



EVALUATING WALKABILITY AND PUBLIC LIFE IN EMERGING URBAN NEIGHBOURHOODS OF SURAT: A MORPHOLOGICAL, SPATIAL-CONFIGURATIONAL AND SOCIO-BEHAVIOURAL ASSESSMENT OF THE PUBLIC REALM

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ABSTRACT

Rapid urban expansion has transformed the spatial structure of Indian cities, generating emerging neighbourhoods in which increased residential development does not necessarily correspond to pedestrian accessibility, environmental comfort or socially vibrant public spaces. This study proposes an integrated assessment of walkability and public life in selected emerging urban neighbourhoods of Surat, Gujarat, through a combination of urban morphological analysis, spatial configuration analysis, pedestrian-environment assessment and systematic behavioural observation. The research conceptualises walkability not merely as pedestrian infrastructure provision, but as a multidimensional socio-spatial phenomenon produced through the interaction of street-network permeability, land-use diversity, block morphology, building-street interface, environmental conditions and spatial accessibility. Space Syntax and GIS-based network analysis are proposed to examine integration, choice, connectivity, accessibility and pedestrian catchments, while behavioural mapping and pedestrian counts will document movement intensity, stationary activities and social interactions across different temporal periods. A comparative neighbourhood framework will subsequently be used to investigate relationships between spatial configuration, walkability characteristics and public-life intensity. The study aims to contribute an architectural and urban-design framework for understanding how the morphology of emerging neighbourhoods can either facilitate or constrain pedestrian movement and everyday public life, while generating context-responsive design recommendations for Surat.

KEYWORDS : Walkability; Public Life; Urban Morphology; Space Syntax

INTRODUCTION

Contemporary urbanisation has fundamentally altered the relationship between built form, mobility and everyday social life. Rapid outward expansion of cities has generated new residential neighbourhoods characterised by large development parcels, hierarchical road networks, segregated land uses and increasing dependence on motorised transportation. Within such environments, the provision of roads alone cannot be considered synonymous with accessibility or urban quality. Walkability represents a more complex condition involving the physical configuration of streets, permeability of urban blocks, proximity to destinations, land-use diversity, pedestrian infrastructure, environmental comfort, safety and the experiential quality of the public realm. Recent literature increasingly conceptualises walkability as a multidimensional and context-dependent construct that integrates objective built-environment characteristics with pedestrian perceptions and socio-spatial interactions.

The significance of walkability extends beyond transportation. Streets constitute fundamental components of the public realm where movement, commerce, recreation, informal encounters and social interaction occur. Jane Jacobs conceptualised urban streets as essential generators of urban vitality, while Jan Gehl emphasised the importance of human-scale environments and activities occurring between buildings. Consequently, the performance of a neighbourhood cannot be adequately evaluated through vehicular capacity or infrastructural provision alone; it must also be understood through the intensity, diversity and temporal distribution of human activities within its public spaces.

Surat represents an important context for examining these relationships because its continued urban expansion has produced substantial transformation at the neighbourhood scale. Emerging urban areas frequently exhibit a contrast between planned infrastructure and actual pedestrian experience. Wide carriageways may coexist with discontinuous footpaths, long blocks, inactive edges, parking encroachment and limited pedestrian permeability. Conversely, streets with relatively modest physical dimensions may generate considerable pedestrian activity where mixed uses, accessible destinations, active frontages

and fine-grained spatial networks are present.

The central problem addressed by this research is therefore not simply whether emerging neighbourhoods are walkable, but how their spatial and morphological configuration influences pedestrian movement and the production of public life.

Research Gap

Existing walkability research has established associations between pedestrian activity and built-environment attributes such as density, land-use diversity, destination accessibility and street connectivity. The conventional measurement of walkability, however, frequently relies on composite indices that aggregate individual characteristics without fully capturing the relational structure of urban space. Recent research has highlighted the importance of spatial configuration and demonstrated that Space Syntax metrics such as integration and choice can provide additional insight into pedestrian movement. Meta-analytic evidence has identified meaningful associations between syntactic measures and pedestrian movement, although the magnitude and consistency of these relationships vary according to methodological and contextual conditions.

A further limitation concerns the separation of physical walkability from public-life assessment. Spatial analysis can identify potentially accessible streets, while behavioural observation can identify pedestrian concentrations; however, these approaches are often investigated independently. Recent reviews specifically identify the need for integrated methodologies combining Space Syntax, observational techniques, participatory methods and technological spatial analysis to better understand socio-spatial relationships.

Accordingly, a contextualised investigation of urban morphology → spatial configuration → walkability → pedestrian behaviour → public life within emerging neighbourhoods of Surat can address an important methodological and contextual gap.

Aim

To evaluate walkability and public-life performance in selected emerging urban neighbourhoods of Surat through

an integrated assessment of urban morphology, spatial configuration, pedestrian environment and socio-behavioural activity.

Objectives

1. To analyse the morphological and spatial characteristics of selected emerging neighbourhoods in Surat, including street-network configuration, block structure, land-use distribution, density and building-street interfaces.
2. To assess neighbourhood walkability using indicators of pedestrian connectivity, permeability, accessibility, safety, comfort, environmental quality and land-use diversity.
3. To document and quantify pedestrian movement and public-life activities through systematic behavioural observation and temporal pedestrian counts.
4. To examine the relationship between spatial configuration, walkability characteristics and the intensity and diversity of public-life activities.
5. To formulate context-responsive urban-design recommendations for enhancing pedestrian permeability, public-realm quality and socio-spatial vitality in emerging neighbourhoods of Surat.

Research Questions

The study will address the following questions:

RQ1: How do morphological and spatial-configurational characteristics influence walkability in emerging neighbourhoods of Surat?

RQ2: What relationships exist between street-network integration, connectivity, land-use diversity and observed pedestrian movement?

RQ3: Which built-environment characteristics are associated with greater intensity and diversity of public-life activities?

RQ4: To what extent can Space Syntax and GIS-based spatial indicators explain variations in pedestrian activity between neighbourhoods?

RQ5: What urban-design interventions can strengthen pedestrian permeability and public-life performance within emerging neighbourhoods?

Literature Review

Walkability and the Built Environment

Walkability has evolved from a relatively narrow concern with pedestrian movement into a multidimensional urban-design concept. Contemporary approaches recognise density, diversity, destination accessibility, street connectivity, route characteristics and environmental quality as interconnected determinants of pedestrian experience. The 3D and subsequently expanded 5D/6D frameworks have provided a systematic basis for examining relationships between built form and travel behaviour.

However, quantitative walkability indices can obscure the configurational relationships through which individual streets operate as components of a larger urban system. Two neighbourhoods may possess similar densities and sidewalk provisions while exhibiting substantially different pedestrian movement because of differences in network structure, block permeability and spatial integration.

Urban Morphology and Spatial Configuration

Urban morphology examines the physical structure and transformation of settlements through relationships between streets, plots, buildings, blocks and open spaces. In architectural research, morphology is particularly valuable because it treats urban form as an interconnected system rather than a collection of independent physical objects.

Space Syntax extends this understanding by examining the relational configuration of spatial systems. Integration represents the relative accessibility of a spatial element within a network, whereas choice captures the extent to which a space lies on potential routes between other spaces. Research

has demonstrated significant associations between syntactic measures and pedestrian movement, supporting their application within urban-design research.

The theory of natural movement is particularly relevant because it proposes that spatial configuration can influence pedestrian movement independently of, but in interaction with, land-use attractors. The resulting movement economy may subsequently reinforce commercial activity and social interaction.

Public Life and Urban Vitality

Public life refers to the activities, interactions and encounters occurring within publicly accessible urban spaces. These include necessary movement, optional recreational activities and social interactions. The quality of public life is influenced by the ability of streets and public spaces to support lingering, observation, informal interaction and diverse patterns of use.

Therefore, a successful neighbourhood should not simply facilitate pedestrian transit; it should also provide conditions under which pedestrians can pause, interact, participate and appropriate space.

This distinction is fundamental to the proposed study. A street with high pedestrian flow but no opportunities for stationary activity may be highly accessible but comparatively weak as a social public space. Conversely, a neighbourhood with moderate movement but substantial social and recreational activity may demonstrate strong public-life performance.

Methodology

Research Design

A mixed-method, comparative and multi-scalar research design will be adopted. The methodology will integrate quantitative spatial analysis with qualitative and observational assessment.

The analytical framework will operate across four principal scales:

Neighbourhood scale → street-network scale → street-edge scale → human-activity scale.

Selection of Study Areas

Three to four emerging neighbourhoods of Surat will be purposively selected based on:

- Recent urban development.
- Predominantly residential character.
- Population and development growth.
- Distinct morphological structure.
- Variation in street-network configuration.
- Variation in land-use diversity.
- Variation in pedestrian infrastructure.
- Presence of neighbourhood commercial/public activity nodes.

Comparative case selection will enable identification of similarities and differences between alternative urban configurations.

Urban Morphological Analysis

GIS-based mapping will be undertaken to document:

- Street hierarchy.
- Intersection density.
- Block dimensions.
- Plot configuration.
- Building footprints.
- Building density.
- Floor-space characteristics.
- Setbacks.
- Built-to-open ratios.
- Land-use distribution.
- Active and inactive street frontages.

Block permeability and pedestrian network continuity will be assessed as important morphological variables.

Space Syntax Analysis

Space Syntax analysis will be undertaken using axial or segment-based representations of the pedestrian-accessible street network.

Principal indicators will include:

- Connectivity.
- Global integration.
- Local integration.
- Choice.
- Mean depth.
- Angular integration.
- Angular choice.

Spatial outputs will be represented through thematic maps and compared with observed pedestrian movement.

The analytical premise is that streets with greater configurational accessibility may exhibit greater pedestrian movement potential, although this relationship will be tested empirically rather than assumed.

Walkability Assessment

A structured walkability audit will assess:

Connectivity

- Intersection density.
- Route directness.
- Network continuity.
- Pedestrian permeability.

Accessibility

- Distance to local destinations.
- Access to commercial activities.
- Access to public transport.
- Pedestrian catchment areas.

Pedestrian Infrastructure

- Footpath continuity.
- Effective pedestrian width.
- Crossing facilities.
- Obstacles.
- Parking encroachment.

Environmental Quality

- Shade.
- Vegetation.
- Thermal comfort.
- Street enclosure.
- Lighting.
- Cleanliness.

Street Interface

- Active frontage.
- Transparency.
- Entrance frequency.
- Blank walls.
- Setback conditions.

These variables will be converted into a structured comparative assessment framework.

Behavioural Mapping and Pedestrian Counts

Systematic behavioural observation will document:

- Pedestrian movement.
- Walking direction.
- Sitting.
- Waiting.
- Informal conversation.
- Children's play.

- Street vending.
- Recreational activity.
- Group interaction.
- Other stationary activities.

Pedestrian counts will be conducted during predefined observation periods, preferably including morning, afternoon and evening periods on both weekdays and weekends.

This temporal dimension is important because public life is not spatially static. A neighbourhood may demonstrate substantially different public-realm performance according to time of day and day of the week.

User Perception Survey

A structured questionnaire using a five-point Likert scale will assess perceived:

- Safety.
- Accessibility.
- Comfort.
- Connectivity.
- Environmental quality.
- Attractiveness.
- Social interaction.
- Sense of belonging.
- Street vitality.
- Overall walkability.

Respondents will be recruited through purposive/systematic intercept sampling within the selected neighbourhoods.

Data Analysis

Descriptive statistics will be used to summarise physical, behavioural and perception-based variables. GIS will be used to generate accessibility maps, pedestrian catchments, network-density maps and activity-density surfaces.

Space Syntax outputs will be spatially compared with pedestrian-count data.

Depending on data distribution, Pearson or Spearman correlation analysis will examine relationships between:

- Integration and pedestrian volume.
- Choice and pedestrian volume.
- Connectivity and activity intensity.
- Land-use diversity and pedestrian activity.
- Active frontage and stationary activity.

Multiple regression modelling may subsequently be undertaken to identify the relative contribution of spatial and environmental variables to public-life intensity.

A conceptual model may therefore be expressed as:

Urban morphology → spatial configuration → pedestrian accessibility → pedestrian movement → stationary activity
social interaction → public-life intensity

This framework positions public life as an emergent socio-spatial phenomenon rather than merely an outcome of pedestrian infrastructure.

Expected Findings and Discussion Framework

As actual fieldwork data are not yet available, numerical findings should not be fabricated. However, the study is designed to determine whether neighbourhoods exhibiting greater street-network integration, finer-grained block structure, higher land-use heterogeneity and more active building-street interfaces demonstrate greater pedestrian movement and public-life intensity.

The research will particularly examine whether highly integrated streets correspond to higher pedestrian volumes. Existing evidence indicates that integration and choice can be

meaningfully associated with pedestrian movement, although these relationships are context dependent.

The analysis will also distinguish between movement-oriented vitality and socially productive public life. High pedestrian flow alone may indicate strong accessibility without necessarily indicating high-quality public space. Streets supporting sitting, interaction, recreation and informal commerce may demonstrate a broader form of public-life performance.

This distinction is particularly relevant to emerging neighbourhoods, where conventional planning frequently prioritises vehicular movement and development capacity over pedestrian permeability and human-scale public-realm design.

Main Findings

The final manuscript should populate this section after fieldwork. The findings should be reported under five domains:

1. Morphological performance: differences in block size, street connectivity, density and land-use structure between selected neighbourhoods.
2. Configurational performance: spatial integration, choice and accessibility patterns derived from Space Syntax.
3. Walkability performance: comparative scores for connectivity, pedestrian infrastructure, environmental comfort and active frontage.
4. Public-life performance: pedestrian volumes, stationary activities, social interactions and temporal activity patterns.
5. Spatial-behavioural relationship: statistical associations between configurational characteristics, walkability indicators and observed public-life intensity.

The final objective will be to identify the specific spatial characteristics associated with high-performing public realms, rather than simply ranking neighbourhoods.

CONCLUSION

Walkability in emerging urban neighbourhoods should not be conceptualised merely as the physical presence of footpaths or pedestrian infrastructure. It represents a complex socio-spatial condition produced through the interaction of urban morphology, spatial configuration, accessibility, environmental quality, land-use structure and human behaviour. Contemporary research increasingly supports the integration of objective spatial metrics with observational and experiential approaches to capture this complexity.

The proposed research provides an architectural framework for examining this relationship within emerging neighbourhoods of Surat. By combining urban morphological analysis, GIS-based accessibility assessment, Space Syntax, walkability auditing, behavioural mapping, pedestrian counts and user perception, the study can move beyond conventional checklist-based assessments.

Its principal contribution will be to establish whether and how the spatial configuration of emerging neighbourhoods influences pedestrian movement and the intensity and diversity of public life. The resulting evidence can support a transition from vehicle-oriented neighbourhood planning toward permeable, human-scaled and socially productive urban environments.

Ultimately, the research can generate a context-sensitive Walkability and Public-Life Urban Design Framework for Surat, translating empirical spatial and behavioural findings into design principles concerning street-network permeability, block dimensions, active frontage, mixed-use interfaces, pedestrian priority, environmental comfort and neigh-

bourhood-scale public spaces.

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