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WHAT MOTIVATES STUDENTS TO WALK IN A HILLY UNIVERSITY CAMPUS?

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ABSTRACT

Walking is a daily activity undertaken by campus users for trips within or outside the campus. Walking purposes are either utilitarian or hedonistic. Walkable campuses are important for the health and wellbeing of its users. This study is part of an on-going research to assess the built environment factors that influence the walkability of a hilly campus and students' perceptions towards leisure walking in the campus. Case study method is used to study the campus environment and its influence on walkability within the campus. The motivation factors are recreation and transportation which are influenced by weather, distance between facilities, shade and resting places along the walking routes.

Findings of this qualitative study provide a preliminary analysis of the user's perspective about campus walking environment of a hilly terrain.

Keywords: Campus, Motivation, Walking Environment

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1. INTRODUCTION

University campuses are the microcosm of cities with many built environment components like residential areas, transportation and utilities working on a small scale as a city (Ramakreshnan et al., 2020). The campus dwellers spend a considerable time of their lives in the campuses; thus, it is pertinent that they are a place of comfort for them. Campus walkability is important for the dwellers as walking is an unavoidable activity which has to be undertaken either for attending classes, library, recreational activities and meeting with friends etc. This paper presents findings of a pilot study conducted to identify the built environment factors that influence the walkability of hilly higher education campuses. The next section provides theoretical understanding of walkability and its assessment through built environment factors that influence it. The third section discusses the methodology adopted to undertake this study. The

fourth section section details out the results and discussion of survey and on site observations followed by fifth section as conclusion of the study

2. LITERATURE REVIEW

Walkability is defined as friendliness and comfort of a built environment associated with walking activity and walking behaviour either for physical wellbeing, recreation or accessibility to services and points of interests (Battista and Manaugh, 2019). Walkable neighbourhoods are the one in which the built environment enables walking; provides comfort and safety to the walking population so that they feel encouraged to take walking for utilitarian as well as hedonistic purposes (Zhang et al., 2020). The immediate walking environment in an education campus is an important factor to shape experiences and choices of campus for hedonistic walking. Spatially, the attributes of walkability covers aspects like traversability, compact and safe walking environment, a dynamic space which promotes the development of various physical activities.

Walkability can be assessed either objectively or subjectively. The past studies done on campuses are based on existing walkability assessment methods on neighbourhoods, community or workplace environments. There are numerous walkability assessment tools which are the result of specific needs and objective based walkability Systematic Pedestrian and Cycling Environmental Scan (SPACES) tool is developed by Pikora et al., (2002). It evaluates the walking environment through assessment of road function, accessibility, safety and aesthetics. The Neighbourhood Environment Walkability Scale (NEWS), developed in the United States, assesses the local built environment for safety, accessibility, aesthetics and physical attributes (Cerin et al., 2009). It is the most widely used assessment tool. Adlakha et al., 2016 has created a modified NEWS called NEWS-India which has grouped data on Residential Density, Land Use Mix Diversity, Land Use Mix Access, Street Connectivity, Street Infrastructure, Safety from traffic and crime and lastly aesthetics of the neighbourhood. The questionnaire of present study has adopted questions which were relevant to an education campus from the NEWS-India Study viz. street connectivity, street infrastructure and aesthetics, have been used in the present study.

Various tools to assess the walkability of a place that measure street-level qualities and features, such as IMI (Irvine Minnesota Index) - a micro-scale walkability measurement tool which considers perceived safety from traffic and crime (Day et al., 2006), PEDS (Pedestrian Environment Data Scan) - this instrument combines items of subjective evaluation of environment and micro-scale features(Clifton et al., 2007), and Urban Design Quality (UDQ). UDQ contains five qualities: imageability, enclosure, human scale, transparency, and complexity (Ewing et al., 2015). These measurement tools are used currently by scholars to assess street qualities in different regions and its influence on walkability. Various authors have given frameworks for assessment of campus walkability and factors that influence 'walking' in that environment. The influence is studied on walking behaviours, walking experiences and overall walkability of a place. Ramakreshnan et al.(2020) investigated the built environment factors affecting the campus walkability in a tropical setting. The researchers have also combined student's perception of social environment with campus's physical environment. Lee and Shepley (2020) studied the relationship between college campus walking routes and student perceptions, emphasizing the need for walker-friendly environments and adaptive solutions to accommodate changes in pedestrian behavior. Forsyth et al., (2008) studied various aspects of street patterns, pedestrian friendly design of street elements and concluded that there is association between walking purpose and physical characteristics of built environment. The built environment factors which can be managed to enhance the walking experience of a place as they have a vital role in shaping the pedestrian friendly environment (Liao et al., 2022). Thus, the quality of a built environment has become an essential aspect of design and planning of any walkable area (Wang and Yang, 2019; Lamíquiz & López-Domínguez, 2015). Similarly, the built environment of a campus is equally responsible to contribute to its walking as well as living experience. Campus life is a crucial and significant milestone in a student's life. The stay at the campus should be comfortable, safe and enjoyable as much as possible. It is pertinent here that campus walkability of a campus is an important measure to provide a comfortable, connected and accessible walking environment which links the hostels, departments, sports and recreational facilities and enhance their overall experience of campus life (Makki et al., 2012).

The phenomenon of walkability from a spatial and built environment perspective in campuses is an emerging area of research. The studies having co-evaluation of campus spaces with its 'real' users are also limited. To have a reliable base for walkable campuses, the subjective as well as objective evaluations are important. Along with the macro-level environment attributes, such as intersection density and block length, the micro-scale street design quality and features

also influence pedestrians' walking experience. The added dimension of hilly terrain makes it another important area to be studied, thus, implementation of a walkable campus concept is crucial in this context. Thus, this study is looking the pedestrian perception of walking in a hilly campus.

3. METHODOLOGY

3.1. RESEARCH AREA

This is a pilot study aimed at eliciting the walkability parameters for the final assessment framework for evaluating walkability of a hilly campus. The study was conducted at NIT Hamirpur, which is a centrally funded deemed university. This was done in two parts – questionnaire survey and on site observation. The campus is located in Himachal Pradesh with the major area having a slope between 5%-25%. The campus in itself feels like a small hilly town with various facilities scattered along the contours of the site. The student strength is around 4000.

The area of campus is approximately 160 acres with two main entry gates. The approximate distance between these two gates internally is 1.6 kms and the administration building is 1.1 kms from main entry gate 1. The main road is between slope 10-15% with faculty and girls accommodation along it. This main spine from the main gate to administration building was considered for onsite observation of built environment factors (See Fig.1).

3.2. ON SITE OBSERVATIONS

The direct observation technique was used to measure and record the condition of street elements that are part of the walkability factors motivating students to walk. The existing conditions were also compared with the results obtained from the survey.

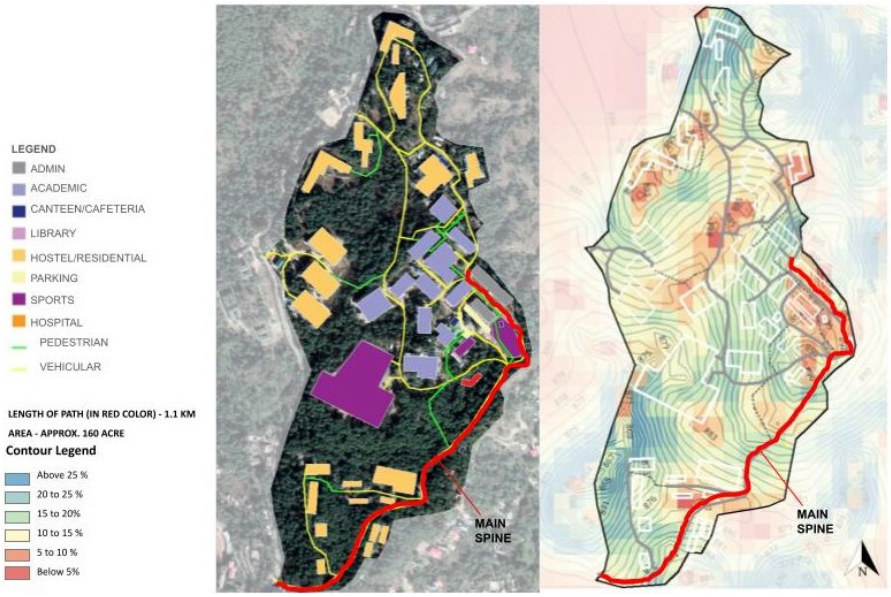

Figure 1 Map of NIT Hamirpur on Google Earth and QGIS for Contours

Source Author

3.3. PARAMETERS USED IN THE STUDY

Initially, Scopus was searched with the "Article title, Abstract, Keywords" function, using the search formula: "walkability" or "walkable" or "walk score" or "walk" and "college" or "campus" or "university". Only peer-reviewed articles are included in the selected literature, and the publication type is limited to journal articles. The publication years are restricted to only after 2000 to 2023. The time span of the article ranges from 2000-2023 as most of the walkability research gained momentum after the first decade of the 21st century. An initial screening returned 214 results. The papers were filtered on the following criteria: articles were supposed to be in the discipline of architecture, urban studies, public environment, environmental sciences and sustainability. The document type is set up as a journal

and review journal. Based on the above screening criteria, a total of 33 papers were retrieved and the factors for campus walkability and built environment were elicited and used in the survey as well as on site observations (see Table 1). The study adopted the following two methods of data collection.

Table 1 Walkability Factors (Source: Literature Review)

Safety	Accessibility	Comfort	Aesthetics	Spatial Quality
Street Width	Physical Barriers	Sidewalk Y/N	Furniture	Enclosure
Street Surface	Sidewalk Continuity	Sidewalk Continuity	Trees	Human Scale
Curb	Signage	Shade	Attractive Landscape	Reachability
Lighting	Lighting	Seating	Green Spaces	Usability
	Slope	Slope	Interestingness	Flexibility
				Interactivity
				Materiality

3.4. SURVEY OF STUDENTS LIVING ON CAMPUS

A total of 51 students were randomly selected living in the hostels of the campus. The survey was conducted in July, 2023. The participants were given closed as well as open ended questions on the following parameters as elicited in the literature review: Walkability Factors which include route choice and distance, sidewalk presence, sidewalk accessibility, availability of shortcuts, shade, resting places, landscape, view points, trees and greenery.

The First section was based on demographic information. The second section had questions on motivations to walk within the campus and factors influencing their walking experiences. The factors influencing the walking experiences were to be rated through a Likert Chart on a scale of 1 to 5 with 1 being least important and 5 to most important factor. The data was collected through an online Google form and loaded into MS Excel for further analysis.

4. RESULTS AND DISCUSSION

It was observed from the site survey that the main pedestrian spine, from entrance gate to academic buildings, is used by vehicular as well as pedestrian users (See Fig. 2). Though vehicle use is prohibited to students, a small number of vehicles used by faculty, post graduate students and visitors still exist there. Sidewalk is not present throughout the chosen pathway which was used for this study as shown in Fig 3. The shortcuts are present which help traversing the hilly terrain by avoiding the longer routes. They do not necessarily have sidewalks or level surfaces or a comfortable walking environment. For example, the pedestrian bridge near girls' hostel is used as shortcut to reach computer centre, sports areas and other entrance gate. The natural environment dominates the built environment and plays a major part in the visual and aesthetic appeal of the walking environment. The roads are lined by tall pine trees and other vegetation (See Fig. 4) which also provide shade during summer months. There are also few pedestrian paths which lead to viewing points of the natural environment of the campus.

The preferable Circulation path is either the main road or the pedestrian shortcuts to various facilities from the main road. 80.4% respondents choose this main road for circulation followed by 27.5% respondents taking pedestrian shortcuts (See Fig. 5). The reasons stated also correspond to the preferred route as one is ease of access of the main road and other is to take the shortest path as much as possible due to limited time to reach the departments. When asked about the factors which enhance their experience of walking, the majority of respondents chose shaded pathways (35%), pleasant views (45%), smooth surface of walkways (29%), and greenery (31%), as the most preferred reasons(See Fig. 6).

Figure 2 Main Road Near Entrance Gate
Source Author

Figure 3 Main Road without sidewalk near Girls Hostel
Source Author

Figure 4 Main Road near Academic Building
Source Author

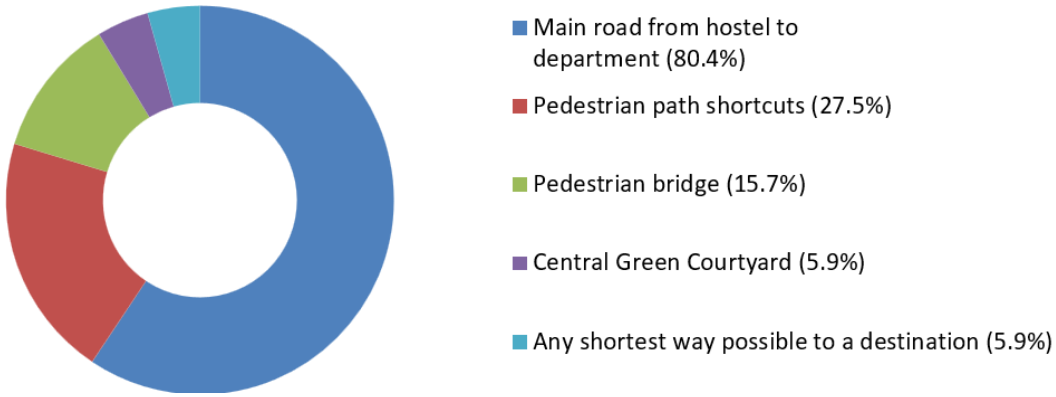

Figure 5 Choice for Transportation
Source Survey by Author

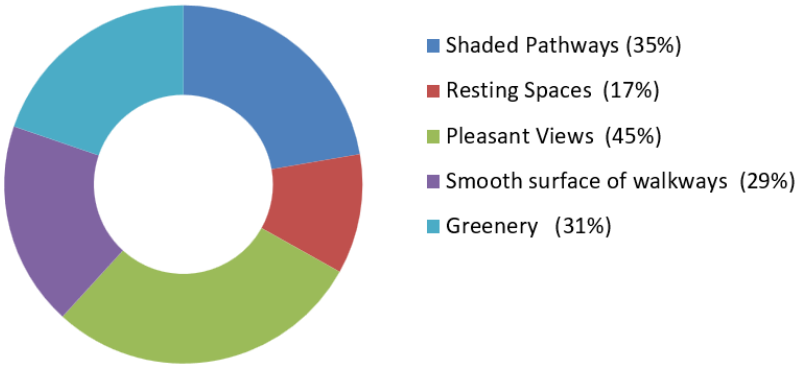

Figure 6 Factors that enhance the walking experience
Source Survey by Author

The accessibility barriers faced are level differences, obstructions on pathways and steep slopes. Students also face barriers in terms of location of sports facilities and hostels with respect to their departments which impacts their decisions of accessing them. More than 50% believe that there should be shade, trees, resting places and parks or gardens along the pathways. These streetscape facilities are important for a good walking experience and motivate the users to walk more in the campus. 47.1% rated the overall quality of the walking environment (buildings and their location, visual quality and accessibility) as very good, followed by 33.3% choosing as good. This implies the overall walking environment is perceived as good by the users. This is also ascertained during site survey as the number of pedestrians on the main path was found to be always good during evening hours and weekends. This means that campus provides a reasonable walking environment to walk for leisure. The findings in this study provide a base for campus walkability and built environment factors which motivate the student to take up walking. The main circulation path is the most preferred path for circulation which is due to accessibility and ease of travel. Thus, streetscape quality is the most important factor that affects the walking experience of campus users. Presence of sidewalk and its quality determines the walking to be hedonistic or utilitarian only. From the results it is clear that the built environment factors influence walking experience in a hilly campus.

In future planning of campuses or retrofitting existing campuses, shortcut routes must be given priority to be made accessible to as much population as possible. The distance between various facilities is another reason for decisions to walk. In this case, hostels are considerably far from the academic and sports facilities, which completely influences the hedonic walking choices to sports areas. On the contrary, some students stated that the sports ground and nearby areas provide beautiful sunset views and they do prefer to walk to have the pleasurable experience of the environment after their classes, thus, it means hedonistic walking is promoted by beautiful views. This prompts for creating not only a comfortable but beautiful aesthetic walking environment so that not only the destination but also the experience to walk to those becomes enjoyable and pleasurable and more users take up walking as leisure activity. While Aesthetics and

shade are of low priority in some studies (Agrawal et al., 2008) and in contradictory to these, some studies report that route preference very much depends on pleasantness of the walking environment. (Gallimore et al., 2011).

5. CONCLUSION

The research has studied the walkability factors of NIT Hamirpur campus which shapes the perception of walking in a hilly campus. It explored the influence mechanism of built environment factors on the walking experience of campus dwellers and their walking decisions. Not all the areas of the campus are accessed by all the students which make it important to study the reasons of accessibility of these areas. Zoning has increased the concentration of facilities in one part of the campus and less in other, which affects the pedestrian experience depending upon the distance between the origin and their desired destinations. Following the findings of the empirical study , we propose the campus administration to prioritize creating a continuous and connected walkable infrastructure , improving accessibility of pedestrian routes, planning the pedestrian infrastructure as per needs of climatic conditions and distance between the facilities. The pedestrian shortcuts need to be designed as the actual paths as they are preferred for circulation within the campus to avoid longer routes, steep slopes and non-shaded areas. The walking paths are also perceived as pleasant when they provide scenic views and greenery along their way. Thus, taking into account slope and landscape of the campus, adequate resting spaces, shaded pathways and opportunities to enjoy the surrounding may motivate the students to walk more in the campus and provide them a pleasurable experience. The social, psychological, health and well-being can be further associated with the campus walkability for further study.

CONFLICT OF INTERESTS

None.

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