

Walkable streets for functionality, liveability and sustainability: a case of Vadodara.

Calles transitables para la funcionalidad, habitabilidad y sostenibilidad: un caso de Vadodara.

Khyati Gulati Tewari¹, Neha Sarwate², Rutvik Tank³

1-Assistant Professor, The Maharaja Sayajirao University of Baroda, Vadodara, India. Email: khyati.g.tewari@gmail.com

2-Associate Professor, SEDA, Navrachana University, Vadodara, India. Email: neha.gabhawala@gmail.com

3-Junior Town Planner, Gujarat Infrastructure Development Board, Gandhinagar, India. Email: tankrutvik@gmail.com

ABSTRACT

Walkable streets in any urban setting are the epitome of public realm for social, cultural and economic interactions. These not only enable face to face meaningful interactions, but also promote informal activities. Streets have culturally been the living room for the community where people have an innate association with different parts of a street – be it in form of informal markets or tea breaks during the long office days or celebration of many festivals that are part of Indian culture. However, with rapid urbanization resulting in increasing migratory patterns and number of private vehicle ownership, streets are losing their essence as a public place as authorities are adopting a vehicle centric approach in their design. Today streets, with their haphazard design are neither functional nor are they liveable. Furthermore, increased traffic and reduced walkability results in greater environmental damage, rendering streets unsustainable. Since aspects of functionality, liveability and sustainability of streets are interrelated and interdependent, this study explores the different factors, their inter-linkages and disparities as acknowledged through existing literature review and observation mapping through a pilot street stretch that evaluates the above mentioned aspects through content analysis of existing legislations and descriptive analysis of the interviews conducted. This pilot study helped identify the factors of compatible and conflicting land-uses, the primary, ancillary and resulting activities as well as their intensities, perception of safety and comfort need to be considered while designing street sections to make them functional, liveable and sustainable.

Keywords: walkability, liveable, functional, sustainable, land-use, activities.

RESUMEN

Las calles transitables en cualquier entorno urbano son el epítome del ámbito público para las interacciones sociales, culturales y económicas. Estos no solo permiten interacciones significativas cara a cara, sino que también promueven actividades informales. Las calles han sido culturalmente la sala de estar de la comunidad donde las personas tienen una asociación innata con diferentes partes de una calle, ya sea en forma de mercados informales o pausas para el té durante los largos días de oficina o la celebración de muchos festivales que forman parte de la cultura india. Sin embargo, con la rápida urbanización que resulta en un aumento de los patrones migratorios y el número de propietarios de vehículos privados, las calles están perdiendo su esencia como lugar público, ya que las autoridades están adoptando un enfoque centrado en los vehículos en su diseño. Hoy las calles, con su diseño azaroso, no son ni funcionales ni habitables. Además, el aumento del tráfico y la reducción de la capacidad para caminar provocan un mayor daño ambiental, lo que hace que las calles sean insostenibles. Dado que los aspectos de

funcionalidad, habitabilidad y sostenibilidad de las calles están interrelacionados y son interdependientes, este estudio explora los diferentes factores, sus interrelaciones y disparidades reconocidas a través de la revisión de la literatura existente y el mapeo de observación a través de un tramo de calle piloto que evalúa los aspectos mencionados anteriormente a través del contenido. análisis de las legislaciones existentes y análisis descriptivo de las entrevistas realizadas. Este estudio piloto ayudó a identificar los factores de usos de suelo compatibles y conflictivos, las actividades primarias, auxiliares y resultantes, así como sus intensidades, la percepción de seguridad y comodidad que deben tenerse en cuenta al diseñar secciones de calles para que sean funcionales, habitables y sostenibles.

Palabras clave: transitabilidad, habitabilidad, funcional, sostenible, uso del suelo, actividades.

INTRODUCTION

Jan Gehl theorizes that it is between the buildings of a city where social interactions and perceptions, urban recreation and the sensory experience (Gehl, 2011) of the city life takes place. Gehl further explains, outdoor activities in public spaces are divided into three categories viz. necessary activities, optional activities and social activities. All three categories of activities place very different demands on the physical environment (Gehl, 2011). Traditionally as well, public places have served as interaction places markets and places for traffic movement among other things. Streets are recognised as the ultimate public place, especially in the Indian scenario, acting as a community living room. The scale and intensity of interactions occurring on a street contribute towards the liveability of a neighbourhood.

However, with rapid urbanization, few conscious efforts made towards improving the functionality of streets have not been enough. Due to the modern way of living which focuses on individualistic lifestyle and reliability on private vehicles, the streets are being designed for vehicles and they are losing their essence as a public place. There is little space for pedestrians, also the market and meeting space are diminishing, rendering the streets inhabitable for human interactions (Tank, 2017; Tewari, 2018). On the other hand, making the streets walkable will render them functional and liveable again. People walk for commuting to work, for leisure and exercise. Additionally, people walk as a medium for last mile connectivity as well as undertake short trips for daily chores and accessing diverse urban services. These walking trips result in various activities transpiring across the street that make the streets lively and functional.

And yet, despite the extent of literature available, discussing the benefits of walkable streets and incorporating walkability into streets (ARUP, 2015; R. Rahman, 2015; Kumar, 2017; Tewari, 2018) existing legislative provisions fail to incorporate the aspects of land-use into spatial plans and the existing street sections fail to cater to the multitude of activities occurring on a street. The existing street design doesn't consider the various intents for which a street is used. Hence, the existing street design needs to be modified to not only consider the street width, but abutting land uses, associated activities as well as their intensities. Thus, the purpose of this pilot study is to highlight the disparities of street design as reflected by the urban lifestyle to achieve more functional, liveable and sustainable urban fabric, by examining an urban street for its adjacent land-uses and their association with various activities taking place on it.

MATERIAL AND METHODS

The street segment selected for this pilot was on the basis of the diverse nature of the adjacent land uses, the street width, and scope of making mid-course corrections. This 1.6 km street stretch is located in the upcoming

/ new developing neighbourhood of Harni, in North-East Vadodara, between the National Highway 48 and the airport (Figure 1). The salient features are a rich mix of land-uses including residential, commercial, institutional, religious, and recreational functions. The residential areas are typified by multistorey apartment complexes, some with retail shops on the ground floor, mostly at street intersections creating active nodes appropriated as public places. 'Party plots' privately owned open land parcels that commercially host weddings, parties and gatherings flank either side of the street and are relatively higher in number. The presence of four educational institutions, three temple complexes and a lakefront recreational complex accentuate the functional diversity of the street.

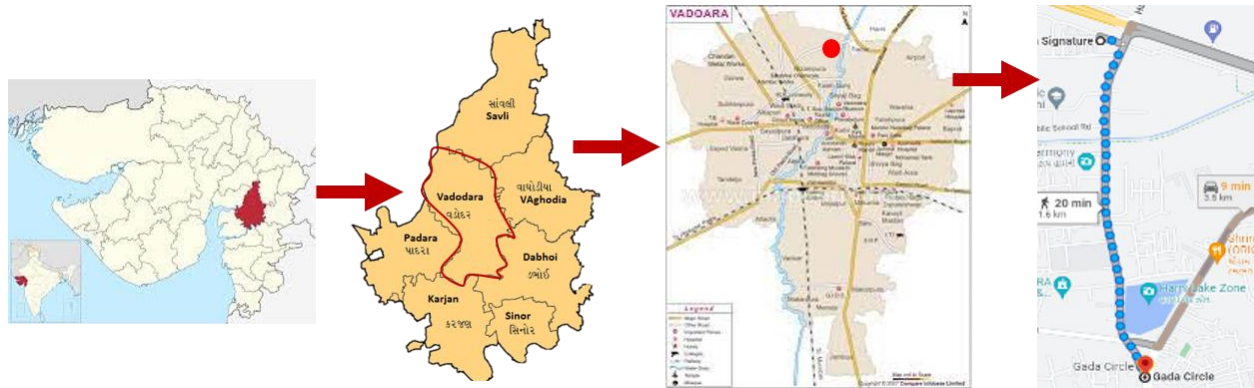


Figure 1 : Study Area Location

This pilot study follows a Practical – Knowledge Gap based research (Miles, 2017) and employs mixed-method approach for data collection and data analysis. For data collection, a triad of mapping, observations and interviews was carried out. Mapping was done to get the lay of the street. On site observations were noted for weekdays as well as weekends during which shopkeepers and party plot owners along with about 40 people were interviewed at different times across the day to better understand the user behavioural patterns. As a first step, street was mapped for identification of different land-uses present. The street stretch as previously discussed is a stretch with diverse land-uses with multiple activity nodes as shown below in Figure 2.

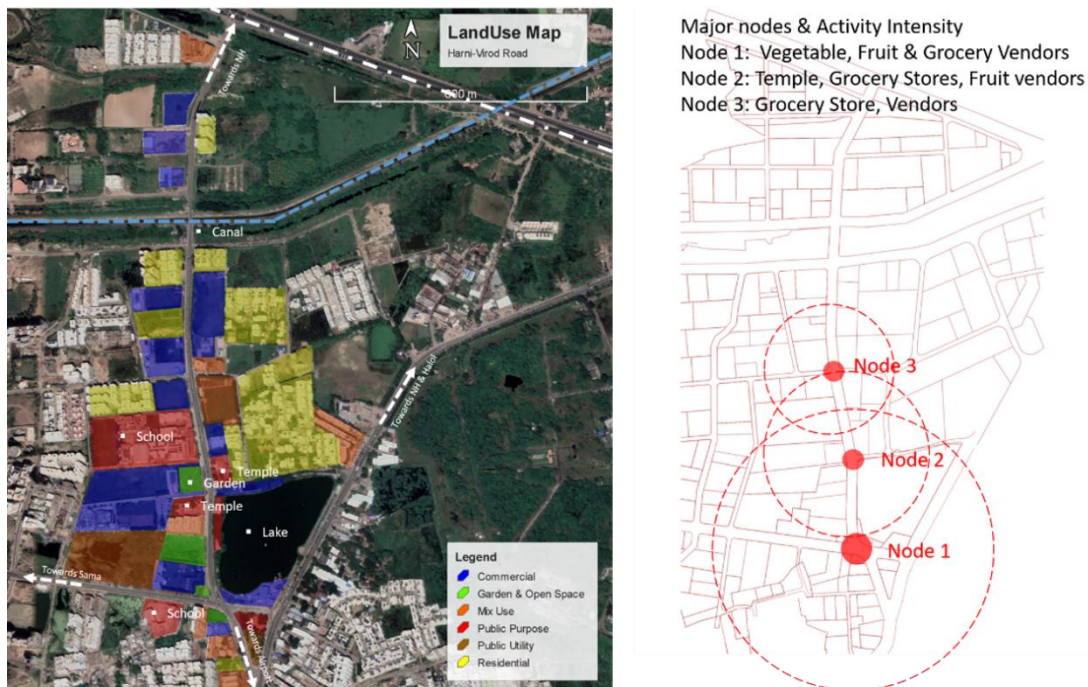


Figure 2 : Land Use Mapping and Activity Nodes

Although the street's right of way is 30m, only 10m is carpeted, 5m on either side of the 45cm median. motorists, cyclists and pedestrians, all tend to use the carpeted section of the street which sometimes compromises pedestrian safety and cyclist wellbeing. The dusty remainder of the right of the way gets muddy and slippery during the monsoons, further hindering the walkability aspect of the street. Some portions of these remainder patches have been modified by the adjacent property owners to befit their purpose. The school has installed planters where the ledge doubles up as a seating facility for the waiting guardians (Figure 3), the party plot owners have modified the entrance to their facility with either paver blocks or cement paving (Figure 4).



Figure 3 : Street Section around School



Figure 4 : Street Section around Party Plots

As there are no continuous sidewalks, the interim spaces between the carpeted part and the private 'plots' are considered as 'no-one's' land and are either left in dusty un-kept condition or have been appropriated by the 'users' of the public realm. This transition area along the length of the street, sometimes gets occupied by both desirable and undesirable activities depending upon the physical characteristics. At strategic nodes, activities such as vending, auto rickshaw stands, cobblers, dhobis tend to crop up providing the residents and passers by the much needed informal urban services that are neglected in the realm of formal urban design (Figure 5 and Figure 6). These areas offer opportunities for integrated multifunctional design to seamlessly accommodate the dynamic activities of the community living room - the streets.



Figure 5 : Informal Activities around Temple



Figure 6 : Informal Activities around Shopping Complexes

The street is oriented almost North-South and therefore facilitates comfortable active morning and evening usage by the community due to the shade provided by abutting buildings. The scorching afternoon sun, due to the lack of mature shade giving trees renders the street unfit for activities, instead adding to the already high heat index. This observations confirmed that the activity and the vibrancy of the street is much greater at the early hours of the day and late evenings because of the weather and minimal shading from the harsh sun during the day. The activities that took place changed with passage of time during the day - where early morning activities included cycling and walking for recreational purposes, visit to the temple and towards their pick-up / drop-off points for work or school; later part of the day is marked with people hanging around refreshments and snack shops and people shopping for daily grocery and other needs. As afternoon approaches, the activities slow down, shops close and the street experiences a lull as the temperatures soar. However, as the sun sets, people start coming out again for recreational walking and socialising, to coming out for their chores. Kids visit the park or cycle as people return from work and walked back home. And the street becomes lively again. It is pertinent to note that the cyclists and recreational walkers utilize their passion for walking and cycling to accomplish their chores on the way back home.

It has also been noticed that most of the above activities are occurring only on one side of the street which is dotted with residential complexes with retail outlets on the ground floor as the opposite side was perceived as being disconnected due to high compound walls and didn't offer much for social interactions or visual stimulus (Figure 7).



Figure 7 : Dead Street with only Vehicular Movement along Compound Walls

However, due to the street design, the informal activities give rise to several issues including compromised safety for the users as everyone occupies the same 10m carpeted space on the street; congestion and bottlenecks due to haphazard parking; no designated hangout spaces resulting in people hanging out on parked vehicles, adding to the chaos. Stock deliveries also happen during the morning hours, adding to the already existing chaos on streets because of haphazard parking in front of shops, temples and schools. Furthermore, when some of the shops hold

sale or exhibitions, there is an additional influx of people coming over and the parking issue becomes more prominent.

Upon interviewing the shopkeepers and party plot owners, it was learnt that occurrence of wedding processions in summer and winter wedding season brings with it the NRI population, which adds to the vivacity of the streets. Additionally, despite the party plots providing parking for 300 to 500 vehicles within their premises, users sometime prefer to park on the street adding to the congestion and chaos. Furthermore, adding to all these activities are the weekly temple meetings and religious ‘yatras’ that take place during the festive season which brings with it a whole set of additional activities like flower vendors, fruit stalls and ‘gauchara’.

Moving on to the analysis, a dual pronged approach of content analysis and descriptive analysis was conducted. As a first step, existing legislative provisions were examined against the observations made during the data collection stage (Table 1).

Table 1: Gap Identification in Existing Legislative Provisions

SR. NO.	LEGISLATIVE REGULATION	INCLUSIONS	REMARKS
1	IRC : 103 - 2012	This IRC guideline is dedicated to guidelines for Pedestrian Facilities and talks about clear walking zone, clear height, footpath width and obstructions among other things	The guidelines talk about adjacent land use and resulting footpath width, however doesn't take into account the resultant activities sprouting on the street.
2	GTPUD Act	The Act discusses process of TP Scheme formulation and mentions that 18% of the area of the TP Scheme should be utilised for Road and Transport Infrastructure	Although, the Act mentions percentage of area to be left aside for road and transport infrastructure, there is no mention of road design criteria or pedestrian and cycling facilities.
3	CGDCR	The Development Regulations do talk about road widths and adjacent land-uses through its various sections, and refers back to IRC Guidelines for road design	Despite the detailed outline on the types of land-uses allowed based on the road widths, it doesn't take into the account either the resultant activities or the intensity of land-use – both of which then tend to spill out on to the streets.
4	URDPFI Guidelines	URDPFI Guidelines talk a lot about the road design, modal segregation as well as pedestrian infrastructure to improve the functionality of streets. Like GDCR, URDPFI Guidelines too refer back to the sections and details provided in the IRC Guidelines for Road Design.	Although, URDPFI Guidelines attempt to make the streets more functional, because they depend on IRC Guidelines, which already has its own shortcomings, those efforts fall flat and the resultant is a non-functional and chaotic streets.

When people were interviewed about their preference towards travel mode to finish their chores, about 80% of them said they preferred using motorised private vehicles (Figure 8). The reasons they cited, for not choosing walking or cycling as a travel medium, varied from concerns for safety because of inadequate walking / cycling surface as mentioned by 12% people, 8% people stating motorised mode being a faster mode as a reason and 3% people citing 'personal choice' as a reason. Moreover, 2% people saw driving around as a way for recreation, even if they drove around just to finish their chores. However, most commonly accepted reason for choosing the motorised vehicles over non-motorised mode, with 75% people citing it is the weather conditions and minimal shading on the street making it non-maneuvrable on foot during the day (Figure 9).

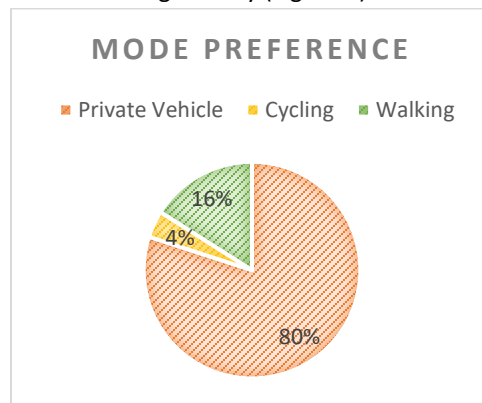


Figure 8 : Mode Preference

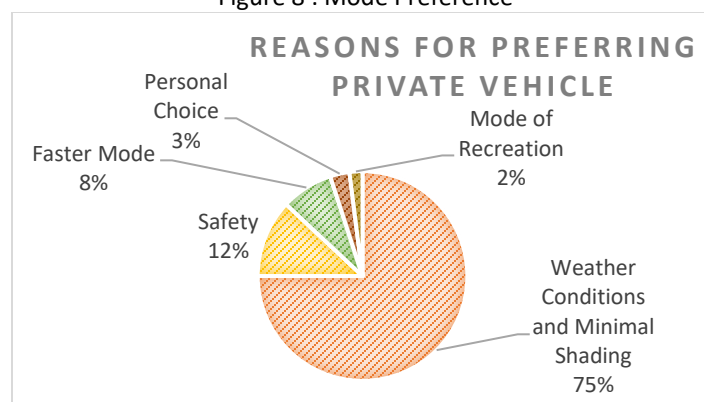


Figure 9 : Reasons for Preferring Private Vehicle

RESULTS AND DISCUSSIONS

People would have used the streets more often had the physical setting been more conducive from a functionality and comfort perspective. Comfort encompasses physical or thermal comfort, perceived sense of safety, security, belonging, and connectedness to the neighbourhood community. This is one of the key aspects of wellbeing where the design of transition spaces to facilitate access, connectivity and interactions play a vital role towards neighbourhood liveability. Each landowner appropriates the Right of Way space in front of their properties to suit their extended public purposes. This results in paved and unpaved surfaces causing hindrance for walking and cycling that deters pedestrians and potential cyclists.

Due to lack of effective design and implementation of Right of Way, majority of the street is left unkempt, which results in dust during dry season and morass during the monsoons. The mitigation of dust and pollution caused by motorised vehicles in conjunction with provision of shade and efficient management of stormwater can not only aid the comfort of the users, but can also promote sustainability of the neighbourhood. The dusty and muddy residual

space on the street is unfit for cycling and walking, thereby forcing pedestrians and cyclists to share carpeted space with motorised vehicles increasing the possibility of accidents and conflicts.

This pilot street segment accommodates multiple, versatile function and activities like informal gatherings of parents outside school premises during pickups and drop-offs, weekly interactions outside temple precincts, seasonal markets and fairs, and hanging out amongst similar age groups at nodes and on street benches. It is pertinent to note that seasonal activities like marriage processions and religious yatras of pedestrians during festivals contribute tremendously to the unfolding drama, with the street as a stage and city as audience. Such dynamism and flexibility of streets is one of the appealing features that charms the Non Resident Community to celebrate festivities in such environmental settings. These activities take up the carriageway space resulting in congestion, traffic mismanagement and safety issues.

The above mentioned activities and associated intensities are completely missed out while drafting building regulations and guidelines, which is reflected in the supposed chaos where the actual ground conditions are not reflected. The existing ground conditions also reflect poor implementation and monitoring of the street infrastructure by the concerned authorities where many areas are left unattended, hence vulnerable to encroachments making maintenance an unsurmountable task, making streets unsustainable.

CONCLUSION

Streets in the Indian context portray an array of functions with varying activities and intensities which are unique to the climatic and cultural contexts. It is this very aspect that embodies versatilities and robustness making the street liveable. However, this liveability can only be sustained if the street design reflects and accommodates the dynamic activities, towards the comfort and safety levels of the diverse user groups that surmounts to the factors of functionality. One of the main attributes of functionality is accessibility – physical and perceptual – that should be reflected in the way street section and segments are legislated and designed to accommodate urban serviced and amenities. Since streets also comprise of a considerable physical area of a particular neighbourhood and the existing materials contribute to the urban heat component, the use of alternative materials and management of stormwaters along with appropriate vegetation can considerably contribute to the long term sustainability. Hence, it can be safely surmised that the factors of functionality, sustainability and liveability are closely inter-related and impact the Quality of Life of the residents where the design for a particular street section should preferably be based on participatory design processes. This pilot study establishes the consideration of multiple factors identified throughout the study which are necessary for street design in addition to the ones established in the existing guidelines. These factors include consideration of compatible and conflicting land-uses along with the primary, ancillary and resulting activities as well as their intensities. Perception of safety and comfort need also be considered while designing streets for functionality, liveability and sustainability.

ACKNOWLEDGEMENT

We are grateful to the residents and stakeholders of Harni Motnath Road for patiently engaging with us and answering all our questions.

REFERENCES

- Andres Duany, J. S. (2010). *The Smart Growth Manual*. Mc Graw Hill.
- ARUP. (2015). *City of Perth : Walkability Report*. West Perth: ARUP.
- Auld, L. L. (2008). *Leisure, Public Space and Quality of Life in the Urban Environment*. Urban Policy and Research.
- Caroline Holland, A. C. (2007). *Social Interactions in Urban Public Places*. Bristol: The Policy Press.

Gehl, J. (2011). *Life Between Streets*.

Jacobs, A. B. (1993). *Great Streets*. California: Mit Press.

K. Zakariya, N. Z. (2014). *Spatial Characteristics of Urban Square and Sociability: A review of the City Square, Melbourne*. *Procedia : Social and Behavioral Sciences*.

Kumar, B. S. (2017). *Improving Pedestrian Facilities in Congested Urban Areas : A Case Study of Chennai City*. IOP Conference Series : Earth and Environmental Science. IOP Publishing Ltd.

Miles, D. A. (2017). *Research Methods and Strategies Workshop: A Taxonomy of Research Gaps: Identifying and Defining the Seven Research Gaps*. Doctoral Student Workshop: Finding Research Gaps - Research Methods and Strategies. Dallas, Texas.

R. Rahman, M. S. (2015). *Evaluation of Level of Service for Pedestrian Movement in Dhaka City*. International Conference on Recent Innovation in Civil Engineering for Sustainable Development (pp. 723-729). Gazipur: IICSD.

Tank, R. (2017). *PLANNING RECOMMENDATIONS THAT ENABLES PLACEMAKING FOR PUBLIC PLACES*. Vadodara.

Tewari, K. G. (2018). *PEDESTRIAN INCLUSIVITY AND FIXED PHYSICAL ELEMENTS: AN EXAMINATION OF "MAKING OF FOOTPATHS " FOR ĘASE OF MOVEMENT" IN VADODARA CITY*. Vadodara.

Received: 14th October 2022; Accepted: 17th October 2022; First distribution: 05th November 2022.

Note: special edition procedure.