

Analyzing the ideal urban commercial streets of India

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Abstract. The quality of the pedestrians' environment contributes immeasurably to the quality of public life in an urban environment. Pedestrians usually experience urban environments, while walking, which includes — visual qualities of the streetscape, other people's behavior, traffic density, safety, etc. Some streets lack the social sense of place. The focus of the streets has shifted from centering around people to vehicular traffic solutions. At present, Delhi's roads are designed for motor vehicles, and pedestrians' movement is an afterthought. Due to this, people are shifting from roads to personal vehicles. Experts say that urban road designs, which weighed heavily in favor of motor vehicles, force people to shift to personal vehicles, which is eventually forcing people to shift to personal vehicles, further increasing vehicular congestion and pollution. Therefore, a new model of streets is required, that transforms a street into places that encourage social livingness. The research aims to develop design guidelines for improving pedestrians' experience on urban commercial streets. Key features that influence the pedestrians' movement in Delhi will be identified through various cases studies and surveys. According to that, design guidelines for improving the experience on urban commercial streets will be developed. Conclusively, a good street design should not only be cognizant of pedestrian needs but should also enhance the legibility of elements that increase satisfaction with environmental values, and is likely to enhance pedestrian usage of the environment. Overall, the behavior of other pedestrians and our experience of place offers the most valuable clues to understanding how well the existing urban environment is working for its users.

Keywords – Pedestrianization, Street Design, Social Livingness, Urban Streets

I. INTRODUCTION

Streets rank amongst the most valuable assets in any city. They not only ensure residents' mobility, allowing them to travel from one place to another, but also are a place for people to meet, interact, do business, and have fun. But in the Indian scenario, one of the key problems is that the roads are designed from the centerline outwards, without taking the needs of all users into account. The median is marked and a carriageway is constructed, and the undefined outer area is left for other undefined purposes. After parking eats away a significant share of this area, pedestrians, trees, utilities, street vending, and social activities jostle for whatever space remains. It is no surprise that in most cases the leftover space is not sufficient to comfortably and safely accommodate these essential functions of the street. (Streets and Sunday) Making streets more efficient, not simply widening them, can help solve our mobility problems. All streets that aim to maximize mobility also need separate slow zones. The slow space is for livability—for people to walk, talk, and interact, for doing business, for children to play. The provision of an adequate slow zone makes it possible for the mobility zone of a street to provide for safe, relatively uninterrupted mobility at moderate speeds. The result is a safer and more pleasant street environment for everyone. (Christopher Kost et al.)

1.1 National Urban Transport Policy (NUTP)

NUTP was formulated to ensure safe, affordable, quick, comfortable, reliable and sustainable transport system which is easily accessible to the growing number of residents of a city, this will be achieved by:

Incorporating urban transportation as an important parameter at the urban planning stage rather than being a consequential requirement. Improving access of business to markets and the various factors of production. Bringing about a more equitable allocation of road space with people, rather than vehicles, as its main focus. Encourage greater use of public transport and non – motorized modes by offering central financial assistance for this purpose. Establishing effective regulatory and enforcement mechanisms that allow a level playing field for all operators of transport services and enhanced safety for the transport system users. Establishing institutional mechanisms for enhanced coordination in the planning and management of transport systems. Introducing intelligent transport systems for traffic management. Addressing concerns of road safety and trauma response. Reducing pollution levels through changes in travelling practices, better enforcement, stricter norms, technological improvements, etc. Promoting the use of cleaner technologies.

1.2 Master Plan of Delhi specifies: (DDA)

All roads should be made pedestrian, disabled and bicycle friendly. Provision of adequate pedestrian facilities and removal of encroachments. Provision for introducing cycle tracks, pedestrian and disabled friendly features in arterial and sub-arterial roads. In urban extension, cycle tracks should be provided at the sub-arterial and local level roads and streets. In specific areas, like the walled city / Chandni chowk / Sadar bazar / Karol Bagh / Lajpat nagar and Trans Yamuna area, the use of cycles/rickshaw as a non-motorized mode of transport should be consciously planned along with Pedestrianization. On all roads with row greater than 30 m exclusive bus lanes will be planned to implement the bus rapid transit system (BRTS) in a phased manner to cover the whole city.

II. LITERATURE REVIEW

A. 2.1 Street Users –

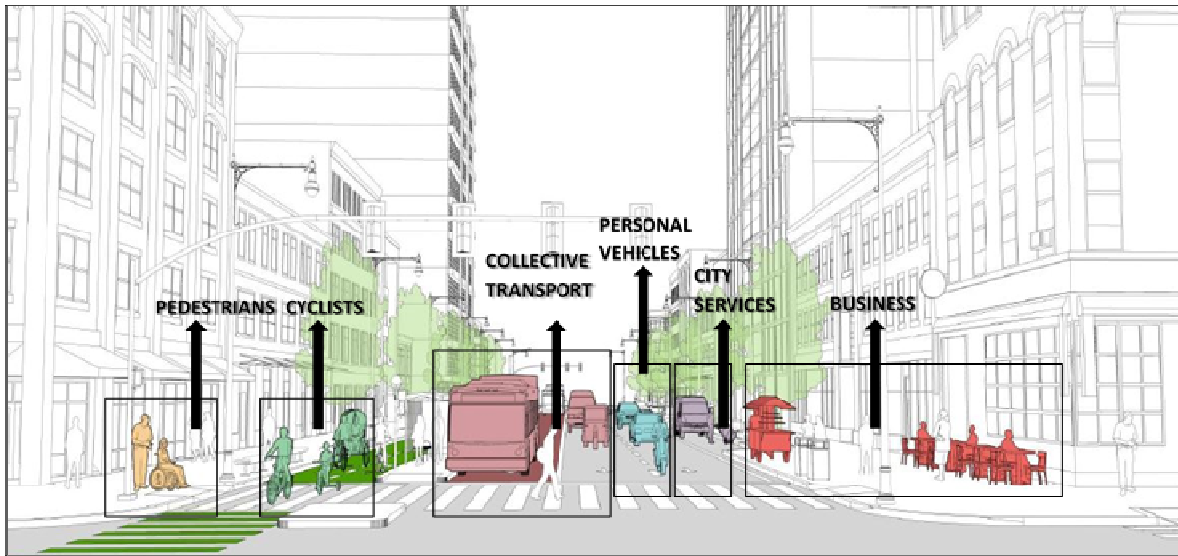


Figure 1 Street Users

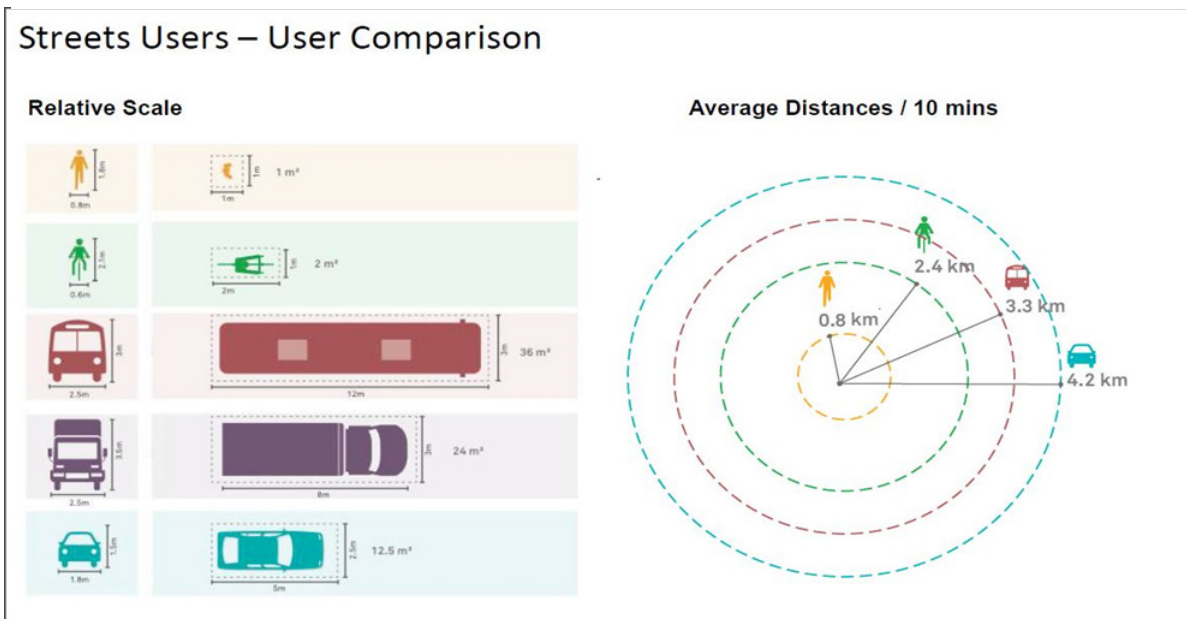


Figure 2 Street User Comparison

2.2 Street Design Elements (Authority and Delhi)

2.2.1) Footpath:

Good footpaths promote safe and comfortable pedestrian mobility. Together with other elements, such as furniture and landscaping, they constitute the primary public space of a city and are accessible to all users, regardless of age, gender, or special needs. Good footpaths are inviting spaces where people can talk, meet, sit and eat. A significant proportion of trips are performed on foot. Additionally, all public transport passengers and many private vehicle users start and end their trips as pedestrians on public streets. Hence accommodating pedestrians is an essential task of transportation planning.

2.2.2) Landscaping:

Landscaping improves the livability of streets. It enhances the aesthetic qualities of streets. It also plays a functional role in providing shade to cyclists, pedestrians, vendors, and public transport passengers. Effective greening with street trees reduces the street temperature, making it comfortable for people to walk, cycle, or gather for social activities, even during summer afternoons. Landscaping can beautify a street, providing an umbrella canopy and adding colors, fragrances, and textures. Trees also capture dust and remove glare.

2.2.3) Carriageway:

The primary purpose of a carriageway is the easy movement of vehicular traffic. A carriageway provides dedicated space for fast moving motorized vehicles separate from slow-speed non – motorized modes, such as walking and cycling, and stationary activities. In case of narrow streets where motor vehicles, pedestrians, and cyclists coexist, carriageways are replaced by shared spaces. A carriageway also can include segregated space for public transport.

2.2.4) Cycle Track:

The cycle is a core mode of urban transport. Cycles offer low-cost, pollution-free mobility and occupy only 1/5th as much driving and parking space as automobiles. Good cycle tracks are continuous and provide for uninterrupted movement. They are physically separated from the main carriageway to ensure both comfort and safety, and are protected from encroachment by parked vehicles, pedestrians, and street vendors. Efficient cycle tracks are safe, convenient, continuous, and direct. On streets with fast moving traffic, cycle tracks can reduce conflicts between cycles and motor vehicles.

2.2.5) Bus Rapid Transit:

Bus rapid transit (BRT) can offer high-capacity and high-quality public transport—similar to a metro rail but at a lower cost—by providing an exclusive right-of-way for BRT buses. Urban growth and rising car ownership are causing high road congestion. Longer travel times make existing bus transport less attractive, reducing public transport usage and increasing private vehicle use. BRT can break this vicious cycle by maintaining competitive travel times and reliable scheduling in road-based public transport. BRT is the only financially viable option for providing high quality public transport service to a majority of urban residents in a short time span. BRT with median bus lanes also improves safety for cyclists by eliminating conflict points at bus stops.

2.2.6) On – Street Parking:

On-street parking is clearly designated, charged, managed and restricted in volume, enabling access to nearby properties without disturbing the continuous flow of vehicles, pedestrians, and cyclists. On – street parking is seen as being favorable to local business, even though successful business districts without on – street parking can be found around the world. Free on-street parking subsidizes private vehicles. This subsidy is undesirable because it increases private motorized traffic—with all of its negative side effects, including traffic congestion, noise and air pollution, and reduced safety for pedestrians and cyclists. Hence, on-street parking should be restricted, and the parking which is available should be charged, not only to counter the mode shift to private vehicles, but also to serve as significant source of funds for the improvement of public space, public transport, and non-motorized vehicular transportation.

2.2.7) Street Furniture:

Street furniture provides people places to sit, rest, and interact with each other. Street furniture also includes services-related infrastructure, such as trash cans, street vending, street paving, toilets, street lighting and signage. Street furniture can help make a street an attractive place to spend time. When positioned on narrow shared streets – benches, tables, street vending spaces, and other furniture can also function as traffic calming elements. Other street furniture, such as way-finding signs and bus stops, provides information.

2.2.8) Street Lighting:

Well-designed street lighting enables motor vehicle drivers, cyclists, and pedestrians to move comfortably and safely by reducing the risk of accidents and improving personal safety. Pedestrians, cyclists, rickshaws, and even some motorized vehicles do not have lights and depend on street lighting, not only to see but also to be seen. From a traffic safety point – of – view, street lighting is very important in potential conflict points, such as – intersections, driveways, and public transport stops. Additionally, lighting helps road users avoid potholes and missing drain covers.

Finally, from a personal safety standpoint, street lighting is essential for mitigating the pedestrian's sense of isolation and reducing the risk of theft and sexual assault. Thus, improved lighting is particularly important in isolated spaces such as under- and overpasses and walkways next to parks or blank façades.

2.2.9) Service Lane:

Service lanes improve safety by separating the property access points and parking from the main carriageway. They also reduce interruptions in cycle tracks and can also serve as pedestrian – friendly shared spaces. Service lanes can increase the mobility function of the main carriageway while also maintaining livability for non-motorized street users. With reduced speeds (because of traffic calming) service lanes can function as slow shared spaces. Paradoxically, the presence of slow-moving vehicles ensures a clear walking space without encroachments by stationary activities.

2.2.10) Pedestrian Crossing:

Good pedestrian crossings allow pedestrians to cross busy streets safely and conveniently. When paired with traffic calming elements such as speed tables, etc. they can improve safety and create a seamless and continuous connection between the two sides of a street.

In Indian context, due to the difficulty and risks (sexual assault, theft etc.) associated with the use of over bridges and subways, pedestrians continue to cross at ground level. In that case, pedestrians cross at random locations and do not get benefitted from the safety that crossing in groups at planned at-grade crossings can provide.

2.2.11) Street Vending:

Well-planned spaces for street vending provide people with secure and dignified areas for the trade of goods and services.

Street vending offers easy access to economical goods and services for a wide range of income groups, especially the poor. In India, street vendors constitute 2.5 percent of the urban population. Assuming a household size of five and multiple income sources, over 10 percent of urban households likely depend on street vending.

Hence, it is important to provide improved and “formal” street vending areas, especially on major streets and intersections. Well located street vending reduces trip lengths by allowing people to shop on the way to their destinations. Well-planned vending zones can make urban space more vibrant, promote social supervision, and improve public safety.

2.3) Pedestrians' Characteristics:

2.3.1) Why People walk? (Cleland and Walton)

The decision to walk usually takes into account:

- The distance of the trip.
- The perceived safety of the route.
- The comfort and convenience of walking versus an alternative mode.

Distance is the primary factor in the initial decision to walk. Most pedestrian trips (73 %) are 0.5 mile (0.8 km) or less in length, with 1 mile (1.6 km) generally being the limit that most people are willing to travel on foot. (Contents) Effects on the perceived and actual safety of pedestrians include sidewalks that are too narrow or adjacent to moving lanes of traffic along with pedestrian crossings that are intimidating because of confusing signal indications, excessive crossing distances, or fast-turning vehicles. The immediate physical environment also affects the comfort and convenience of walking. For example, shade trees or places to sit and rest may encourage pedestrian activity. The appearance of buildings, landscaping, and the street itself can contribute to a pleasant visual environment. A 1990

Harris poll found that 59 % of all respondents would be willing to walk more often if there were safe, designated paths or walkways. (Officials and Officials)

2.3.2) Increased pedestrian design considerations would result in: (No)

Increase in comfort for current walking population. Reduced dependency on the car, if shorter trips can be made comfortably by foot. Prioritization of public transport and non-motorized private models in street design. Reduced car use leading to reduced congestion and pollution. More equity in the provision of comfortable public spaces and amenities to all sections. Safety on streets. Optimal space utilization. Encouraging the use of aesthetic streetscape treatments to enhance the livability of urban streets.

III. RESEARCH OBJECTIVES

3.1 Aim- The aim of the research is to understand the prevailing problems and thus develop design guidelines for improving pedestrians’ experience on urban commercial streets.

3.2 Objectives

- To study the true nature and elements of a street.
- To examine and understand the existing guidelines related to streets.
- To understand the existing street scenario around the world.
- To provide basic design criteria to make on the streets a better experience.

IV.METHODOLOGY

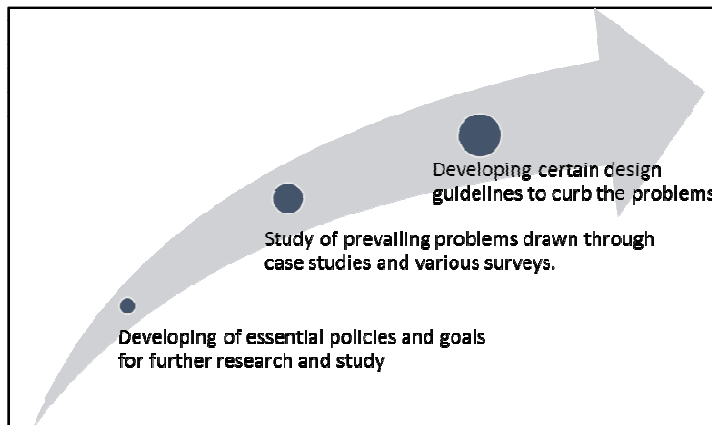


Figure 3 Methodology

| 2 Prolong Approach | |
|--|--------------------------------|
| SWOI Anaylsis | Opinion Survey |
| Literature case studies for the selected sites | Location of the site |
| Reason for the selected site | Reason for the particular site |
| Prelimnary data extraction | What are the questions? |
| Method of collection | Selection process |
| Anaylsis of the data | More representatives |

Figure 4 Methodology of Data Collection

4.1 Overall Approach

4.1.1 SWOT Analysis

The selected sites for literature case studies are Chandni Chowk and Ajmal Khan road, Karol Bagh. Both the sites are selected due to the relativity and have the fairly amount of footfall for the study. Data collection is focused on secondary sources to get an insight about the urban street system. This will help in understanding how the Pedestrianization evolved in the commercial areas. The data collected by secondary means will eventually help in analysing the strengths, weaknesses, opportunities and threats of both the urban streets.

4.1.2 Opinion Survey

The site selected for the opinion survey is Rani Bagh market. It is located in the Rohini zone and is famous for its Rani Bagh Market. Nearby areas include Pitampura, Saraswati Vihar, Rohini, etc. This market (Rani Bagh Market) was taken as the area of study because of the location of the market area and the areas it serves. There is no similar market in the near vicinity (approx. 10 km radius) which serve the North, North – West and West zones of Delhi that provide similar quality of goods.

Questions included in the opinion surveys-

- Purpose of visit?
- Mode of transportation?
- Reason for visiting this particular market?
- Should Non- Motorized vehicles be allowed inside the market area?
- Should Motorized vehicles be allowed inside the market area?

V.RESULT AND CONCLUSION

5.1 SWOT Analysis

5.1.1 Ajmal Khan Road, Karol Bagh

Strengths- Vehicular entrance prevented from Pusa road which is encouraging the use of public transport and making it a pedestrian friendly street. Metro station (Karol Bagh metro station) located near the entrance allows the pedestrian flow inside the market.

Weakness- Approximately 8m of the street width is used for parking purpose. No common façade typology is followed in the market which gives an undefined character to the street. No definite demarcation of the limits of spaces, which create an overlap in the activities on the street. No public amenities. Not enough public furniture.

Opportunities- The built form provides a good informal environment and good physical links.

Threats- MV (motorized vehicles) and pedestrians use the same zone for their movement on the street creating chaos and confusion in the street environment.

Proposals based on Literature case study- Creating shaded walkways and sit – outs by increasing the width of the sidewalks, which creates opportunities to stop and interact. Create opportunities for place making at major pedestrian nodes (Karol Bagh metro station and intersection of Ajmal Khan and Arya Samaj road in this case). Public amenities such as open spaces should be provided.

5.1.2 Chandni Chowk

Strength- Defined Frontage Zone. The stretch is used by very high number of pedestrians either on foot or through Non – motorized vehicles.

Weakness- Parking, Pedestrians and motorized vehicles using the same space for movement on the streets, as the number of street users is way more than the existing width of the walking corridor. No defined street façade is followed which gives an inappropriate character to the street. No signage or proper street lighting makes the condition worse for the street users although, there is a properly defined frontage zone on the street, but the encroachment of street vendors makes the movement of pedestrians more difficult.

Proposals based on Literature case study- Create a unique culturally significant destination public space. Only non-motorized vehicles to be accommodated in the designing process. Use of environmentally friendly materials and technology. Creating a pedestrian friendly street with user friendly public transport. Street trees and shaded walkways to add comfort in the walking experience. Integration of street furniture i.e. multifunctional street lights. Clear frontage zone (without obstructions and encroachments) with an additional sidewalk catering the number of pedestrians using the street.

5.2 Opinion Survey

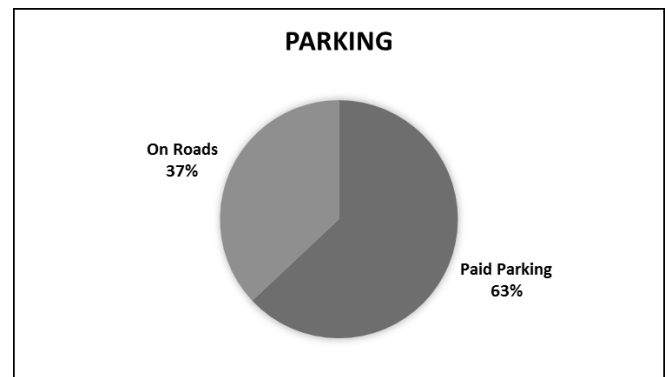
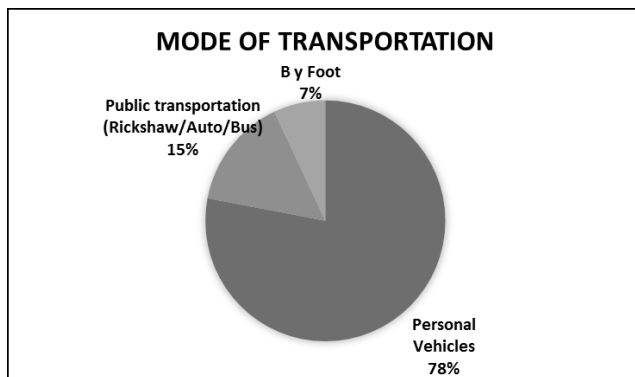
5.2.1 RANI BAGH MARKET

Description of visitors' survey: A total of 369 people was interviewed in the market area. It proved to be extremely difficult to get visitors over the age of 30 to agree to participate in the survey. In addition, it was comparatively easier to get 57% of women to agree to participate in the survey.

| AGE (years) | Sex | | TOTAL |
|---------------------|------|--------|-------|
| | Male | Female | |
| Less than 15 | 3 | 3 | 6 |
| 15 – 29 | 88 | 109 | 197 |
| 30 – 44 | 53 | 78 | 131 |
| 45 – 60 | 12 | 15 | 27 |
| Above 60 | 2 | 6 | 8 |
| Total | 158 | 211 | 369 |

Mode of transportation: As per the survey conducted, 78% of the shoppers / pedestrians use personal vehicles and approximately, 15% of the shoppers / pedestrians use public transport to reach the market. High percentage of personal vehicle users creates demand for long term parking and somehow creates higher chances of vehicular congestion around the market area, which eventually becomes one of the main reasons for vehicular – pedestrian conflict.

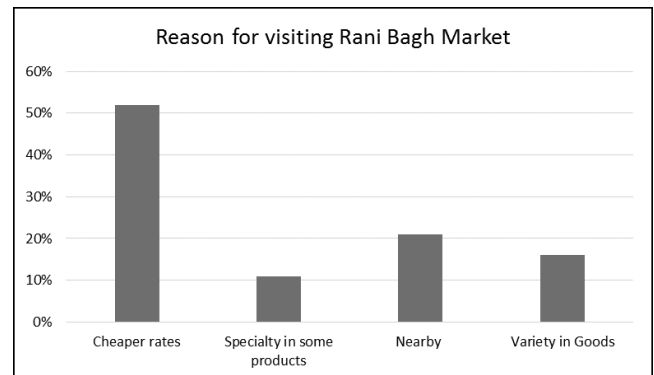
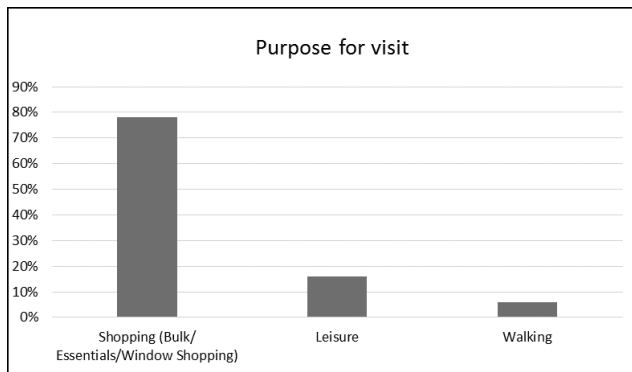
Parking: As per the survey conducted, approximately 63% of shoppers who use their personal vehicles to get to the market park their vehicles in the paid parking area, while approximately 37 % people park their vehicles on the roads near the market. Although smaller percentage of people park their vehicles on roads, but due to reasons like narrow width of road and high population around the market area, there is a high tendency of vehicle – vehicle, vehicle– pedestrian and pedestrian – pedestrian conflicts to rise.



Purpose of visit: More than 75% of the total visitors, visit the market for shopping purpose (78% in particular), and approximately 16 % of the visitors come to the market for leisure. Most of the visitors who live near the market area

visit the market for spending their leisure time and for walking purpose and most of the people coming from distant areas visit the market for bulk shopping or for essentials.

Reason for visiting this particular market: A lot of visitors were asked about why they thought of visiting this particular market (Rani Bagh Market). More than 50% of the visitors visit Rani Bagh Market because of the cheaper rates when compared with market with similar quality of goods. Also, significant number of people visit this market because of the speciality and variety in goods.



Should NMV (non – motorized vehicles) be allowed inside the market area?

The visitors were asked their opinion on whether NMV (non – motorized vehicles) like – rickshaws, bicycles, e – rickshaws, etc. should be allowed to enter the market area keeping the safety of pedestrians in mind. A mixed response was received from the visitors. Approximately 54 % of the total people were quite comfortable if these vehicles are allowed in the market whereas approximately 46 % of the total people didn't agree with this. So, design proposals have been given for both the situations – 1st where the NMV is allowed inside the market area and 2nd where NMV is not allowed inside the market area.

Should mv (motorized vehicles) be allowed inside the market?

The visitors were asked whether it would be feasible if MV (motorized vehicles) like – cars, autos, motorcycles, etc. area allowed to enter the market area keeping the safety of pedestrians in mind. A clear and unanimous opinion was drawn from the survey that these vehicles should not be allowed to enter the market area as there would be higher chances of vehicular – pedestrians conflicts

Conclusion on the basis of Opinion Survey

The Sidewalks should be raised at a level above the ground level. The Frontage zone should be raised at a level above the ground level. Raised table – top crossings should be provided at every crossing intersection for the easy and uninterrupted movement of the pedestrians. Width of the sidewalks and dead width (frontage zone) should be increased for the proper and smooth movement of the pedestrians. Street lights should be installed at proper intervals for the proper lighting for night activities. Trees should be included in the planning, because in addition to the increased landscaping, trees also act as shading devices which protect the pedestrians from the scorching heat of the sun, thus improving pedestrian environment and encouraging more walking. Street furniture should be included in the planning keeping in mind the necessity of a buffer zone (resting area, here) while pedestrian visit and shop for hours.

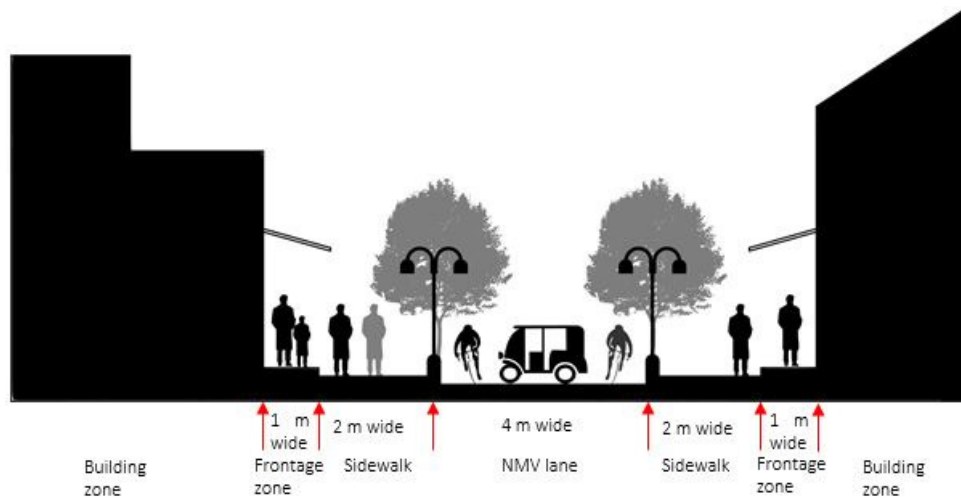


Figure 5 When Non- Motorized vehicle is allowed

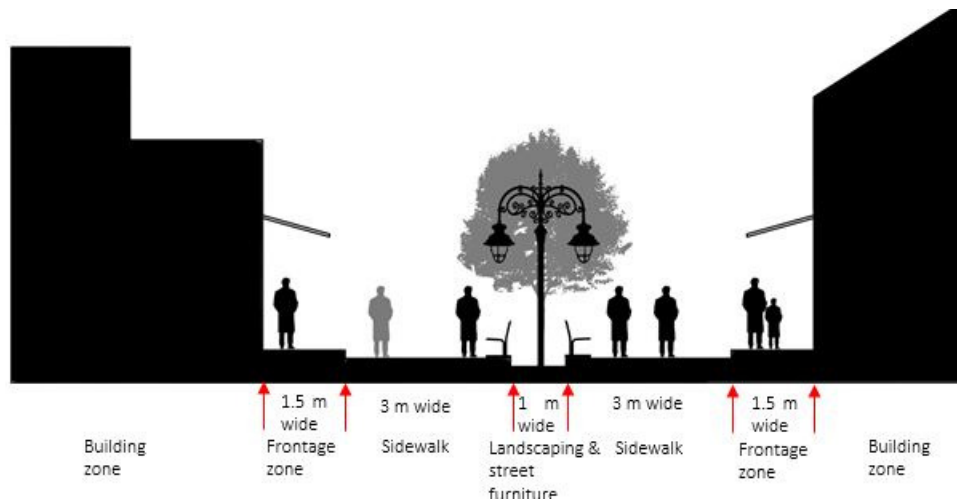


Figure 6 When Non- Motorized vehicle is not allowed

5.3 CONCLUSIONS ON THE BASIS OF THE STUDY (LITERATURE CASE STUDY AND OPINION SURVEY)

Nowadays, as an indispensable element in a city, urban streets have become only a path for people to move by means of motorized vehicles while the other important characteristics of a street i.e. the street as a place for pedestrians, a street for enhancing public interaction has not received that much attention in urban design.

The study helped in analysing that good street design should not only be cognizant of pedestrians needs but should enhance legibility of elements that increase satisfaction with environmental values and in turn is likely to enhance pedestrian usage. A Street should have various factors like-

- Wide sidewalks that can help making streets more usable for pedestrians without obstructions.
- Creating opportunities for place making within the street stretch.
- Creating non – motorized vehicular zones (NMV zones).
- Small open plazas where interactive sit – outs and streetscapes enhance ecology and comfort.
- Proper seating and designed spaces along the stretch.
- Green bands.

- Selection of materials for sidewalks and streets.
- Public amenities.
- Smooth public transport connectivity.
- Street art and installations to make it more active and livelier.
- Defined zones for frontage, walking, and street furniture and cycling.

These parameters make an urban street a liveable street and should be analysed in terms of how people behave in a particular street. This offers the most valuable clues to understand how well existing urban environments are working for their users.

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