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Assessment of Campus Walkability Parameters and its Impact on Pedestrian Priority in Institutional Premise: A Case of GITAM University, Visakhapatnam

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Abstract: ***The campus design influences pedestrian behavior and perception regarding movement, safety, and comfort. To fulfil user satisfaction on the campus, the built environment must consider walking, accessibility, and convenience. The planned campus environment stimulates social encounters and green mobility that enhances pedestrian movements within the premise. The findings suggest that green walkways, shaded paths, and walking spaces play an essential role in the comfort and convenience of walking. The negatives for pedestrian satisfaction were indicated in the studies as very poor shading, walkway disrepair, and high interaction between people and vehicles. This study aims to understand the factors that influences walkability within the University Campus, pertaining to attributes such as social interaction, accessibility, social inclusion, sense of security and elementary aspects such as landscaping incorporations. The study was conducted in GITAM University campus, Visakhapatnam with a cohort of 75 stakeholders from the student's fraternity of the University for understanding the prioritization of the factors influencing walkability within the campus. The factors identified from the comprehensive SLR (Systematic Literature Review) were assessed and the selected parameters were derived with mean weight factor of 2.613 - for Accessibility, 1.93 - for Landscape and Street Furniture, 2.573 - Sense of inclusivity, 2.656 - for Social Interaction. The findings of the research can form a basis of deriving factors of design quality indicators of the built environment promoting walkability with a Fuzzy Model Logistic for Campus Design.***

Keywords: Walkability, Pedestrian Perception, Walkability Factors, Walkability Assessment

1. Introduction

The world is experiencing its most significant wave of urban growth to date. Today, 3.9 billion people, or 54% of the world's population, reside in cities, whereas in 1950, 30% resided in cities. By 2050, this figure is expected to increase to 6.3 billion, 66% more (Nations, 2014) (UNDP, 2015). One of the defining features of urbanization is mobility, and the accompanying infrastructure always shapes the urban form. Mobility is highly manifest in cities; in 2005, 7.5 billion trips were made daily worldwide (Report, 2012). By 2050, three to four times the number of passenger kilometers will have been travelled compared to 2000. Nevertheless, despite the constant rising mobility in cities, urban sprawl, the horizontal, low-density spread of cities over large areas, has made the accessibility between functional places, like workplaces, schools, and shopping complexes, progressively more difficult. Commuting has taken longer, and citizens have gradually depended on private motorized transport. Active transport is estimated to cover a broad range of advantages, such as being a lower expense to the individual, less traffic, fewer vehicle emissions, improved productivity, and more significant social capital and well-being (Ambrey & Bitzios, 2018). The growing popularity of pedestrian-friendly urban space, coupled with issues about their performance, highlights the need to carry out more studies on pedestrian experience in the urban environment. These studies should also look into the role of the built environment in how people perceive, think, and consequently behave in urban areas (Isaacs, 2000). Walkability of an area can potentially affect the extent to which individuals utilize sustainable transport, since a safe and enjoyable area is more pedestrian- and cycle-friendly. Through the development of walkable areas, schools and cities can potentially make commuters utilize sustainable and health-friendly modes of transport, thereby making the overall area more sustainable (Biology et al., 2014). Streets are a component of urban public space. The spatial quality of streets denotes human experiences of the overall environment of such spaces. High spatial quality streets can contribute positively to the quality of life and amenities offered to citizens. Moreover, increased street quality can enhance social interaction among users and encourage healthy behaviour among residents
(LI et al., 2022).

Walking makes up a considerable portion of the so-called moderate physical activity. It is determined by many factors, one of which is local topography. The natural neighborhood environment, such as its hilly nature or not, can greatly influence a person's choice to be physically active. Yet research rarely assesses the influence of hills in the local natural environment on the attractiveness of walking (Sun et al., 2015). Walkability refers to the conducive or hindering force the built environment has on walking in daily living. Some studies also deal with potential facilitators, barriers to walkability, and other related aspects. Those include a wide range of demographic and social variables concerned with the social composition of places (like age, ethnicity, and socio-economic status of populations, social cohesion and capital, and crime statistics) and contextual factors of places (including the availability of healthy and affordable food, land use designations, and particular design features such as sidewalks and crossings). In fact, among all the matters of so many other recent studies about walkability, walking has come to be recognized as the single most actively encouraged and deemed the most valuable lifestyle habit in terms of population health benefits (Andrews et al., 2012). Walkability integrates three most important urban-space elements: density (residential and employment density), diversity (mix of land use), and design (intersection and street density) (Cervero & Kockelman, 1997). In principle, people living in walkable neighborhoods have a greater chance of participation in routine exercise can bring important health gains, whether that exercise is found through utilitarian or recreational travel. The physical environment's contribution to promoting or preventing physical activity is an increasingly active field of research (Handy et al., 2002) (Humpel et al., 2002) (Saelens E et al., 2003) (James F. Sallis Michael Pratt, 2007), and it could be a unifying theme for research and practice that re-establishes the close historical relationships between urban planning and public health (Northridge et al., 2003).

A well-designed street space can encourage an increase in the number of outdoor uses, thus affecting users' behavior (Tang & Long, 2019). The utmost focus on physical space at the cost of human behaviour has resulted in a cultural loss of spatial vitality. Environmental behaviour theory gained momentum after the 1960s, pushing architects out of their offices toward the synergetic interplay of ‘physical space’ and "human behaviour". Vibrant streets have been reported; however, that could make a big difference in the general health of the people, their level of activity, and even their social cohesion. Jacobs' concept of impulses composes urban vitality in creating diverse urban street life, and designers and planners have recently acknowledged public space differentiation as one of the most feasible solutions to mitigate threats of rapid modern urbanization (Jacobs, 1961). Henceforth, urban street vitality has been a prime target of urban design as a vital measure of urban spatial quality. Within this context of urban development, the vast influence of New Urbanism design theory has brought a consensus on how such communities are to be planned: walkable, sustainable, and healthier (Lian et al., 2024). The work done in this regard has shed some light on walking not just as a destination-oriented mode of transport but also as a form of fluid and active movement involvement of body, mind, and space, with differential varieties based upon purposes, pace, gait, and rhythm (Chan et al., 2020).

In recent years, metropolitan dynamics, e.g. low-density urban spaces, have been principally shaped by sprawling streetscapes and commercial areas. When designed with due diligence in land use conditions for basic facilities for pedestrian movement, the inner cities could eventually lean towards sustainable modes of transit and even significantly influence the travel modes' choice among pedestrians. Low-density places rarely boast pedestrian-friendly mixed land use, extending the distances one travels and requiring automotive reliance. The separation of residential, commercial, and industrial areas supports car-dependent lifestyles; residents must travel long distances for work, shopping, and leisure. The lack of connectivity between the primary land uses feeds into the problems, leading to less attractive pedestrian environments (Mehrinejad Khotbehsara et al., 2024). Transportation, urban planning, and research academics have long realized that neighborhood design and land use is created and used can impact transport choice (auto, transit,) walking/cycling). Factors that influence the use of motorized or non-motorized transport is inherently based on two fundamental elements of land use: (a) proximity (distance) and (b) connectivity (directness of travel) (Frank, 2000). (Saelens E et al., 2003) identifies high-walkable neighborhoods as having intense non-residential land use along the principal corridors; grid street pattern with short block length and limited cul-de-sacs. Low walkable neighborhoods have longer-blocks, mixed curvilinear and grid-like street pattern, and higher cul-de-sacs. The number and activities of pedestrians that took place in each area and, in that area, at a specific time, are influenced by many factors of the urban built environment. Urban planners and transportation engineers typically analyze local pedestrian volumes to measure a neighbourhood's walkability, physical activity, safety issues, effects of new development, and foot traffic near local retail establishments. Whyte has also followed this up in his investigation into how human activity has been impacted overall by externalities in the urban environment: space layout, form of construction, street furniture, and such environmental impacts as noise and light (Whyte, 1980).

Macro studies of urban mobility tend to focus on network analysis or regional patterns while giving less consideration to micro-locations and micro-behaviours. Many of these studies tend to focus on one aspect, for example, a road network or one transit – quite often through the lens of transportation planning, and they do not consider localized areas as an ensemble of multiple objects and dimensions. These limitations prevent a deep understanding of human activity in different neighbourhoods or communities regarding when or why those activities vary in locations (Lai & Kontokosta, 2018). In this regard, walking has become the most sustainable kind of physical exercise available in our daily lives since its slow pace helps people to engage in more direct interaction with their surroundings. Growing data shows that improvements in the built environment can help with walking and other forms of physical activity. Walking behaviour may be influenced differently depending on the trip's goal—housework, business or study, leisure, etc. Therefore, it is appropriate to investigate how the built

environment affects several walking activity goals (Chan et al., 2021). Walkable transit-oriented neighbourhoods are essential for low-carbon cities that need climate-change adaptation. While a comfortable and beautiful walking environment improves walkability, hills, heat, cold, rain, snow, crime, noise, dirt, scent, and broken pavements discourage it. Although these elements are not less crucial, they will be kept in brackets for our needs to concentrate on the morphological parameters of density, mix, and access (Dovey & Pafka, 2020).

Policymakers and practitioners must consider plans that move people from fuel-based transportation to active forms of travel if they are to benefit from active travel fully. Commuting- both to and from work- is a fundamental problem that needs to be addressed in developing a sustainable transportation plan. Features of the built environment (BE) help pedestrians decide on their paths. On the other hand, elements like steep terrain, longer walking distance, longer waiting time, litter presence, and absence of pedestrian indicators lower the possibility of route selection (Basu et al., 2023). At the micro level, research employed mostly participants' perceptions of neighbourhood amenities that motivate them to walk. Fewer studies employed objective inspection to determine if the microenvironment is walkable. University campuses are mini societies in society, and they share many features of a small city, such as residential areas, transport, utilities, land use, and communications (Amaral et al., 2015). Like their larger counterparts, university campuses face the same problems regarding active transport, where the respective solutions must be generalized to macroscale applications. A walkable community that links the campus communities with facilities and services through walking is considered one of the campus sustainability challenges. Also, a lack of concern for pedestrian demand and non-functional campus buildings incompatible with hot weather are the central concerns that require maximum attention to foster walking on and off campus. Therefore, influences that mould the walkability of the campus as a task to be undertaken to promote walkability are crucial in making campuses sustainable. There are few studies, but some address the characteristics of university buildings associated with walkability (Ramakreshnan et al., 2020). A pedestrian space reduces dependence on motorized transportation, saves non-renewable resources, and lowers neighbourhood pollution, thus deserving its endorsement in the Global Action Plan on Physical Activity 2018–2030 (Organization, 2019).

The campus setting is notable for its restricted boundaries and regulated access, usually offers shared spaces, such as sidewalks and bikeways, that are needed to encourage active living and possibly maintaining physical activity through to older adulthood (Lu et al., 2017). University campuses are more than intellectual hubs of distinction. For many young adults, they are places of personal development and discovery, which help build lifelong health patterns, such as physical activity participation. The university campus can encourage active lifestyles in the whole university community: students, teachers, and workers (King et al., 2020). The primary role of university campuses is to promote students' health and fitness through walkability. Campus walkability is distinctive and distinct from the general communities since it integrates physical design, social behaviour, and environmental elements customized to the unique requirements of a university environment. Unlike ordinary walking, campus walkability focuses on building proximity, street connectivity, and pedestrian infrastructure. These aspects make walking on campus functional and efficient for daily routines, such as walking from one class to another attractive and sustainable (Liao & Zhu, 2025). Walking as a routine activity can help students, staff, and faculty meet their daily levels of moderate activity, reach healthy body weight, and adopt life-long physical activity habits (Peachey & Baller, 2015). (Park, 2008) and (Harun et al., 2020) highlighted that elements of streetscape are fundamental elements with important influences on the character of walkable streets. Campus walkability is the key component of campus mobility because it allows users to access a network of direct, easy-to-follow, and interconnecting routes that connect hostels, faculties, green spaces, public transport stops, and other facilities. This connectivity is needed to promote the campus experience, which needs to be safety-oriented, functional, enjoyable, and learning-oriented. Walking is generally linked to many advantages, such as reducing air pollution, easing traffic, and fighting obesity and other diseases while fostering neighbourliness and the creation of a more pleasant and secure city. The primary purpose of walkability in measuring a university campus is to encourage healthy living, reduce emissions, and improve sustainable transport provision (Liow Ken Keat Nor Rasidah Hashim, 2016).

As per (Speck, 2012), there are four most important factors of the 'General Theory of Walkability.' This book discusses the factors that make a city enjoyable and walkable for pedestrians, and most importantly, it discusses the traits of a 'pedestrian-friendly' street. It mentioned that four primary conditions satisfy walking requirements: i) safety, ii) useful, iii) comfortable, and iv) interesting. Each of these attributes should be consistent with each other, and none of them individually is acceptable. Walkability can also be linked with qualitative characteristics such as visual beauty, attractiveness, safety, and comfort. It has aspects that are hard to define. It is abstract, evading physical form or depiction through solid structures. Its existence depends on the environment in which it is present and how it is perceived (Harun et al., 2020).

(Gehl Royal Danish Academy of Fine Arts, Copenhagen, 1996) Posited that there are three basic principles of pedestrian-friendly places: i) protection, ii) comfort, and iii) enjoyment. Another study of (Moayedi et al., 2013) establishes that walkability is measured through the quality of streetscape design that should promote comfort, deliver adequate access, provide permeability, and support pleasant experiences. (Spoon, 2005) Has listed the main benefits of a walkable community as a livable, accessible, attractive, safe, diverse, and healthy community. Promoting walkability has social benefits, such as increasing social contact and fostering relationships by enabling direct connections. Walking is also a green mode of transportation that improves safety and lowers pollution and noise. Other positive factors include appealing parks and nodes. By constructing safe sidewalks, well-maintained pavement, street lighting, and an attractive sidewalk environment, urban planners and

architects may significantly contribute to creating walking-friendly designs that make walking efficient, safe, and enjoyable (Raswol, 2020). Five infrastructure factors were identified by (Shay et al., 2003) pedestrian facilities, including sidewalk amenities; accessibility and convenience; connectivity, as determined by the short distance and efficiency to destinations; the aesthetic aspect of walkability, which includes a pleasant environment, attractive architecture, trees, and sidewalk landscaping; and street safety, which provides for curb extensions, street lighting, sidewalk amenities, and street narrowing. On the other hand, (Ewing et al., 2006) investigated the characteristics of physical attributes and personal opinions, such as safety and attractiveness, as the key components of walkability notions.

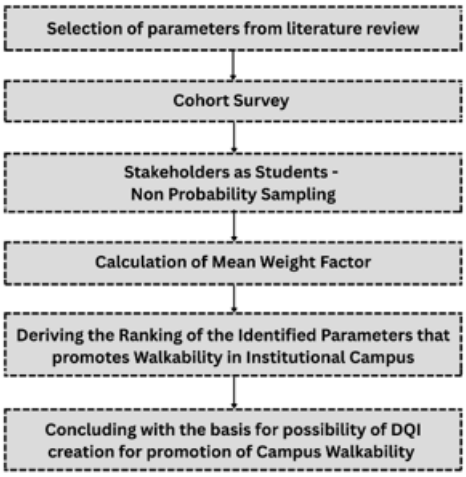

Figure 1: Chronology of the adopted methodology

2. Literature Review

Universities are dynamic spaces within which walking is the most natural mode of movement employed by the students, professors, and staff. These built environments- in pathways, green spaces, lighting, and accessibility characteristics- contain the framework that experiences pedestrian mobility on university campuses. A thriving and pedestrian-friendly campus enhances safety, comfort, and social interaction, thus, an overall positive experience. In contrast to urban environments, there are few perceptual studies about the pedestrian-friendly nature of university environments. In the case of the campus as an isolated contextual environment, it poses opportunities and challenges for pedestrian planning. This literature review refers to research on pedestrian vision, built environment factors, safety, and sustainability specific to university settings. Along with realizing common contributors toward pedestrian experience, it builds upon existing literature to point to further investigation opportunities, especially for considering Indian universities like GITAM.

2.1 Pedestrian Experience

The general quality tends to trigger a mix of visual and non-visual impressions, depending on weather, climate, pollution, human activities, and also the context surrounding some history (Nasar, 1987) (Cassidy, 2014) (Johansson et al., 2015). The technical assessment of the walkability of urban space, focusing on street design, land use, and the level of 'pedestrian-friendliness,' reduces the barriers faced by people with disabilities to a 'dilemma of access.' It does not consider, however, the intense embodied experiences and affective states of being 'out of place' in disabling urban space produced by economic, political, and cultural forces (Andrews et al., 2012). Researchers mathematically and graphically analyze information on spatial organization to ensure maximum accessibility so that users can easily experience and use public buildings. Vegetation regulates the microclimate of streets through the supply of shade, dust retention, and a pleasing visual environment, maximizing the pedestrian experience (Lian et al., 2024). It is the ideal time to introduce more qualitative data, exploring pedestrians' knowledge, perceptions, interpretations, and the specific meanings they attribute to their everyday walking experience. Recent studies on people's walking experience and behaviour in public health and transportation research have focused on the importance of physical infrastructure. Yet relatively few have addressed the issue of how social and cultural environments shape individuals' walking. This neglect is shocking because contextual considerations can powerfully shape individuals' perceptions and the overall experience and behaviour of walking. To enable participants to describe their walking experiences most comfortably, participants were encouraged to use either walk-along or stationary interviews in places they prefer (public places such as parks and cafes or where they live) or by route preferences (ways and footpaths that the participant had decided to "walk-along." Participants' reactions to their city space and the knowledge they acquired on their walking excursions were shaped by elements of the time-scape, among them the tempo and timing. The duration and timing of their walking outings and the sequence of their routes were significant. Several participants noted the temporalities of the built and social environment, citing how walking at various times influenced their engagement with and responses to the surrounding world. Some stated the merits of the neighbourhood. The environment also negatively affected them because they walked at different times of the day. A good example was the broad, smoothly laid walkways enjoyed in the morning, but proved frustrating, breaking their rhythm of walking in the daytime when hawkers and vendors had set up their stalls. Knowing urban walking not only covers the present to the past is significant but also for shaping what people anticipate in the future. In contemporary walkability research, policy-led and focused urban design modifications are considered essential instruments for transforming the built environment (Chan et al., 2020).

Key findings from various methods that involve observation, GIS, GPS tracking, and survey questionnaires to explain the influence of mixed land use on travel behaviour, the enhancement of the pedestrian network, and the impact of electronic navigation on the walking experience. The urban design for cities tends to function in most cases because most of them are not low-density, and they restrict most of the general pedestrian experience. Urban designs that become less popular due to low density and urban designs in the CBD negatively impact the liveability of places. The access to the street mostly depends on its design and the connectedness of the area, since this access determines how the pedestrian experiences public space. Therefore, low-density urban designs require careful consideration of

pedestrian comfort to ensure that such factors, like street integration, are considered better connections to urban space with compatible land use. By giving preference to such place-making initiatives to ease exploration and interaction while stopping incompatible developments near hot spots of pedestrian activity, urban planners could ameliorate the walkability and liveability of low-density downtowns (Mehrinejad Khotbehsara et al., 2024).

Previous studies show that walkability is associated with social interaction. Capital, identity, engagement, safety, and liveability in various neighbourhoods are entwined with a rich texture that determines people's affective walking experience- those interwoven hedonic and eudemonic factors- and mental health. The affective experience constitutes a significant thread in the textile of well-being, which, from a phenomenological standpoint, is a conceptualization rooted in personal experience and lived life. Such personal meaning significantly contributes to the extent to which individuals enjoy the walkability of a place. It has been proven that happiness, comfort, annoyance, and feelings of security are inevitably linked with walking in a city. Such experiences are significantly valuable to campus students; beneficial walking experiences are essential to student well-being. On the other hand, positive attitudes toward walking have been found among setting types of transport and leisurely walking (Chan et al., 2021). Frequently walking students through highly walkable campus spaces leads them to experience decreased stress levels and improved mental health. Such favourable experiences, on the other hand, are convertible to higher-quality academic outcomes through better physical well-being and enhanced alertness and cognition. In conventional terms, one's walkability perception improves the more one feels positively inclined about walking. That, in turn, advances the walking pattern towards walking, enhancing the walkability experience overall. A beneficial orientation towards walking will likely elicit a better experience associated with the act (Liao & Zhu, 2025).

The key determinants of walkability on the campus were street connectivity and accessibility, traffic safety, pedestrian infrastructure, experience, land use, and campus neighbourhood. Prior studies have demonstrated that a positive environmental perception was a decisive factor in place attachment, whereas the nature of place attachment to environmental perception could be unclear (Chan et al., 2020). The motivation for walkability was the experience of desire that compels a person to walk on the university campus. The walking experience was rated as a determinant instrumental in enhancing campus walkability. Of special interest were cleanliness and maintenance of walkways, shaded walkways providing acceptable thermal comfort, and animal-nuisance-free walkways as the most significant experiential attributes in influencing walking behaviour in the campus communities. However, extreme climate and weather might not always be a burden and might even be embraced depending on the movement activity (Andrews et al., 2012).

Contrarily, the availability of street trees and ornamental plants along the walkways, the aesthetic experience of the campus landscape, as well as the attractiveness of landmarks, murals, and wall paintings were considered comparatively significant to create a satisfiable walking experience. These amenities create physical comfort and make urban areas more pleasing to the eye and inviting, enhancing pedestrian life (Mehrinejad Khotbehsara et al., 2024). The least important factors were rated as topographic features, such as hills and slopes, which demotivate walking. The participants rated traffic safety as the fifth determinant instrumental for walking on campus. Crosswalks, reasonable road and sidewalk separation, traffic lights, and speed limits were considered significant ingredients to minimize the pedestrian and vehicular conflict on the campus, possibly leading to increased risk of injury and fatality in a collision. The interaction of seating with greenery would typically be more assertive in the evening to make street characteristics conducive to lingering and sustained vitality (Lian et al., 2024). However, the participants considered less importance towards the need for traffic police and speed bumps to improve safety while walking on campus. The least concerning factor was the existing status of the campus neighbourhood to influence the campus walkability in the campus community. Although they did not show great interest, most participants stressed that the enclosed and fenced campus neighbourhood was essential in promoting pedestrian safety at any moment. Notably, the participants ruled out the limited parking spaces to encourage walking within the campus neighbourhood. This shows an engaged relationship in which the environment influences the person, and the mere act of walking simultaneously reconstitutes their attitudes toward that environment. This can then result in more significant emotional responses towards the walk. Students may prefer to walk as transport to reduce their spending on easy modes of transportation, like taxis and private hire cars. Considering this, the campus management should devise targeted interventions and infrastructure development to provide them with a more comfortable and convenient walking experience while persuading others to walk on the campus. Another important finding was that wealthier participants were less likely to walk, as it could be perceived as a resemblance of the capability of vehicle ownership and social standing (Ramakreshnan et al., 2020). The inconclusiveness of these findings offers a potential avenue for creating new, generalizable information on the expected changes from environmental change across the range of sociodemographic variables (Ambrey & Bitzios, 2018).

2.2 Social & Community

Social interaction is of great importance to the way in which pedestrian practices unfold (Middleton, 2018) . Streets have an obvious social role. They are considered public spaces and are deliberately planned to encourage street life, as any movement of pedestrians is thought to strengthen the ties of community and create a sense of place (Talen, 1999). The social significance or symbolic significance of a location could be due to its overall mood that is perceived (Thompson, 2002) (Lynch, 1960). The quality of good streets thrives by enabling socially vibrant interactions between the various users and encouraging healthy habits among the residents (LI et al., 2022). Spaces and activities can support one another and create vitality through the different types of human activity. These activities are not

just in quantity but in kind and time. In public space, these activities are influenced by urban spatial patterns, creating a cohesive entity of spatial characteristics and the underlying social life. Public seating spaces play a significant role in enabling social interaction and increasing activity levels on pedestrian streets (Lian et al., 2024). The walkable interface length is substantial since the interface is also an active interstitial space that supports urban life. This is another argument borrowed from Jacobs' writings. The first three chapters stress the importance of sidewalks in urban liveability, social cohesion, and safety. The interface catchment is used here to measure the city's capacity to embrace diversity through multiple entrances at the public/private boundary. The permeability of the street network is therefore linked to the aggregate interface catchment lengths and, finally, to street-life vitality (Dovey & Pafka, 2020).

Walking for transport has many environmental, social, and health benefits. The complexity of walking decisions is based on various factors found that social attributes largely determine walking avoidance. In contrast, the choice to walk is influenced by spatial-physical factors (Basu et al., 2023). The walking behaviour of the pedestrian exists in a broader socio-cultural context; thus, future qualitative work can add to the debate by exploring how pedestrians make sense of their pedestrian world in many social and cultural settings (Chan et al., 2021). In focusing on these walkability dimensions, we are particularly bracketing variables like topography, micro-climate, safety, and aesthetics (Dovey & Pafka, 2020). Daily urban walks are full of verbal and non-verbal conversations between pedestrians and other users; "walking with" can bring into being and sustain supportive public spaces that enhance social interaction and community cohesion. The concept of viewing walking as a significant social activity and the interactions among friends, families, and colleagues commuting in private cars proved that a vehicle can be a social space and that commuting together is a social activity. Walking tours are a necessary bridging activity for our walkers in their lives, and they greatly value channeling these walks into communication and affective interaction. Walking is a physical movement, but it is a way of relating to new places, maintaining social bonds, and maintaining emotional bonds to origins (Chan et al., 2020). Local crime incidents always negatively impact pedestrian activity, which may reflect pedestrians' perceptions of the area's safety (Lai & Kontokosta, 2018).

The vast literature about urban behaviour shows that urban settings correlate considerably with behaviour, the dynamics of movement, and pedestrians' environmental satisfaction. Such literature has developed several quantitative theories and methodologies to model and describe the complicated relationship between spatial arrangements and social behaviour. The spatial arrangement of historical districts has significantly influenced pedestrian movement and social interactions. Pedestrians engaged in highly legible places with visual access, distinct landmarks, and an uncluttered environment were encouraged to increase foot traffic and social interaction with each other. The findings of this study revealed that spatial design contributes a lot to making cities livable, thus proving the interconnected social life that takes place with integrated and legible urban space and promotes a suitable environment for walking and interacting with others. Incorporating the Space Syntax analytical tool into GIS provides significant advantages in urban morphological analysis within GIS. GIS offers excellent tools for exploring urban morphology using appropriate spatial analysis and visualization tools. A network intentionally promoting communication among compatible uses can shape social interaction and behaviour. Hence, proper attention should be directed to land-use practices aimed at pedestrian activities to improve urban residents' behavioural aspects (Mehrinejad Khotbehsara et al., 2024). Regarding energy savings, expenditure reductions, and health improvements, walkable environments help physical activities that boost a neighbourhood's social cohesiveness and economic prosperity. More data is still needed to support the body of walkability knowledge already in use from the standpoint of the campus community in various geographical and climatic conditions (Ramakreshnan et al., 2020).

A vital evaluation tool determines the degree to which a built environment invites walking for any purpose, be it physical activity, active mobility, leisure, or going to the shops. It is used for socializing and neighbourhood engagement. Weighting walking more would, among others, ensure students' physical health while enhancing environmental sustainability by reducing vehicle use and boosting social interaction and community ideas. A pedestrian-friendly campus should create environments that are safe, comfortable, and functional, leading to a campus experience that is healthier, more sustainable, and more cohesive. Rich academic and commercial destinations within walking distance of each other constitute the right variety to promote the practical walking experience for students in a more snowballing manner. This, in turn, suggests a greater sense of purpose, opportunity, and engagement, along with positive emotional responses. Here, a further linking of these observations would be primarily related to the college town: in this case, a connection between the integrated use of campus and community resources as related to more positive affective walking experiences (Liao & Zhu, 2025).

Table 1: Summary of the findings of each parameter

S. No.	Parameters	Findings
1	Pedestrian Experience	Most University of Malaya students had a poor walking experience on campus, with the main factors being the lack of accessible street features, though facilities such as traffic calming devices at pedestrian crossings were welcomed (Liow Ken Keat Nor Rasidah Hashim, 2016). Land use mix and destination accessibility also have powerful effects on students' affective walking experience, and they have a more powerful and lasting influence than individual attitudes towards walking (Liao & Zhu, 2025).
		The study suggests that a campus landscape with more mixed-use areas in a 1km radius makes walkability better. Again, pedestrian infrastructure, traffic safety, and proximity to destinations are the determinants of walkability. Again, pedestrian infrastructure, traffic safety, and proximity to destinations are the determinants of walkability. Students prefer to walk as an affordable mode of transport, whereas high-income students walk less because they perceive social status (Ramakreshnan et al., 2020). Therefore, campuses need to adopt interventions directed at the appropriate targets, identify buildings near each other, and put in place zoning regulations that foster walkable environments. These changes in the built environment, unlike the use of attitude change, are at the core of fostering the practice of walking, improving wellness, and creating a more sustainable campus community (Liao & Zhu, 2025)
2	Social & Community	The empirical evidence presented in this research has provided a new vision of the role of the streets. Apart from their functional role as urban bridges, streets offer wide areas for various forms of pedestrian activities, both passive and active. This activity would facilitate the physical and social development of students (Harun et al., 2020).

3. Methodology and Data

In the current study, a mixed-method study is utilized that incorporates qualitative and quantitative approaches to explore the factors influencing pedestrian perception and walkability in context of the GITAM University campus. The overall concern is to assess how the users perceive the built environment that promotes walkability within the campus with regard to four identified parameters: accessibility, landscape and street furniture, sense of inclusivity, and social interaction. The study was conducted on 4 hotspots in the campus which witnesses the maximum footfall aspects pertaining to the activities ranging from recreation, refreshments, academic abiding, congregation purpose, sports activities involving indoor and outdoor as well as active and passive. The identified hotspots, thereby ranges from cafeteria, eat street, indoor stadium precinct, play area to central library and common auditorium precinct. Four hotspots for assessment of walkability factors and pedestrian perceptions have been identified as the research focal areas, chosen due to their density and social importance in the campus environment. The Indoor Stadium, Eat Street, GIMSR Café, and the Knowledge Resource Centre are such chosen spots. The study was conducted on choice of these locations as they are socially active and spatially prominent locations in the campus environment.

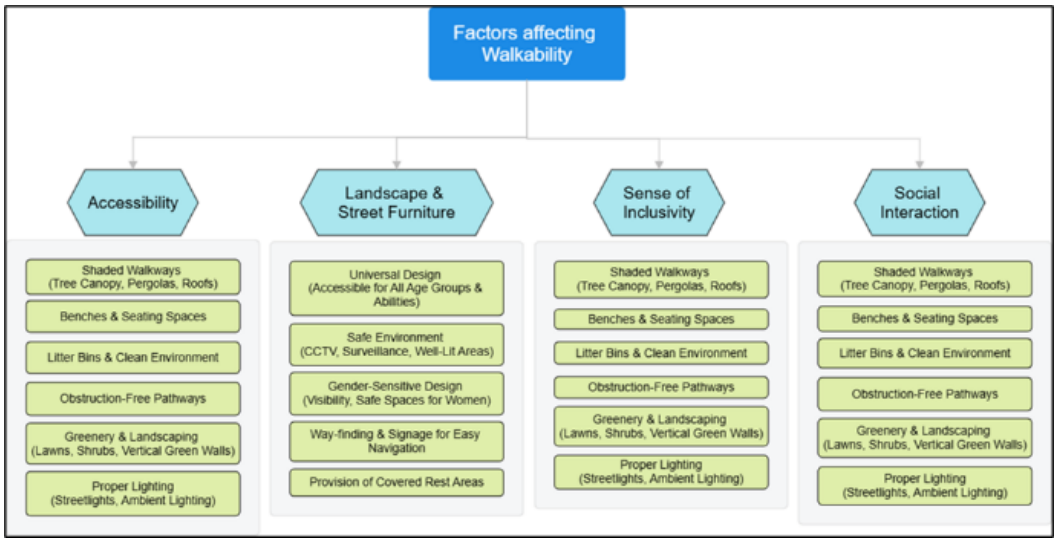

Figure 2: Factors Affecting Walkability in a University

3.1 Study Area

The Gandhi Institute of Technology and Management (GITAM) University is a multidisciplinary university located in Visakhapatnam, Andhra Pradesh, which offers educational programs in different disciplines of education, such as engineering, management, law, science, pharmacy, humanities, medical sciences, and architecture. Established in 1980, the campus occupies more than 100 acres of land. The university is on moderately sloped terrain, where moderately sloped ground levels determine how people move between zones.

The built environment is composed of academic buildings, students' hostels, recreation centers, and landscaped green areas, providing an overall vibrancy and cosmopolitanism. The study examines pedestrian mobility and perceptions concerning major hotspots on campus, such as the Indoor Stadium, Eat Street, GIMSR Cafe, Knowledge Resource Centre, and Talent Cafe. The hotspots were selected based

on high traffic volume and their social attractiveness, so they experiences provided feedback about the respective walkability

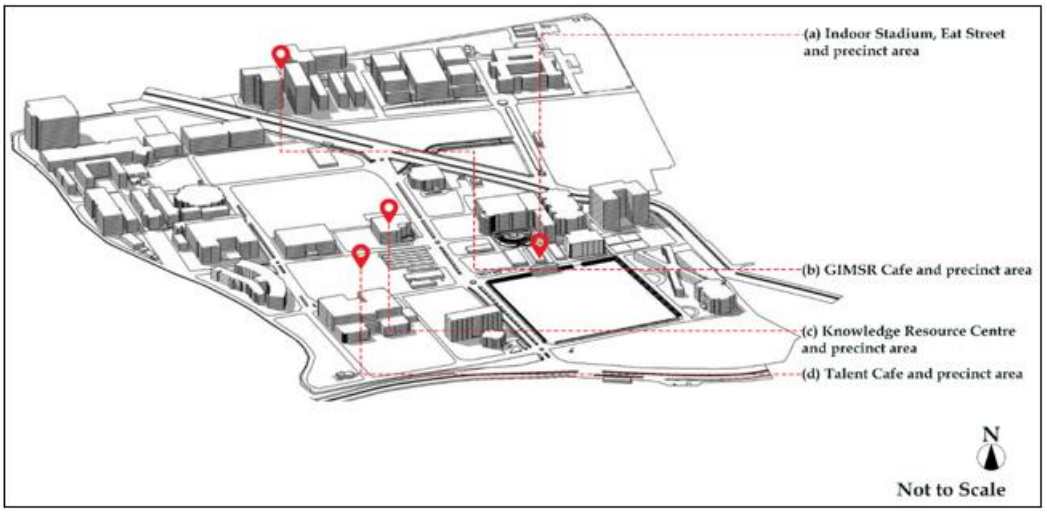

Figure 3: Masterplan of GITAM University

Figure 4: Selected Hotspots and the respective precincts in GITAM University Campus

3.1.1 Identified Hotspots in GITAM University Campus, Visakhapatnam (Indexing from Figure3):

1) **The Indoor Stadium and its precinct area** support varying sports, including badminton, basketball, cricket, and tennis, along with a gymnasium, which is attractive to sports enthusiasts. The sports hall attracts students and lecturers for sports and socializing as a non-specific shared gathering space in the context of the wider community. There is a tendency for visitors to use the stadium steps, making it an unofficial social space for relaxation and socializing.
2) **Eat Street and its precinct area** are renowned for offering a variety of food outlets catering to various tastes in the campus community. Students and workers from different departments come to this place to quench their hunger; hence, it is one of the most crowded places on campus. This area promotes a sociable environment, as people come to eat and socialize.
3) **The GIMSR cafe and its precinct area** are known for their cleanliness and pleasant environment. It is adjacent to the GITAM Institute of Medical Sciences and Research on the GITAM campus. The cafe operates functionally as a mini, multi-cuisine quality restaurant and welcomes medical students, faculty, and guests searching for a break from their busy routines. The cafe also provides a conducive area for relaxation and conversation.
4) **The Knowledge Resource Centre (KRC) and its precinct area** represent the primary focus for academic and scholarly activities on campus, providing a comprehensive range of books and study resources. Because of its central campus location, students engage in academic study, collaborate on informal discussions, and socialize. Foot traffic in this area remains busy throughout the day, representing a central point of engagement in student life.
5) **The Talent Cafe and its precinct area** are a more casual setting for students to engage in informal discussions, collaborative activities, and leisure. This area functions as a corridor between academic blocks. It allows students to plan and develop spontaneous engagement, contributing to an already active engagement in student life at GITAM University.

Each of these points of convergence serves as a manifestation of student life at GITAM University. When subject to analysis, this research will be able to identify the basis for incorporation of design elements and features that will influence walkability factors from the assessment which is done on the selected parameters from the extensive literature review.

3.2 Data Collection and Method

The data gathering method adopted in this research is based on existing research that has employed cohort surveys to examine community attributes, behavioral tendencies, and spatial behavior among specific user groups (Reddy & Mukhopadhyay, 2024) (Ghia & Mukhopadhyay, 2024). By extending these methods, this research adopts a cohort survey design with non-probability sampling, which involves 75 students who share common exposure in the university campus from various disciplines. Structured questionnaires were used to gather students' perceptions on walkability, spatial clarity, comfort, and usability of pedestrian environments. This method allows for a focused assessment of pedestrian perception in the campus setting, which is experience and behavior-focused rather than generalization-focused. The cohort questionnaires were designed with a range of open, close ended and interval range based multi choice options enabled questions to quantify the findings from qualitative nature of the research questions adopted for the study. Since the factors of walkability were derived from the literature review with search strategy on key words such as "Walkability Factors" AND "Pedestrian Perceptions" AND "Walkability in University Campuses" OR "Pedestrian Perception on Built Environment" from the SCOPUS, Web of Science, UGC Approved databases in a timeline of 20 years. The identified parameters as stipulated in (Table 1) were assessed through the cohort survey from 75 responses with questionnaires on prioritization of the parameters such as accessibility, landscape and street furniture, inclusivity, and social interaction.

3.3 Survey Design

Data were gathered using a guided online questionnaire (shown in Figure 1), which was used as a cohort survey tool with student participants. The parameters examined- landscape and street furniture, accessibility, inclusivity, and social interaction- were qualitative in nature and were designed to examine perceptual and experiential parameters of the built environment.

To examine walkability within the GITAM University campus, a structured questionnaire survey was designed and administered to students. The questionnaire was developed to capture subjective perceptions of campus walking environments, focusing on four key parameters as derived from the literature review which are, **Accessibility, Landscape and Street Furniture, Sense of Inclusivity, and Social Interaction** with regard to walkability and campus planning in the university context.

The instrument consisted of closed ended questions measured using a **five-point Likert scale**, ranging from strongly disagree (1) to strongly agree (5), allowing respondents to express their level of agreement with statements related to pedestrian experience. The survey included location specific questions for major campus precincts, such as the Knowledge Resource Centre, Indoor Stadium and Eat Street area, Talent Cafe, and GIMSR Cafe, to capture spatial variations in pedestrian perception.

The questionnaire was administered to **75 students**, selected through convenience sampling across different academic disciplines and years of study to ensure diverse representation. Prior to the main survey, the questionnaire was reviewed for clarity and relevance, and minor refinements were made to improve comprehension. Collected responses were coded and analysed using descriptive statistical methods. Weighted mean scores were computed to derive final parameter scores, enabling comparative assessment of walkability attributes across the campus. The questionnaire-based approach provided a systematic means to quantify subjective pedestrian perceptions and supported the priority and its substantiation for factors influencing walkability in the university environment.

Implementation of Saaty Scale (SAATY & KEARNS, 1985)

Table 2: The fundamental table

Intensity of importance on an absolute scale	Definition	Explanation
1	Equal priority	Both selected walkability parameters (e.g., accessibility and social interaction) equally contribute to the pedestrian experience.
2	Moderate priority	One parameter (e.g., landscape and street furniture) is slightly more important than another (e.g., inclusivity) in influencing walking.
3	Strong priority	A parameter (e.g., accessibility) significantly influences campus walkability more than others, based on student perceptions.
4	Very strong priority	One factor (e.g., sense of inclusivity) plays a dominant role in shaping student satisfaction and walking behavior on campus.
5	Extreme priority	A critical parameter (e.g., accessibility for all users, including persons with disabilities) overwhelmingly drives walkability perception.

4. Results and Findings

From the data collected from the online surveys on parameters affecting walkability on the selected four hotspots in the university, were identified. Table 4 to table 8 shows the descriptive statistics of the information by the survey respondents. Table 9 to Table 24 shows parameter-based calculated weightages at different locations. Data was analyzed, and table 9 to table 29 presents an overall view of weights for different parameters at various locations in the University.

Table 3: The questionnaire which was floated for survey

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	17.00	5	6.7	6.7	6.7
	18.00	22	29.3	29.3	36.0
	19.00	21	28.0	28.0	64.0
	20.00	10	13.3	13.3	77.3
	21.00	9	12.0	12.0	89.3
	22.00	4	5.3	5.3	94.7
	23.00	4	5.3	5.3	100.0
	Total	75	100.0	100.0	

Table 4: Gender-related information of the survey respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	29	38.7	38.7	38.7
	Male	46	61.3	61.3	100.0
	Total	75	100.0	100.0	

Table 5: Semester-related information of the survey respondents

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1st - 2nd	31	41.3	41.3	41.3
	3rd - 4th	26	34.7	34.7	76.0
	5th - 6th	8	10.7	10.7	86.7
	7th - 8th	10	13.3	13.3	100.0
	Total	75	100.0	100.0	

Table 6: Walking activity of the survey respondents.

Time spent (in minutes) walking on the Campus					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	>60	12	16.0	16.0	16.0
	0 - 15	11	14.7	14.7	30.7
	16 - 30	17	22.7	22.7	53.3
	31 - 45	25	33.3	33.3	86.7

	46 - 60	10	13.3	13.3	100.0
	Total	75	100.0	100.0	

Table 7: Weather preference of the survey respondents

Preferred weather for walking on campus					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Monsoon (July to October)	2	2.7	2.7	2.7
	Monsoon & Winter (July to February)	14	18.7	18.7	21.3
	None of the above	19	25.3	25.3	46.7
	Summer (March to June)	1	1.3	1.3	48.0
	Summer & Monsoon (March to October)	1	1.3	1.3	49.3
	Throughout the year	6	8.0	8.0	57.3
	Winter (November to February)	32	42.7	42.7	100.0
	Total	75	100.0	100.0	

$$\bar{X} = (\Sigma_{i=1}{}^{k}\, f_i X_i) \,/\, (\Sigma_{i=1}{}^{k}\, f_i) = (f_1X_1 + f_2X_2 + \ldots + f_iX_4) \,/\, (f_1 + f_2 + \ldots + f_i)$$

where, X_{i} = Mid-point of ith class interval and f{1} + f{2} +...+f k =n

where, **n= 75.**

The weighted mean method was employed to compute the final weightage of the walkability parameters. In this formulation, $X_i$represents the mid-point of the i^{th} class interval, while $f_1 + f_2 + \cdots + f_k = n$, where $n = 75$ denotes the total number of survey respondents. This approach enables the aggregation of ordinal survey responses into representative mean scores, allowing comparative evaluation of Accessibility, Landscape & Street Furniture, Sense of Inclusivity, and Social Interaction.

The derived weightages reflect students' overall pedestrian perceptions, that promotes walkability and ranking of the parameters impacting so, through mean weight factor achieved from the defined method, across the campus. This approach enables the aggregation of ordinal survey responses into representative mean scores, allowing comparative evaluation of Accessibility, Landscape & Street Furniture, Sense of Inclusivity, and Social Interaction. The derived weightages reflect students' overall pedestrian perceptions, that promotes walkability and ranking of the parameters impacting so, through mean weight factor achieved from the defined method, across the campus.

Table 9: Parameter-based (Accessibility) calculated weightages at Indoor Stadium, Eat Street and precinct area.

Priority Weightage	Accessibility	Weights
1	15	15
2	20	40
3	23	69
4	12	48
5	5	25
Total	75	197

Table 10: Parameter-based (Accessibility) calculated weightages at GIMSR Cafe and precinct area.

Priority Weightage	Accessibility	Weights
1	30	30
2	19	38
3	15	45
4	5	20
5	6	30
Total	75	163

Table 11: Parameter-based (Accessibility) calculated weightages at Knowledge Resource Centre and precinct area

Priority Weightage	Accessibility	Weights
1	13	13
2	11	22
3	28	84
4	19	76
5	4	20
Total	75	215

Table 12: Parameter-based (Accessibility) calculated weightages at Talent Cafe and precinct area

Priority Weightage	Accessibility	Weights
1	12	12
2	14	28
3	34	102
4	8	32
5	7	35
Total	75	209

The weightage given for the parameter **"Accessibility"** were obtained from rankings on a scale of 1 to 5 (representing equal priority to extreme priority) by the stakeholders. These responses correspond to one parameter with respect to different hotspots- Indoor Stadium, Eat Street and precinct area, GIMSR Cafe and precinct area, Knowledge Resource Centre and precinct area, Talent Cafe and precinct area, within the campus respectively.

The rankings are shown in the first column, and the second column records the response frequency for each rank.
Weight = Priority Weightage x Number of Responses

Table 13: Calculated weightages of 'Accessibility' with respect to the hotspots.

Intervened Precinct	Accessibility
Indoor Stadium, Eat Street & precinct area	2.626
GIMSR Cafe & precinct area	2.173
Knowledge Resource Centre & precinct area	2.866
Talent Cafe & precinct area	2.786

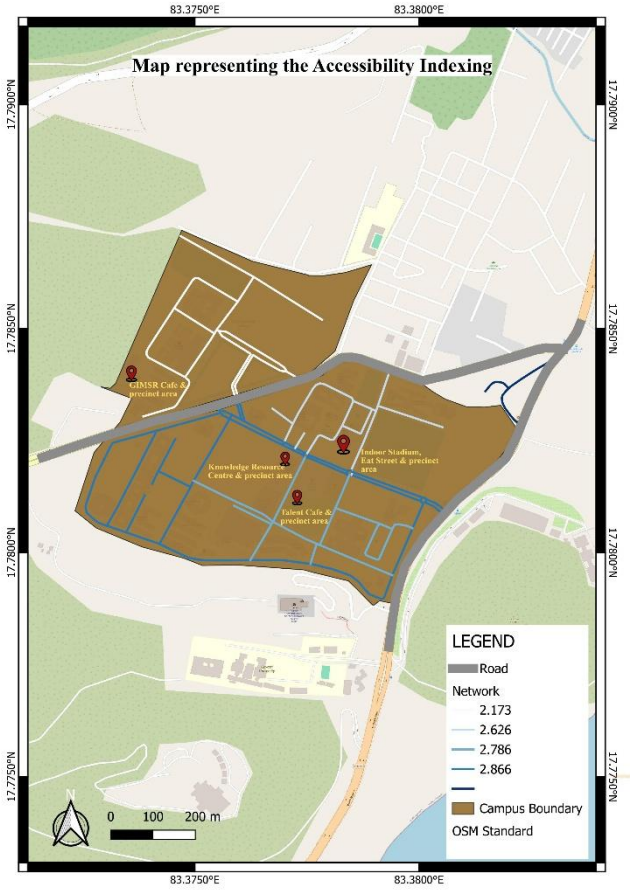

Figure 5: Ranking of the 'Accessibility' parameter with respect to the hotspots.
-Shown in GIS map (Source: Author)

Among the assessed locations, the **Knowledge Resource Centre (KRC) and its surrounding precinct** recorded the highest mean accessibility score (**2.87**). This suggests that students perceive this academic core as relatively easier to access, likely due to its central placement, well-defined pedestrian pathways, and frequent daily usage. The **Talent Cafe and precinct area** followed closely with a mean score of **2.79**, indicating favourable accessibility perceptions, possibly influenced by its social function and connectivity to major pedestrian routes. The **Indoor Stadium and Eat Street precinct** achieved a moderate accessibility score (**2.63**). While these facilities attract high pedestrian volumes during peak hours and events, the results imply potential limitations related to walking distance, route clarity, or pedestrian comfort, which may affect overall ease of access. In contrast, the **GIMSR Cafe and precinct area** received the lowest mean accessibility score (**2.17**), highlighting comparatively weaker pedestrian access.

This lower perception may be attributed to peripheral campus location, limited pedestrian linkages, or inadequate supporting infrastructure such as shaded walkways and clear wayfinding. Overall, the findings demonstrate that students' perceptions of accessibility are strongly influenced by spatial proximity, land-use intensity, and pedestrian network continuity. These results underscore the need for targeted walkability interventions in lower-performing precincts to enhance pedestrian experience and support a more equitable and accessible campus environment.

Table 14: Parameter-based (Landscape and Street furniture) calculated weightages at Indoor Stadium, Eat Street and precinct area

Priority Weightage	Landscape & Street furniture	Weights
1	33	33
2	31	62
3	7	21
4	2	8
5	2	10
Total	75	134

Table 15: Parameter-based (Landscape and Street furniture) calculated weightages at GIMSR Café and precinct area

Priority Weightage	Landscape & Street furniture	Weights
1	46	46
2	18	36
3	7	21
4	2	8
5	2	10
Total	75	121

Table 16: Parameter-based (Landscape and Street furniture) calculated weightages at Knowledge Resource Centre and precinct area

Priority Weightage	Landscape & Street furniture	Weights
1	25	25
2	33	66
3	13	39
4	2	8
5	2	10
Total	75	148

Table 17: Parameter-based (Landscape and Street furniture) calculated weightages at Talent Cafe and precinct area

Priority Weightage	Landscape & Street furniture	Weights
1	18	18
2	26	52
3	21	63
4	7	28
5	3	15
Total	75	176

The weightage given for the parameter **"Landscape and Street furniture"** were obtained from rankings on a scale of 1 to 5 (representing equal priority to extreme priority) by the stakeholders. These responses correspond to one parameter with respect to different hotspots- Indoor Stadium, Eat Street and precinct area, GIMSR Cafe and precinct area, Knowledge Resource Centre and precinct area, Talent Cafe and precinct area, respectively. The rankings are shown in the first column, and the second column records the response frequency for each rank.

To determine the weights, every ranking was multiplied by the corresponding number of responses:
Weight = Priority Weightage x Number of Responses

Table 18: Calculated weightages of 'Landscape and Street furniture' with respect to the hotspots.

Intervened Precinct	Landscape & Street furniture
Indoor Stadium, Eat Street & precinct area	1.786
GIMSR Cafe & precinct area	1.613
Knowledge Resource Centre & precinct area	1.973
Talent Cafe & precinct area	2.346

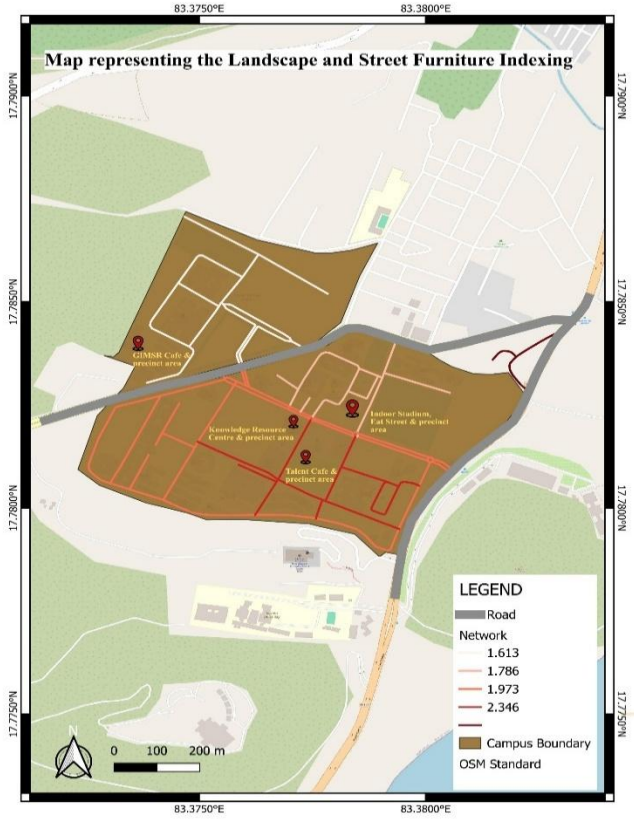

Figure 6: Ranking of the 'Landscape and Street Furniture' parameter with respect to the hotspots.
-Shown in GIS map (Source: Author)

Among the evaluated locations, the **Talent Cafe and its surrounding precinct** recorded the highest mean score (**M = 2.35**), indicating comparatively positive student perceptions regarding the presence and quality of landscape elements and street furniture. This suggests that features such as seating, shading, planting, and informal gathering spaces are relatively better integrated in this zone, supporting longer pedestrian stays and social interaction. The **Knowledge Resource Centre (KRC) and precinct area** achieved a moderate mean score (**M = 1.97**). Despite being a highly frequented academic hub, the results imply that while basic landscape provisions exist, there may be limitations in the diversity, comfort, or maintenance of street furniture elements along pedestrian routes. Lower mean scores were observed for the **Indoor Stadium and Eat Street precinct** (**M = 1.79**) and the **GIMSR Cafe and precinct area** (**M = 1.61**), indicating comparatively weak perceptions of landscape quality and pedestrian amenities. These areas may lack adequate seating, shaded walkways, or cohesive landscape design, which can reduce pedestrian comfort, particularly during peak usage hours or adverse climatic conditions. Overall, the statistical trend suggests that landscape elements and street furniture are unevenly distributed across the campus and are more positively perceived in socially active precincts.

Since such elements play a critical role in enhancing pedestrian comfort, safety perception, and walkability, their absence can negatively influence walking behaviour and route choice.

Table 19: Parameter-based (Sense of Inclusivity) calculated weightages at Indoor Stadium, Eat Street and precinct area

Priority Weightage	Sense of Inclusivity	Weights
1	12	12
2	19	38
3	28	84
4	13	52
5	3	15
Total	75	201

Table 20: Parameter-based (Sense of Inclusivity) calculated weightages at GIMSR Café and precinct area

Priority Weightage	Sense of Inclusivity	Weights
1	26	26
2	21	42
3	18	54
4	4	16
5	6	30
Total	75	168

Table 21: Parameter-based (Sense of Inclusivity) calculated weightages at Knowledge Resource Centre and precinct area

Priority Weightage	Sense of Inclusivity	Weights
1	11	11
2	19	38
3	26	78
4	16	64
5	3	15
Total	75	206

Table 22: Parameter-based (Sense of Inclusivity) calculated weightages at Talent Cafe and precinct area

Priority Weightage	Sense of Inclusivity	Weights
1	11	11
2	25	50
3	25	75
4	9	36
5	5	25
Total	75	197

The weightage given for the parameter **"Sense of Inclusivity"** were obtained from rankings on a scale of 1 to 5 (representing equal priority to extreme priority) by the stakeholders. These responses correspond to one parameter with respect to different hotspots which are- Indoor Stadium, Eat Street and precinct area, GIMSR Cafe and precinct area, Knowledge Resource Centre and precinct area, Talent Cafe and precinct area, respectively.
The rankings are shown in the first column, and the second column records the response frequency for each rank.

To determine the weights, every ranking was multiplied by the corresponding number of responses:

Weight = Priority Weightage x Number of Responses

Table 23: Calculated weightages of 'Sense of Inclusivity' with respect to the hotspots.

Intervened Precinct	Sense of Inclusivity
Indoor Stadium, Eat Street & precinct area	2.681
GIMSR Cafe & precinct area	2.242
Knowledge Resource Centre & precinct area	2.746
Talent Cafe & precinct area	2.626

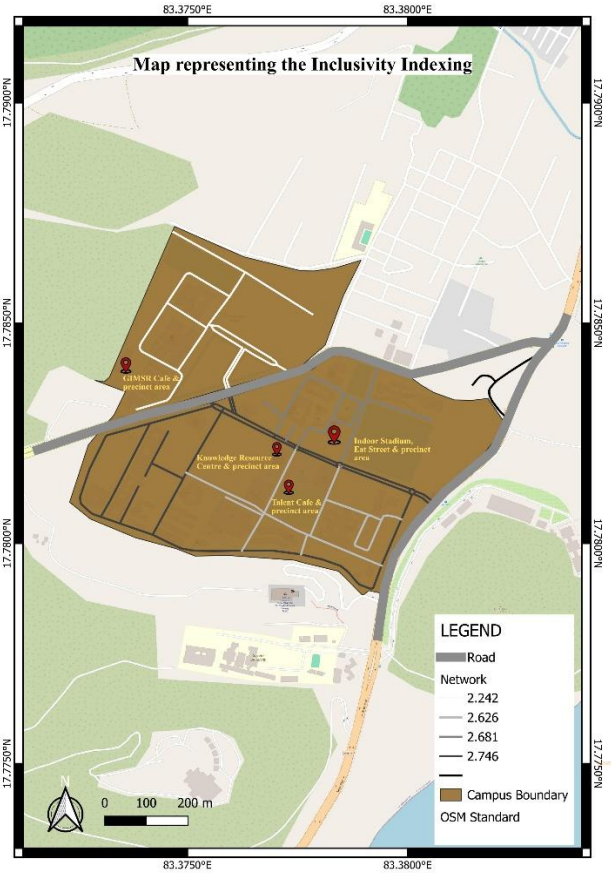

Figure 7: Ranking of the 'Inclusivity' parameter with respect to the hotspots.
-Shown in GIS map (Source: Author)

The **Knowledge Resource Centre (KRC) and its surrounding precinct** recorded the highest mean inclusivity score (**M = 2.75**), indicating a relatively strong perception of inclusiveness. This suggests that the area is perceived as accommodating to a wide range of users, likely due to its academic centrality, active pedestrian presence, barrier-free access, and balanced mix of formal and informal spaces. The **Indoor Stadium and Eat Street precinct** also demonstrated a high inclusivity perception (**M = 2.68**). As a recreational and social hub, this area appears to support diverse pedestrian activities and interactions, contributing to a sense of belonging and social comfort among students.

The **Talent Cafe and precinct area** achieved a moderately high mean score (**M = 2.63**), reflecting generally positive perceptions of inclusivity. The presence of social gathering spaces and active frontage may enhance user comfort; however, the slightly lower score compared to KRC indicates potential scope for improving universal access features and spatial legibility. In contrast, the **GIMSR Cafe and precinct area** recorded the lowest mean score (**M = 2.24**), suggesting relatively weaker perceptions of inclusivity. This may be attributed to its peripheral location, specialized user group, or limited pedestrian amenities, which can reduce the sense of openness and shared ownership among the wider student population.

Table 24: Parameter-based (Social Interaction) calculated weightages at Indoor Stadium, Eat Street and precinct area.

Priority Weightage	Social Interaction	Weights
1	14	14
2	26	52
3	19	57
4	10	40
5	6	30
Total	75	193

Table 25: Parameter-based (Social Interaction) calculated weightages at GIMSR Cafe and precinct area.

Priority Weightage	Social Interaction	Weights
1	25	25
2	29	58
3	7	21
4	6	24
5	8	40
Total	75	168

Table 26: Parameter-based (Social Interaction) calculated weightages at Knowledge Resource Centre and precinct area

Priority Weightage	Social Interaction	Weights
1	13	13
2	15	30
3	24	72
4	9	36
5	14	70
Total	75	221

Table 27: Parameter-based (Social Interaction) calculated weightages at Talent Café and precinct area

Priority Weightage	Social Interaction	Weights
1	8	8
2	23	46
3	23	69
4	13	52
5	8	40
Total	75	215

The weightage given for the parameter **"Social Interaction"** were obtained from rankings on a scale of 1 to 5 (representing equal priority to extreme priority) by the stakeholders. These responses correspond to one parameter with respect to different hotspots – **Indoor Stadium, Eat Street and precinct area, GIMSR Cafe and precinct area, Knowledge Resource Centre and precinct area, Talent Cafe and precinct area, respectively.**

The rankings are shown in the first column, and the second column records the response frequency for each rank.

To determine the weights, every ranking was multiplied by the corresponding number of responses:

Weight = Priority Weightage x Number of Responses

Table 28: Calculated weightage of 'Social Interaction' with respect to the hotspots

Intervened Precinct	Social Interaction
Indoor Stadium, Eat Street & precinct area	2.573
GIMSR Café & precinct area	2.241
Knowledge Resource Centre & precinct area	2.946
Talent Café & precinct area	2.866

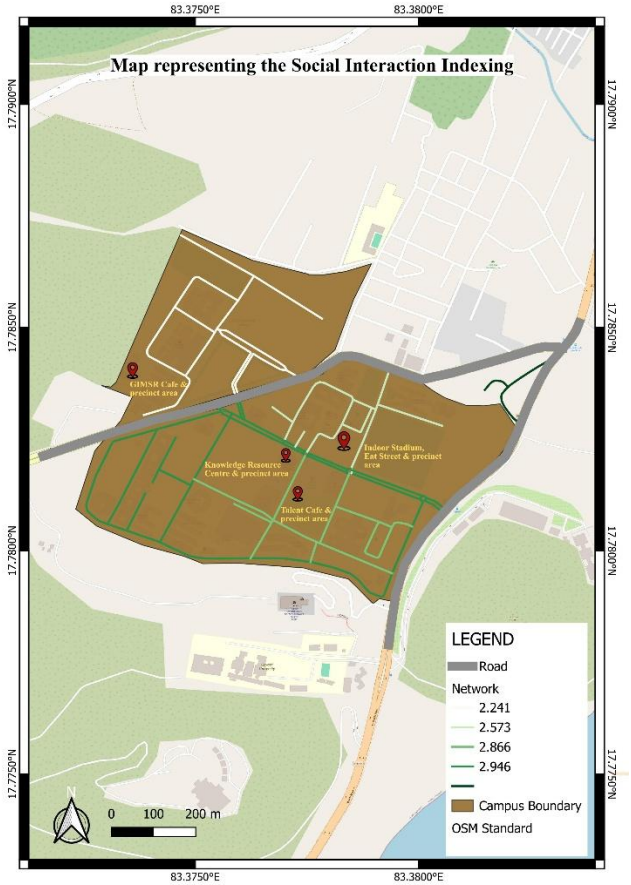

Figure 8: Ranking of the 'Social Interaction' parameter with respect to the hotspots.
-Shown in GIS map (Source: Author)

The **Knowledge Resource Centre (KRC) and its surrounding precinct** achieved the highest mean score for social interaction (**M = 2.95**), indicating that this area is perceived as the most socially vibrant pedestrian environment on campus. Its central academic role, high pedestrian footfall, and availability of informal seating and spill-over spaces likely encourage spontaneous interactions and prolonged stays. Closely following was the **Talent Cafe and precinct area**, which recorded a high mean score (**M = 2.87**). As a socially active node with food, leisure, and congregation functions, this precinct appears to effectively support peer interaction and casual social exchange, reinforcing its role as a key social anchor within the campus. The **Indoor Stadium and Eat Street precinct** demonstrated a moderate-to-high perception of social interaction (**M = 2.57**). While this zone hosts large gatherings during events and peak hours, the results suggest that social interaction may be more episodic rather than continuous, potentially influenced by time-specific activity patterns and spatial organization. In contrast, the **GIMSR Cafe and precinct area** recorded the lowest mean score (**M = 2.24**), indicating comparatively limited social interaction. This lower perception may stem from its peripheral location, specialized user group, or limited pedestrian-scaled amenities that restrict informal social engagement.

Table 29: Mean weightage of all the parameters

Accessibility	Landscape & Street furniture	Sense of Inclusivity	Social Interaction
2.613	1.931	2.573	2.656

Table 29 shows the mean weightages of significant parameters evaluated at different hotspots. These parameters- Accessibility, Landscape & Street Furniture, Sense of Inclusivity, and Social Interaction- were scored on a scale of 1 to 5, where 1 represents moderate priority and 5 represents extreme priority.

5. Conclusion

Based on the consolidated responses from **75 students**, final weightages were derived for the four walkability parameters namely, **Accessibility, Landscape & Street Furniture, Sense of Inclusivity, and Social Interaction** to understand their relative influence on pedestrian perception within the GITAM University campus. The aggregated scores indicate clear differences in how students prioritize and experience various dimensions of campus walkability.

Among the four parameters, **Social Interaction** emerged as the highest-ranked factor (**Weightage = 2.656**), underscoring its central role in shaping pedestrian experience on a university campus. This finding highlights that students value spaces that enable informal encounters, peer engagement, and social vibrancy, reinforcing the idea that walkability extends beyond physical movement to include social connectivity and place attachment. **Accessibility** ranked second (**Weightage = 2.613**), emphasizing the importance of ease of movement, route continuity, and proximity to key destinations. While physical access remains a fundamental requirement for walkable environments, its slightly lower ranking compared to social interaction suggests that functional accessibility alone is insufficient to create meaningful pedestrian experiences without supportive social settings. The **Sense of Inclusivity** parameter secured the third rank (**Weightage = 2.573**), indicating that perceptions of safety, openness, and universal usability moderately influence walkability assessments. Although inclusivity is recognized as important, its relative ranking suggests scope for enhancing design and planning strategies that better accommodate diverse user groups across the campus. **Landscape & Street Furniture** ranked lowest (**Weightage = 1.931**), revealing a comparatively weaker influence on overall pedestrian perception. This outcome suggests that while environmental amenities contribute to comfort and visual quality, their impact is diminished when not integrated with active social uses and accessible pedestrian networks.

Overall, the ranking demonstrates that intangible experiential factors, particularly social interaction, play a dominant role in pedestrian walkability perceptions within university campuses. The findings advocate for a holistic campus planning approach that balances physical infrastructure with socially responsive and inclusive pedestrian environments. The assessment and the derivatives from the concerned methodology of the study, shows and gives a direction on the preferences and the priority aspects of the stakeholders, the students fraternity of the University, in the case pertaining to pedestrian movement within the campus precinct. The prioritization gets reflected on the basis of the preferred timeline both seasonally as well as during the working day of a regular semester, along with the priority weightage of the selected parameters that promote

walkability and pedestrian perceptions. The way forward and findings from the concerned study model could be an important determinant for the multiple criteria decision making for the site planning and landscaping attributes in the time to come of the concerned University campus, for promoting walkability as a regular phenomenon in the daily lives of the stakeholders, the student's fraternity as per the given cohorts. The findings could be envisioned as a basis of design quality indicators and parameters affecting the walkability on the chosen academic campus.

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