• Funding &amp; resources devoted to pedestrian planning</li> <li>• Presence of relevant urban design guidelines</li> <li>• Existence &amp; enforcement of relevant pedestrian safety laws &amp; regulations</li> <li>• Degree of public outreach for pedestrian &amp; driving safety etiquette</li> </ul>

**Table 2.** Overview of two types of surveys, Source: [10]

Public agency survey	Field survey
Data which could not be collected through physical infrastructure survey like, pedestrian fatality statistics, pedestrian related regulation and like, is collected under this survey.	It is used to collect data like, crossing safety, amenities, disability infrastructure, which is collected by surveys within local populations to prevent bias results.
Data is collected from administrators in the selected area who are responsible for urban and transport planning.	10 stretches of road are surveyed on a scale of measurement of 1 to 5 (1 entity is lowest, 5 highest) rating.

**Figure 1.** Study Area, Source- (Author)

Global walkability index includes, a field survey and a public agency survey, overview of which is provided in Table 2

In Global walkability index, weights of all variables are equal owing to the fact; one group may believe that variable related to disability should receive more weight, whereas other group may believe security would be weighed more. For stability, field survey should be performed during peak period and length of street to be surveyed ranges between 0.2 to 0.4 km. Walkability index is the summations of results derived from public agency and pedestrian facility rating. This method along with identification of pedestrian preferences, also analyze government policies.

Both tangible and intangible variables have significant social, economic and environmental benefits in B&M retail markets. Global walkability index is remarkable and subjective qualitative index which relies on the context-sensitivity. In addition, it was precisely developed for worldwide application and because of these reasons; GWI method has been selected for this research.

## 2. Study Area and Research Methodology

### Survey area

Ludhiana, with an area of 159 km<sup>2</sup> is the largest city of Punjab, along with this; it is major trading hub for import &

export in North India. Chaura bazar, a century old market is the commercial hub of Ludhiana city having diverse shops including, clothes, footwear, utensils, weeding wears etc. Study region of retail markets in and along, Chaura bazar, from Clock tower chownk to Ghass mandi, is shown in Fig 1.

For case study, 10 stretches of length varying between 0.2-0.4 km of B&M retail markets in and along, Chaura bazar road are selected. Selected stretches of B&M retail markets along with length are marked in Fig 2.

### Data Collection

As per requirement of Global walkability index calculation, data is collected in two steps, first from local users and second from Municipality administrators in the selected area through surveys forms.

Step 1 (Field survey): - Under this survey, data is collected from selected 10 stretches, through field data collection form measuring nine variables as briefed below:

- Walkability Path Conflict Model- Level of mixing between vehicular traffic and pedestrian is assessed under this criterion.
- Crossing Safety- At signalized crossings, the safety of crossing the street is assessed under this criterion.
- Security from Crime- During survey, this variable judge safety from crime as perceived by surveyor.
- Motorist Behavior- This parameter evaluates drivers regard towards pedestrian safety and road safety laws.

- Amenities (Cover, benches, public toilets, street lights)- Amenities, like street lighting, benches, shade etc. for enhancing walkability are assessed under this criterion.
- Disability infrastructure and sidewalk width- Infrastructure is assessed, with regard to pedestrian friendliness of people with disability under this variable.
- Maintenance and Cleanliness- This parameter evaluates maintenance and cleanliness of walking path.
- Obstructions- Under this variable, due to obstruction of any kind like, waste dumped, electric poles, trees, parked vehicles etc., movement of walking path is assessed.
- Availability of Crossings- As per traffic flow, under this criterion availability of signal is assessed.

Step 2 (Public agency survey): - Under this survey, data is collected from Municipality administrators, through public agency survey form measuring remaining five variables as briefed below:

- Proportion of road accidents that resulted in pedestrian fatalities- Under this variable, pedestrian fatalities and injuries are assessed.
- Funding & resources devoted to pedestrian planning- Financial and other resources dedicated to pedestrian planning are sufficient or not, is assessed.
- Presence of relevant urban design guidelines- Urban design guidelines related to pedestrians is assessed.
- Existence & enforcement of relevant pedestrian safety laws & regulations- Under this variable,

availability and implementation of regulation and law is assessed.

- Degree of public outreach for pedestrian & driving safety etiquette- Under this variable, efforts related to road and pedestrian safety is delivered or not, to drivers as well as pedestrian are assessed.

### Method to calculate Walkability index

Step1- For each surveyed area, field data was collected in peak time on business day, to record Level-of-Service (LOS) for mentioned nine variables under field survey in data collection, on a scale of measurement of 1 to 5 (1 entity is lowest and 5 is highest). To standardized results, calculation is done as per below equation:

- Each LOS X Pedestrian count X length of surveyed road X10 / 10

To evaluate final average, calculation is done as per below equation:

- Sum of unweighted averages / the total number of survey areas

Step 2- To calculate scores of this survey, data was collected from administrator of municipality, Ludhiana, with regard to each variable and points were assigned to response for 5 questions. Final average is acquired from the sum of points evaluated under 5 variables as per GWI method.

Step 3- The final GWI is derived by adding average of field survey and average of public agency survey. Through this method along with pedestrian preferences, government policies are also considered for final calculation of walkability index.

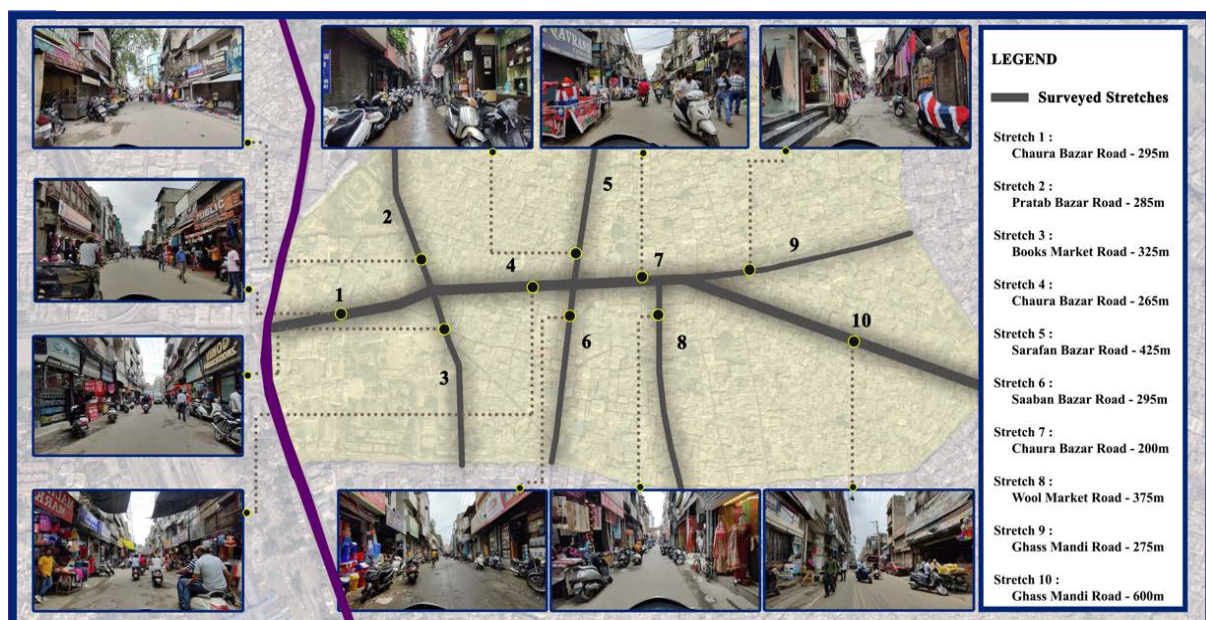
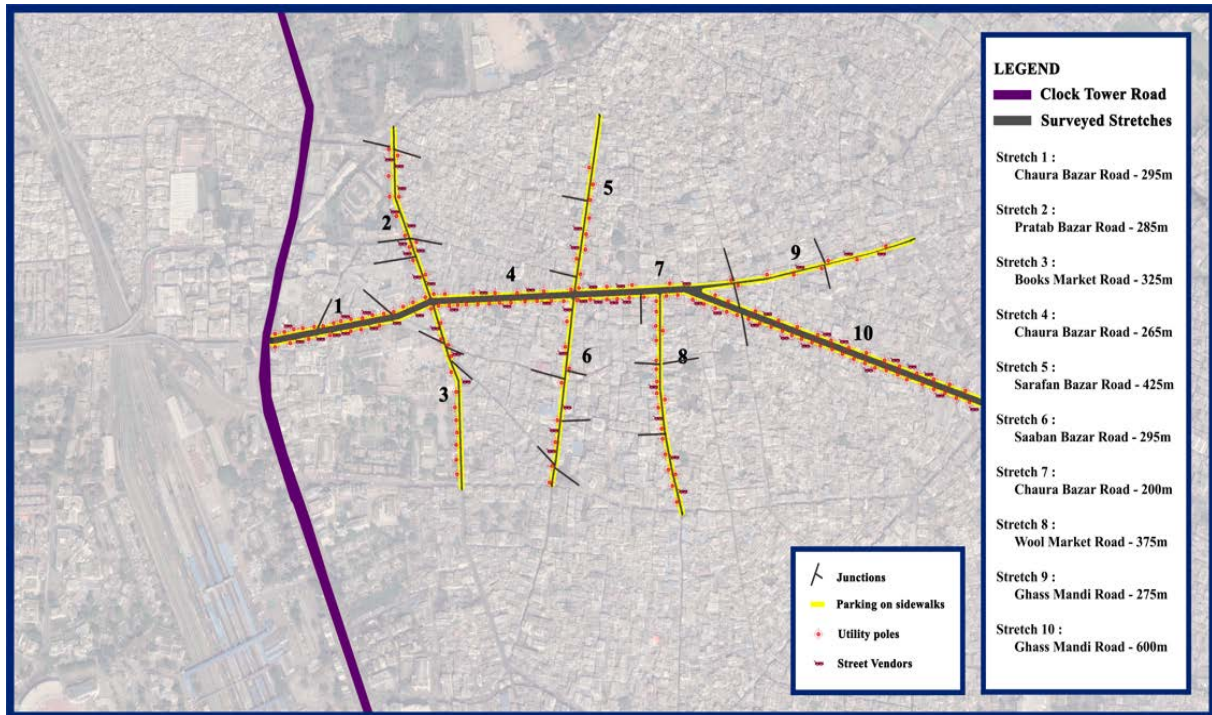


Figure 2. Surveyed Stretches, Source: (Author)



Source: (Author)

**Figure 3.** Obstruction (parking on sidewalk, utility poles & street vendors)

### 3. Results and Discussion

#### 3.1. Field Survey Findings

For each area, with help of five local volunteer, mostly undergraduate architecture student, who were trained in audit application, assessed pedestrian condition according to nine criteria of GWI. During survey, questions related to walking attitude and basic amenities were asked to 20 to 25 people in each stretch and below observation with regard to nine variables are mentioned:

- Walkability path conflict model and obstruction: - Surveyed 10 stretches along with parking in sidewalk, utility poles and street vendors are depicted in Fig 3.
- In stretch 1,4,7 and 10, width of road is sufficient for movement but due to obstruction by two-wheeler parking and utility poles on both sides conflict in movement was observed. In stretch 2, 3 and 6, conflict was more, firstly because of parking and secondly due to its less width. Lastly, in stretch 5,8 and 9, conflict was maximum as width was too less for pedestrian movement and two wheelers. In addition, in stretch 5,8 and 9, construction and material waste were also dumped on sidewalk. Street vendors were also present in large number in almost all stretches.
- Availability of Crossings, Crossing Safety & Security from Crime: - In junctions of all stretches like, cross, T or Y, no signals were provided. In stretch 1,4,7 and

10, it was safe to cross but in all other stretches it was difficult for pedestrian to cross streets due to many reasons like, parking, moving vehicles, street vendors and waste dumped on street. Markets were having their own security guards to protect people and property from thieves at night. As per response of retailers and customers, area was secured from crime.

- Motorist Behavior, Maintenance and Cleanliness: - Overall in all stretches rules and regulation were not obeyed by motorist. Stretch 1,4,7 and 10, were clean as compared to other stretches. Stretch 2,3,5,6,8 and 9, were not clean firstly because of waste dumped from shops and secondly due to unhygienic condition of public toilets.
- Amenities, Disability infrastructure and sidewalk width: - Under amenities, firstly, considering public toilets, they were present in stretch 1,2,3,6 and 10, but toilets in stretch 2 and 3 were not maintained. Water point was available only in stretch 1. Street lights were also not sufficient in majority of stretches. Overall, in all stretch's sidewalk was mostly covered with parking and utility poles. Planning consideration with regard to disable people was not there in any stretch. Public toilets, water point and street lights are depicted in Fig 4.

As per observations from retailer and user, rating on a scale of measurement of 1 to 5 (1 entity is lowest, 5 highest) was done and average of them was calculated.

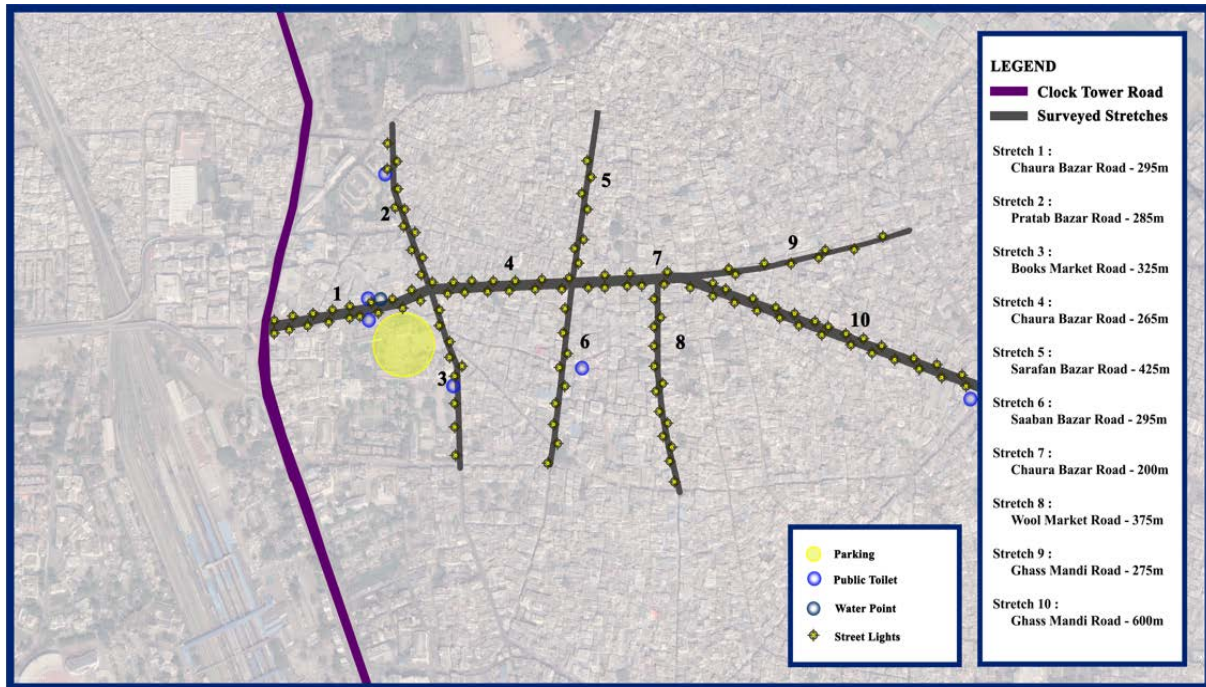


Figure 4. Amenities (parking, public toilets, water point & street lights), Source: (Author)

Table 3. Field Survey Result, Source: [10]

Variables	Surveyed Road Stretches										Σ (Each LOS* length* count* 10)/10
	1	2	3	4	5	6	7	8	9	10	
Walkability Path Conflict Model	4	3	3	3.5	2	3	3.5	2	2	4	17.3
Crossing Safety	4	3.5	3.5	4	3	3.5	4	3	3	4	20.7
Security from Crime	4	3.5	3.5	4	3.5	3.5	4	3.5	3	4	21.5
Motorist Behavior	3	2.5	3	3	2.5	3	3	2.5	2.5	3	16.5
Amenities (Cover, benches, public toilets, street lights)	4	3.5	3.5	2.5	2.5	3	2.5	2.5	2.5	4	18.2
Disability infrastructure & sidewalk width	2.5	2	2	2.5	2	2	2.5	2	2	2.5	12.9
Maintenance and Cleanliness	4	3	3	4	3	3	4	3	3	4	19.9
Obstructions	3.5	3	3	3.5	2	3	3.5	2	2	3	16.2
Availability of Crossings	2	2	2	2	2	2	2	2	2	2	11.8
Pedestrian Count	20	20	25	20	25	20	20	25	20	25	
Surveyed Stretch Length in km	0.2	0.2	0.3	0.2	0.4	0.2	0.2	0.3	0.2	0.4	
Unweighted Average											15.5

Response of 9 variables through field survey and as per GWI calculation, unweighted average is presented in Table 3. The average field walkability survey of B&M retail markets in and along, Chaura bazar was found to be 15.5.

### 3.2. Public Agency Findings

For selected area, data is collected from administrators

of municipality and assessed laws/regulations and other relevant policy according to five criteria, which highlights existence and enforcement of rules and regulation as per authority of Ludhiana. In addition, financial and other resources which are dedicated for pedestrian safety in selected area were accessed. Response of 5 variables in form of questionnaire related to policies and awareness through public agency survey is provided in table 4.



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