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"Warning in Spaces : Blending Heritage, Nature and Design"

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Faculty of Built Environment, UiTM Perak Branch, Seri Iskandar Campus



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"Harmony in Spaces : Blending Heritage, Nature and Design"

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Chilling Under the Rain Trees: Gen-Z Perception of *Samanea saman* and Outdoor Lifestyle in Taman Tasik Taiping, Perak.

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Abstract

Malaysian urban parks have historically served as significant green lungs and public gathering spaces, fulfilling ecological roles as well as community cultural identity. In the hot and humid environment of the Malaysian peninsula, the accessibility and beauty of public parks are greatly influenced by the presence of large shade trees. Perhaps the most iconic of these is *Samanea saman* or simply the rain tree whose large, umbrella-like canopy creates massive shaded spaces and distinctive microclimates within parkscapes. Taman Tasik Taiping in Perak is Malaysia's oldest public park and is renowned for its historical *Samanea saman* avenues curved above walkways and roads to create one of the country's most iconic urban landscapes. While ecological and aesthetic uses of *Samanea saman* have been well established for a long time, much less is known about the social and utilitarian value of *Samanea saman* to contemporary park visitors, in particular the newly emergent Generation Z.

The study explores Gen-Z visitors' perception and use of *Samanea saman* in Taman Tasik Taiping as socialising areas, recreational leisure spots, outdoor studying or photography or content creation spaces. The research adopts a mixed-methods approach in the form of spatial hotspot mapping of *Samanea saman* location, systematic behavioural observation of Gen-Z activity patterns, and a short survey of perception of comfort, shade quality, aesthetic value and identity value of these trees. Optional microclimate data will also be collected to compare objective and subjective comfort. By integrating these data, the study seeks to create a rich portrait of how the "giant umbrella" trees are functioning to influence the outdoor lifestyles of a digitally native cohort.

findings will fill a literature niche for knowledge of the social functions of heritage shade trees in tropical parks. They should generate evidence-based guidelines for park managers and landscape architects on how to maintain and enhance experiential values of *Samanea saman* groves and other similar canopy trees. Last but not least, the study aims to promote the attractiveness of heritage parks such as Taman Tasik Taiping to the new generation of users, demonstrating that heritage trees sustain not only ecological services but also essential social infrastructure for contemporary urban living.

Keyword: *Samanea saman*, Generation Z, Park Behaviour, Outdoor Lifestyle, Taman Tasik Taiping

INTRODUCTION

Urban parks are natural components of modern cities that play ecological, recreational, and social functions of utmost importance for sustainable urban existence. They act as "green lungs" function by reducing air

pollution, regulating microclimates, and maintaining habitats for biodiversity, in addition to offering spaces for recreation, physical activity, and socializing (Becchetti et al., 2023). Within tropical countries such as Malaysia, vegetation plays a huge role in mitigating the urban heat stress and enhancing human comfort in the outdoor spaces (Shahabuddin et al., 2019). (Yaacob et al., 2016)

Among the many types of vegetation, shade trees are a vital component in urban park settings. They provide large canopy cover that contributes to temperature reduction, creates thermal comfort, and keeps people outdoors for longer durations (Wang et al., 2023). Shade trees also enhance the beauty of parks, support recreational activities such as picnics and running, and encourage people's feelings of relaxation and well-being (Becchetti et al., 2023)

Samanea saman, or the rain tree, is one of the most common roadside and urban park landscape shade trees cultivated in Malaysia. Although native to Central and South America, the species has been naturalized in Southeast Asia since the plant has a rapid growth rate, it is also drought-tolerant, and it possesses a wide umbrella-shaped canopy (Tahir et al., 2020). Its ecological benefits include carbon sequestration, stabilisation of soil, and regulation of the microclimate, while it is valued socially for its cultural significance and creation of shaded recreational spaces.

Samanea saman is an innovative tree species in Taman Tasik Taiping, and it has been planted along walkways, open grasslands, and lake shores. Observation at the initial stages indicates that the majority of the users of the park prefer to rest, socialize, or participate in recreation under its canopy. But despite its purportedly ecological and social importance, very little study has focused on the immediate relationship between *Samanea saman*, users' uses, and tourists' perceptions of urban parks in Malaysia. Elucidation of this relationship is necessary in order to integrate ecological and social value in the planning and management of urban parks.

This study, therefore, is "Chilling Under the Rain Trees: Gen-Z Perception of *Samanea saman* and Outdoor Lifestyle in Taman Tasik Taiping, Taiping, Perak." It specifically focuses on how Generation Z users perceive and utilize *Samanea saman* as spaces for socialising, leisure, learning, and content creation in the park. By the restriction of the question to a single iconic species and a major historic park, the study attempts to provide a full account of how *Samanea saman* functions as ecological infrastructure and social space that shapes the life outside for a digital-native generation.

PROBLEM STATEMENT

As much as the environmental and aesthetic benefits of mature shade trees in Malaysian parks have been well recognized, so much remains unknown about their social functions, particularly how these trees influence outdoor activities across generations. Species with wide canopies such as *Samanea saman* create shaded microclimates and physical spaces that have an effect on where and how people group together, relax, and interact socially in public parks (Becchetti et al., 2023). Taman Tasik Taiping, Malaysia's oldest public park, is especially renowned for its heritage *Samanea saman* with their umbrella-like dramatic canopies that define the parks' pathways and lakeshores and are used as symbols in tourism brochures (FRIM, 2022). But despite all their visibility and presumed importance, little empirical evidence exists for how they shape the attitudes and behaviour of Generation Z, a generation with distinctive play patterns

integrating physical, social, and virtual practices (Planning Malaysia Journal, 2021). Without this knowledge, park managers and landscape architects might underestimate the social function of heritage trees as social infrastructure in designing maintenance, replanting or new schemes. This research thus bridges the evidence gap on how *Samanea saman* in Taman Tasik Taiping enlivens and influences outdoor living for Generation Z tourists, with the aim of incorporating ecological and social values in evidence-based park management for modern and prospective users.

RESEARCH OBJECTIVES

- 1.To identify the ecological and aesthetic attributes of *Samanea saman* that contribute to users' comfort, relaxation and engagement in outdoor setting .
- 2.To analyse the role of *Samanea saman* in shaping interactions and outdoor activities among Generation Z users in Taman Tasik Taiping.
- 3.To evaluate Generation Z's perceptions and suggestion toward Taman Tasik Taiping as a socially engaging space within the park with *Samanea saman* environment.

LITERATURE REVIEW

Inclusivity and Spatial Behavior of Gen Z in Open Public Spaces

Public spaces are essential for fostering social interaction, identity formation, and inclusion among youth, particularly Generation Z. Inclusive public spaces provide access not only in physical terms but also socially, through activities and information, ensuring safety, comfort, and belonging for all users (**Itair, Shahrour & Hijazi, 2023**). As digital natives, Gen Z those born between 1996 and 2010 combine physical and virtual engagement in their daily lives .These behaviours influence how they utilize open spaces, often merging online connectivity with in-person socialization (Twenge, 2017; López et al., 2021).

Studies such as Rahmawati and Fathony (2025) in Alun-Alun Kidul Yogyakarta show that Gen Z prefers sedentary activities like chatting, dining, and phone use in open areas, especially grassy or shaded spaces suitable for social gatherings. Although they engage physically, virtual communication remains constant, indicating a hybrid interaction pattern. The inclusivity of such spaces, therefore, depends on balancing spatial design and technological accessibility providing comfort, visibility, and digital connectivity (**Itair, Shahrour & Hijazi, 2023**)

Creating inclusive open spaces for Gen Z requires acknowledging this duality between physical and virtual life. Spaces should offer openness, social safety, and internet access to support both in-person and online participation (Hampton et al., 2017; Rahmawati & Fathony, 2025). Effective design integrates spatial form, social activities, and user experience to maintain relevance for younger generations navigating both worlds.

Samanea saman as a Heritage shade Tree in Malaysia

Samanea saman has become a popular landscape tree in Malaysia due to its broad umbrella-shaped canopy, fast growth, and resistance to tropical climatic conditions. It is originally from Central and South America and was introduced into Malaysia during colonial times and planted extensively along road verges, school grounds and parks (Tahir et al., 2020) .In Taman Tasik Tapping, the tree forms an unbroken promenade along the lake and has since become synonymous with the image of the park itself (FRIM, 2022). Its

distinctive silhouette has contributed to sense of place identity, being not only a shade provider but also visual indicator of residents and visitors.

In addition to its beauty, the longevity of Rain Tree and nitrogen-fixing roots make it a treasure of sustainable urban forestry. The species was declared a "heritage tree" by the local government in acknowledgment of its cultural significance and role in shaping historical landscapes (FRIM, 2022). Despite this status, there have been few studies on how one such iconic species as *Samanea saman* affects user perception and behaviour in Malaysian urban parks. This study seeks to address that gap for Gen-Z park users

Shade Trees and Thermal Comfort

Research consistently shows that shade is a key determinant of outdoor comfort (Becchetti et al., 2023) demonstrated that tree shade lowers surface and globe temperatures considerably, creating thermally comfortable microclimates that promote longer outdoor recreation. (Rahman et al., 2020) also demonstrated that shaded spaces in tropical cities attract disproportionately more users compared to unshaded areas. These results uphold the notion that big-canopy species such as *Samanea saman* have the ability to directly affect the spatial distribution of individuals within parks.

However, thermal comfort is not equal for every user. Different demographic groups, like young adults, may experience different levels of acceptable heat and shade. Despite the importance of shade in comfort, Malaysian studies examining the influence of tree canopy on Gen-Z park user behaviour are few. This knowledge gap highlights the need for empirical research linking microclimate modification by trees to the outdoor lifestyles of youths.

Generation Z's Park Use and Preferences

Generation Z is emerging as a leading user group of city public space, with their own tastes and habits. A study by the Planning Malaysia Journal (2021) states that shade, beauty value and "Instagrammability" rank among the most influential factors for Gen-Z park visits. Generation Z makes use of parks not only for body exercise but also for co-working, socializing, and creating online content. The identifiable tree forms and camera-friendly landscape have been discovered to serve as informal landmarks and photo opportunities for social media (Becchetti et al., 2023)

In Malaysia, there is limited empirical evidence on Gen-Z tourist interaction with heritage tree species such as *Samanea saman*. Taking into consideration their views and outdoor lifestyle, research can guide park administrators on how to remain topical and attractive for this generation without infringing on heritage trees.

RESEARCH METHODOLOGY

This study employs a **mixed-method research design**, integrating quantitative and qualitative approaches to obtain a comprehensive understanding of Generation Z's perception and utilisation of *Samanea saman* in Taman Tasik Taiping. The mixed-method strategy strengthens the reliability of findings by enabling triangulation between actual behavioural patterns and self-reported experiences.

A mixed-method approach was selected to capture two complementary dimensions of data. The quantitative component consists of a structured questionnaire designed to measure perceived comfort, aesthetic value, shade quality, and outdoor activity preferences under the *Samanea saman* canopy. The qualitative component involves systematic on-site observation to document actual spatial behaviour, activity patterns, and utilisation of shaded and unshaded areas. Together, these methods provide both measurable indicators and contextual behavioural insights.

Site Selection

Taman Tasik Taiping was selected as the research site due to its exceptional historical significance and long-standing role as a public landscape in Malaysia. Established in 1880 during the British colonial period, it is recognised as the oldest public garden in the country. Originally developed on abandoned tin-mining land, the park reflects an early and successful transformation of a degraded industrial landscape into a functional and socially meaningful public space (Taiping Municipal Council, 2026.). This historical foundation provides a strong contextual background for examining how landscape design influences human interaction and long-term public use.

The site was deliberately designed and opened to the public to support recreation, social gathering, and environmental comfort for the community of Taiping, which was then the capital of (Taiping Municipal Council, 2026.). Officially inaugurated in 1893, the garden has remained freely accessible to the public for over a century, allowing continuous patterns of use across different generations (Taiping Municipal Council, 2026.). This uninterrupted public access makes Taman Tasik Taiping an ideal setting for studying evolving social behaviours within a stable and historically consistent landscape framework.

Taman Tasik Taiping is also distinguished by its mature landscape character, particularly the presence of iconic *Samanea saman* that line the lakes and pedestrian routes (Ariffin et al., 2019). These heritage trees play a significant role in shaping microclimate, visual identity, and spatial experience, while simultaneously influencing where people gather, rest, and interact (Ariffin et al., 2019). The strong association between the *Samanea saman* and public activity patterns provides a unique opportunity to investigate the relationship between large-canopy trees and social behaviour in a real, functioning public park.

Furthermore, the site's layered combination of heritage value, ecological function, and everyday social use strengthens its relevance for landscape architecture research. Taman Tasik Taiping operates not only as a recreational park but also as a living cultural landscape where historical planning ideals, nature-based systems, and contemporary urban life coexist (Taiping Municipal Council, 2026.). These qualities collectively justify the selection of Taman Tasik Taiping as a meaningful and representative site for research exploring the social, environmental, and spatial roles of heritage trees within Malaysian public open spaces.

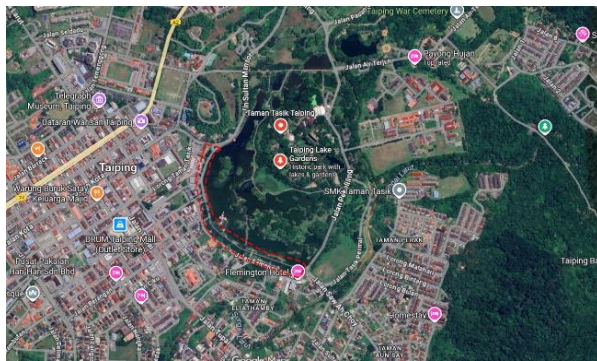


Figure 1 : Key Plan Taman Tasik Taiping

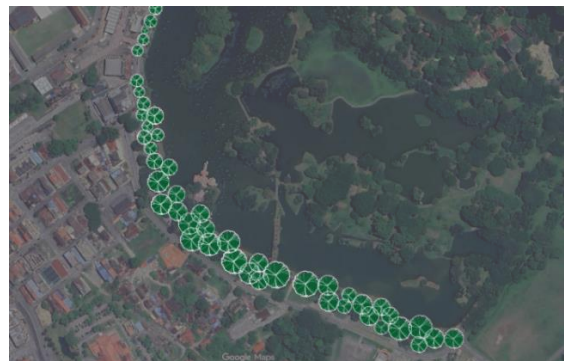


Figure 2 : Location Plan Taman Tasik Taiping

Data Collection Method

This study employed a **mixed-method approach**, integrating qualitative and quantitative methods to examine the physical characteristics of *Samanea saman* and user perception in Taman Tasik Taiping, Perak. Qualitative data were collected through systematic field-based observation and spatial mapping to document tree location, crown width, and their distribution along the lakeside pedestrian corridor, with supporting elements such as benches, nearby parking areas, and visual attraction features recorded for contextual understanding. The quantitative component involved a questionnaire survey targeting **Generation Z** respondents to assess their perception of *Samanea saman*, preferences for shaded outdoor spaces, and attitudes towards outdoor lifestyle and activities, allowing the findings to complement and strengthen the overall analysis.

a) Qualitative Component: Site Observation

Systematic non-participatory site observation was conducted using ticking method to examine using the physical, behavioural, and ecological aspects of Taman Tasik Taiping, with particular emphasis on the role of *Samanea saman* in shaping Gen-Z outdoor behaviour. This approach aimed to understand how tree characteristics, environmental conditions, and supporting landscape features influence patterns of use beneath and around the tree canopy.

All primary observation data were collected in June until July 2025. This observations were carried out during two key time periods: morning (7.00–9.00 a.m.) and afternoon to early evening (5.00–7.00 p.m.) because it is during residents' leisure times (Zhao et al., 2024) on both weekdays and weekends. Authors of previous studies have recommended this level of observation to obtain a robust estimate of park users and physical activity. These time frames were selected to reflect typical recreational behaviour associated with shaded outdoor spaces under *Samanea saman*.

The physical aspect of the observation focused on landscape and environmental attributes, including crown width, canopy coverage, environmental comfort, noise level, and visual quality of the surrounding setting. These factors were assessed to evaluate the suitability of *Samanea saman* canopies as comfortable outdoor environments. The behavioural aspect documented Gen-Z usage patterns, including activity types (resting, socialising, jogging, studying, photography, content creation, and informal play), group size, duration of stay, use of park furniture, preferred areas (shaded or unshaded), social settings, and levels of user engagement within the observed areas. The ecological aspect focused on the tree character and aesthetic

value of *Samanea saman*, including canopy form, scale, and visual dominance, and how these qualities contribute to user perception and overall landscape experience.

All observations were systematically recorded using field notes and behaviour-mapping sheets, without photographing identifiable individuals. Supporting attraction factors, including seating provision, proximity to parking areas, and visual or iconic location signage, were noted as secondary influences on user presence.

Based on the observation findings, although 46 *Samanea saman* trees were identified along the lakeside, only 6 trees were actively used by Gen-Z visitors, indicating selective spatial preference influenced by canopy quality, environmental comfort, and supporting landscape features.

b) Quantitative Component: Questionnaire Survey

The quantitative component of this study employed a questionnaire survey using convenience sampling, targeting Generation Z visitors aged between 18 and 30 years who were present within or around the *Samanea saman* canopy areas at Taman Tasik Taiping. From 50 respondents participated voluntarily in the survey, only 33 are the Gen-Z. This age group was selected as it represents a key user demographic whose outdoor lifestyle preferences, social interaction patterns, and environmental perceptions differ from those of older generations, particularly in relation to informal outdoor spaces and nature-based environments. However, because of time limitation and monsoon in November, the participants count only 30-50 people because according to the Central Limit Theorem, a minimum sample size of 30 respondents is sufficient for a statistical analysis. (Ghasemi & Zahediasl, 2012)

The questionnaire was designed to capture a comprehensive understanding of Gen-Z perceptions and experiences and was structured into five main sections. The first section focused on the respondent's profile, collecting basic demographic information such as age, visit frequency, and purpose of visit, which provided contextual background for subsequent data interpretation. The second section examined respondents' ecological awareness and perception, with particular emphasis on their understanding of environmental elements and the ecological role of *Samanea saman* within Taman Tasik Taiping.

The third section addressed the aesthetic value of Taman Tasik Taiping and the *Samanea saman* trees, focusing on perceptions of visual quality, canopy character, and overall landscape appeal. Selected items in this section, specifically Questions C2c, C3a, and C3b, were measured using a four-point Likert scale ranging from 1 to 4. This scale was used to collect data on variables evaluated using the Spearman rank-order correlation coefficient, which allowed respondents to indicate their degree of agreement with the options: 1 (strongly disagree), 2 (disagree), 3 (agree), and 4 (strongly agree). The Likert scale provided a straightforward method for evaluation, allowing us to quantify the intensity of the respondents' answers (Deckelmann, 2019)

The fourth section explored respondents' involvement with the park atmosphere, including their level of engagement, comfort, social interaction, and overall outdoor experience beneath the *Samanea saman* canopy. The final section consisted of an open-ended question that allowed respondents to provide personal opinions and suggestions on how the atmosphere and outdoor experience at Taman Tasik Taiping could be improved. This open-ended format provided respondents with the flexibility to express individual

perspectives and reflections derived from their overall experience in the park, thereby enriching the quantitative findings with contextual insights.

Sample size

This study will use a convenience sampling method, selecting respondents who are available and willing to participate during on-site data collection at Taman Tasik Taiping. The target population consists of Generation Z visitors aged between 18 and 30 years old. A minimum sample size of 30 respondents will be required to obtain sufficient data for basic statistical analysis, while the total number of participants is expected to range between 30 and 50 visitors to ensure diverse representation of user experiences.

This research will be conducted at Taman Tasik Taiping, Taiping, Perak. The participants in this study were Gen Zs that visit Taman Tasik Taiping. The data collection techniques that will be used are questionnaires and site observation. The number of respondents in this study was calculated by the Slovin Formula (Panjaitan, Christiani, Hartono & Lumempouw, 2021). with total population in Taiping are 130 712 people. (Department of Statistics Malaysia, 2023)

$$n = \frac{N}{1 + (N \times e^2)}$$

$$n = \frac{130712}{1 + (130712 \times 0.05^2)}$$

$$n = \frac{130712}{1 + (130712 \times 0.0025)}$$

$$n = \frac{130712}{1 + 326.78}$$

$$n = \frac{130712}{327.78}$$

$$n \approx 398.66$$

However, because of time limitation the participants count only 30-50 people because according to the Central Limit Theorem, a minimum sample size of 30 respondents is sufficient for a statistical analysis. (Ghasemi & Zahediasl, 2012)

ANALYSIS AND DISCUSSION

Qualitative Method

This chapter presents and discusses the findings derived from both the qualitative site observation and the quantitative questionnaire survey. The analysis focuses on how *Samanea saman* influences Gen-Z perception, behaviour, and outdoor lifestyle at Taman Tasik Taiping, with particular attention to physical comfort, aesthetic value, ecological character, and supporting attraction factors.

Site observation indicates that the highest concentration of active use occurs around tree numbers 5, 6, 9 and 10 (Figure 3). The presence of benches positioned directly beneath or adjacent enhance the usability of the space. However, tree number 1, 2, 3 and 4 received moderate amount of visitor due to its near to entrance and there are fences that makes it have no space to do any activity. Tree number 7 and 8 are semi active because these trees are located along the primary circulation route and in close proximity to parking areas, improving accessibility. Tree number 11 has the biggest crown but the branches are too low and wide into the lake making it quite dangerous. Furthermore, tree number 12 and 14 has no attraction and it is clearly why the amount of visitors is low. The last 2 trees, number 13 and 15 has an iconic location signage and

“giant picture frame” that attract visitor but in a short time period.

The combination of wide canopy coverage and seating encourages users to remain in these areas for longer durations. Observations show that activities such as resting, socialising, and casual leisure are concentrated in these shaded seating zones, indicating that physical comfort and amenity provision play a decisive role in sustaining prolonged use. As a result, only tree number 5,6,9,10,13 and 15 are function not only as ecological elements but also as socially supportive landscape features.

Table 1: *Samanea saman* canopy width

Tree Number	Canopy Width
1	28m
2	35m
3	34m
4	28m
5	20m
6	35m
7	32m
8	35m
9	32m
10	37m
11	40m
12	34m
13	32m
14	23m
15	37m

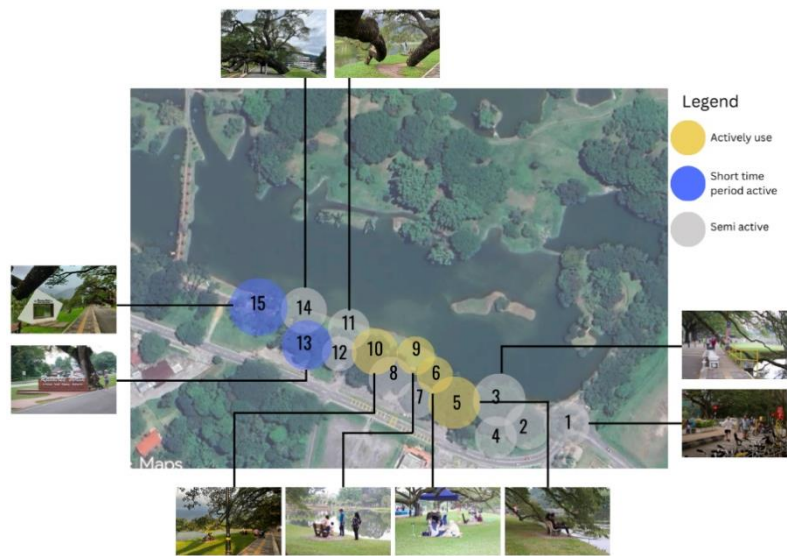


Figure 3 : location of actively used *Samanea saman*

Using Atlas ti, only tree number 5,6,9,10,13 and 15 are left due to the activity engaging by Gen-Z and the analysis were divided into 3 themes: i) physical dimension, ii) behavioral dimension and iii) ecological dimension.

Section A : Physical Dimension

The physical analysis demonstrates that the spatial and structural characteristics of the study area strongly support user comfort, accessibility, and visibility, as evidenced by field observations showing that benches positioned beneath or adjacent to dense tree canopies encourage prolonged user presence and resting behaviour (6:1). Substantial shade coverage provided by large-canopied trees creates a comfortable microclimatic environment, enhancing thermal comfort and visual enclosure and supporting extended stays and passive recreational activities (12:1; 13:1; 14:1). The close proximity of these shaded resting areas to parking facilities further improves accessibility and contributes to higher visitation rates (15:1). In addition, the visual dominance of mature, large-canopied trees strengthens the spatial identity and recognisability of the site within the park landscape (7:1), while iconic signage enhances spatial legibility and orientation, reinforcing the area’s role as a focal point for visitor movement and activity (8:1). Collectively, these physical attributes form a cohesive, user-friendly outdoor environment that effectively supports comfort, ease of access, and functional use.

Section B : Behavioral Dimension

From a behavioural perspective, observations indicate that shaded spaces beneath large-canopied trees strongly support varied social interaction and leisure activities, with high levels of activity recorded in areas where seating and shade are well integrated (9:1). Users were frequently observed resting, socialising in small groups, studying, and engaging in content creation such as photography and casual media use, reflecting the multifunctional nature of the space (10:1). Group behaviour analysis shows that most visitors formed small groups of two to five individuals, suggesting the space is more suitable for intimate social interaction rather than large gatherings (11:1). Longer duration stays were common, indicating a high level of comfort and place attachment (12:1), while activity-specific uses such as brief photography sessions near landmark signage resulted in shorter visit durations, demonstrating how specific spatial features directly influence behavioural patterns and user engagement (13:1; 15:1).

Section C : Ecological Dimension

Ecologically, the findings emphasise the critical role of large-canopied trees, particularly *Samanea saman*, in enhancing environmental quality and shaping user experience within the park. The expansive canopy structure improves thermal comfort while contributing to ecological richness and establishing a strong visual identity in the landscape (16:2). The aesthetic and symbolic presence of *Samanea saman*, through its distinctive form and scale, functions as a visual anchor that strengthens place identity and overall landscape character (18:2). Increased canopy density creates favourable microclimatic conditions that support both ecological resilience and human comfort (12:2), while wide crown structures provide effective shading and encourage social interaction within shaded zones, especially when complemented by interpretive elements such as signage (20:2). The integrated relationship between tree form, strategic placement, and surrounding amenities reinforces ecological functions alongside experiential quality, resulting in a space perceived as environmentally responsive and socially meaningful (19:2).

Overall, the findings demonstrate that the strong integration of physical design, user behaviour, and ecological structure creates a comfortable, legible, and socially meaningful park environment. Shaded seating beneath large-canopied trees enhances thermal comfort and accessibility, encouraging longer stays and diverse activities (Chen & Ng, 2022), particularly small-group social interaction and passive recreation, which are commonly associated with comfortable and well-shaded outdoor settings (Rahman et al., 2021). Clear spatial cues, landmark elements, and proximity to supporting amenities further reinforce ease of use, orientation, and repeated visitation (Zhao et al., 2024). Ecologically, the presence of mature trees such as *Samanea saman* plays a critical role in regulating microclimate, strengthening visual identity, and fostering user attachment to place, demonstrating how canopy structure and tree form simultaneously support environmental performance and experiential quality in urban green spaces (Zhao et al., 2024).

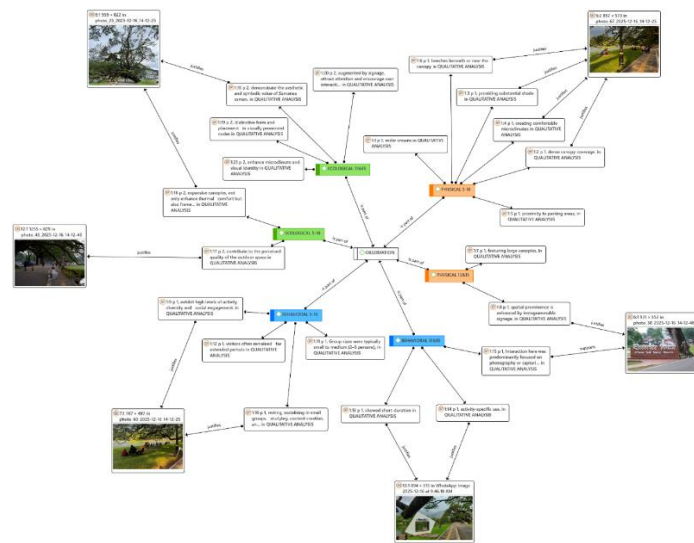


Figure 4 : Observation Method analysis

Quantitative Method

Referring to research objective 01: to identify the ecological and aesthetic attributes of *Samanea saman* that contribute to users' comfort, relaxation and engagement in outdoor setting, the questionnaires were developed and turned into these keywords.

This study adopted a quantitative approach to systematically measure and analyse observable phenomena within the research site by collecting numerical data through structured observations and inventory assessments, enabling the identification of patterns, trends, and relationships among key variables. The method provided an objective basis for evaluating user interactions, spatial usage, and environmental characteristics by quantifying factors such as frequency of use, duration of stay, and the influence of specific site features, thereby supporting evidence-based assessment of the landscape's functional and social performance. The demographic profile of respondents was predominantly young, student-based, and moderately female-skewed, with most participants being occasional or first-time users, indicating that the findings are most representative of young adult and student populations. However, the limited inclusion of older age groups, non-student occupations, and frequent visitors may restrict the external validity of the results, suggesting that future studies should incorporate a more diverse and balanced sample to improve representativeness and enable broader demographic comparisons.

Table 2 : Demographic Data Collection

Variable	Category	Frequency	Percent
Age	18-22	10	30.3
	22-24	21	63.6
	25-27	1	3.0
	28-30	1	3.0
	Total	33	100.0
Gender	Male	14	42.4
	Female	19	57.6
	Total	33	100.0

Occupation	Student	25	75.8
	Private Sector	1	3.0
	Self Employed	6	18.2
	Other	1	3.0
	Total	33	100.0
Visit Frequency	First Time	9	27.3
	Occasionally	16	48.5
	Monthly	3	9.1
	Weekly	3	9.1
	Almost Daily	2	6.1
	Total	33	100.0

Table 3 indicates that respondents (N = 33), predominantly representing a young and student-based demographic, visited Taman Tasik Taiping for multiple purposes, highlighting the park's multifunctional role as a recreational, social, and learning-oriented landscape. Studying emerged as the most common purpose of visit (Mean = 1.91, SD = 0.292), suggesting that the park is perceived as a comfortable and conducive environment for concentration-related activities. This was followed by exercise (Mean = 1.79, SD = 0.415) and tourism (Mean = 1.76, SD = 0.435), reflecting the park's dual function as an active recreational space and a leisure destination. Meeting friends also recorded a relatively high mean value (Mean = 1.73, SD = 0.452), underscoring its importance as a social gathering space, while photography was the least selected purpose (Mean = 1.61, SD = 0.496), indicating more situational and interest-based engagement.

Table 3: Purpose of Visit

	N	Mean	Std. Deviation
5. Purpose of visit today (choose all that apply) / Tujuan lawatan hari ini (pilih semua yang berkaitan):Exercise /Bersenam	33	1.79	0.415
5. Purpose of visit today (choose all that apply) / Tujuan lawatan hari ini (pilih semua yang berkaitan): Meeting friends/ Berjumpa Rakan	33	1.73	0.452
5. Purpose of visit today (choose all that apply) / Tujuan lawatan hari ini (pilih semua yang berkaitan):Studying/Belajar	33	1.91	0.292
5. Purpose of visit today (choose all that apply) / Tujuan lawatan hari ini (pilih semua yang berkaitan):Photography/ Fotografi	33	1.61	0.496
5. Purpose of visit today (choose all that apply) / Tujuan lawatan hari ini (pilih semua yang berkaitan):Tourism / Melancong	33	1.76	0.435

Based on Table 4, respondents clearly recognised the benefits of the *Samanea saman* canopy in enhancing comfort (Mean = 3.39, SD = 0.659) and shade quality (Mean = 3.27, SD = 0.674). These high values indicate a consistent perception that the canopy creates a pleasant microclimate, provides protection from direct sunlight, and supports prolonged use of shaded areas.

In comparison, temperature moderation (Mean = 1.64, SD = 0.603) and overall enjoyment (Mean = 1.24, SD = 0.502) received lower scores, reflecting more subtle awareness of the cooling effect and experiential benefits. Despite lower mean values, the low standard deviations show strong consensus that the trees positively influence the park environment and visitor experience (based on Table 4)..

Overall, the findings suggest that visitors most strongly perceive the tangible benefits of *Samanea saman* in terms of comfort and shading, while temperature regulation and overall enjoyment reflect a consistent,

experiential appreciation of the canopy. This aligns with studies showing that users recognise ecosystem services primarily through direct comfort and microclimatic effects (Rahman et al., 2021; Chen & Ng, 2022; Zhao et al., 2024), demonstrating that mature *Samanea saman* enhance both ecological function and user experience, contributing to environmental quality, social engagement, and place attachment.

Table 4 : Ecological Awareness and Perception

	N	Mean	Std. Deviation
1. How comfortable do you feel under the rain tree canopy? / Sejahtera mana keselesaan anda di bawah naungan pokok hujan-hujan?	33	3.39	0.659
2. How would you rate the shade quality? / Bagaimana kualiti teduhan pokok ini?	33	3.27	0.674
3. How is the temperature compared to open areas? / Suhu di bawah pokok berbanding kawasan terbuka?	33	1.64	0.603
4. Do the rain trees make the park more enjoyable to visit? / Adakah pokok hujan-hujan menjadikan taman ini lebih menarik untuk dikunjungi?	33	1.24	0.502

Table 5 presents respondents' perceptions of aesthetic attributes associated with spaces beneath the *Samanea saman* canopy at Taman Tasik Taiping (N = 33). The analysis focuses on visual appeal, spatial beauty, and multisensory qualities that collectively shape the aesthetic experience of the park environment.

Visual Appeal and Aesthetic Preference

The analysis of aesthetic preferences under the *Samanea saman* canopy shows that preferred areas for sitting or relaxing (C1[a]) had a high mean (Mean = 32.15) with a large standard deviation (SD = 173.569), indicating that respondents identified multiple visually appealing locations rather than a single dominant spot. This suggests that aesthetic value is distributed throughout the park, reflecting the visual continuity of mature *Samanea saman*. For the most attractive visual element under the trees (C1[b]), a moderate mean (Mean = 3.00, SD = 1.000) indicates general appreciation for canopy form, filtered sunlight, and surrounding greenery, though individual preferences varied.

Beauty of Space and Spatial Aesthetics

In relation to spatial beauty, common activities performed under the *Samanea saman* canopy (C2[a]) recorded a mean of 2.79 (SD = 0.740), indicating that the space supports a variety of passive and light active uses and reflects a balance between openness, enclosure, and visual comfort. The perception of spatial arrangement (C2[b]) achieved a higher mean score (Mean = 3.30, SD = 0.637), suggesting that respondents found the composition of tree spacing, openness, and pedestrian pathways visually pleasing and well-structured. This spatial coherence enhances aesthetic legibility, enabling users to navigate the park comfortably while appreciating its visual order.

Sensory Aesthetics and Experiential Quality

The aesthetic experience under the *Samanea saman* canopy is strongly influenced by sensory attributes, with the overall sensory experience receiving a high mean score (Mean = 3.27, SD = 0.626), indicating that respondents positively evaluated the combined visual, thermal, auditory, and air quality aspects of the space. Notably, the pleasantness of the natural sound environment recorded the highest mean (Mean = 3.45, SD = 0.617), suggesting that sounds such as birdsong and wind through the canopy significantly enhance

the park's aesthetic atmosphere. Together, these sensory elements contribute to a sense of calmness, immersion, and reinforced aesthetic identity of the *Samanea saman* landscape.

The analysis shows that the *Samanea saman* canopy strongly enhances park aesthetics through visual, spatial, and sensory qualities. Preferred sitting areas (C1[a], Mean = 32.15, SD = 173.569) and appreciation of canopy form and filtered sunlight (C1[b], Mean = 3.00, SD = 1.000) indicate widespread visual appeal. Spatial coherence is reflected in diverse activities (C2[a], Mean = 2.79, SD = 0.740) and well-structured tree and pathway arrangements (C2[b], Mean = 3.30, SD = 0.637), while sensory experiences, particularly natural sounds (Mean = 3.45, SD = 0.617), reinforce calmness and immersion. These findings highlight that *Samanea saman* enhances aesthetic experience, environmental perception, and place identity in urban parks (Zhao et al., 2024; Chen & Ng, 2022; Rahman et al., 2021).

Table 5: Aesthetic Attributes

	N	Mean	Std. Deviation
C1(a): Visual Appeal : Which area do you prefer for sitting or relaxing? / Kawasan mana anda lebih suka untuk duduk atau berehat?	33	32.15	173.569
C1 (b): Visual Appeal : What visual element under the rain trees do you find most attractive? / Elemen visual apakah di bawah pokok hujan-hujan yang paling menarik perhatian anda?	33	3.00	1.000
C2 (a): Beauty of Space : What activity you always do? / Apakah aktiviti yang anda selalu lakukan?	33	2.79	0.740
C2 (c): How would you rate the spatial arrangement (tree spacing, openness, walking paths) under the rain trees? / Bagaimana anda menilai susunan ruang (jarak pokok, keluasan, laluan pejalan kaki) di bawah pokok hujan-hujan?	33	3.30	0.637
C3 (a): Overall Sensory Experience : How would you rate your overall sensory experience (visual, thermal, sound, and air quality) when spending time under the rain trees? / Bagaimanakah anda menilai pengalaman deria keseluruhan (visual, suhu, bunyi dan kualiti udara) semasa berada di bawah pokok hujan-hujan?	33	3.27	0.626
C3 (b): How pleasant is the natural sound environment (birds, wind, water) under the rain trees? / Sejauh mana suasana bunyi semula jadi (burung, angin, air) di bawah pokok hujan-hujan adalah menyenangkan?	33	3.45	0.617

Referring to research objective 02: to analyse the role of *Samanea saman* in shaping interactions and outdoor activities among Generation Z users in Taman Tasik Taiping.

Based on Table 6, respondents' engagement in the *Samanea saman* area at Taman Tasik Taiping (N = 33) was moderate across all indicators, with visitors moderately choosing this area compared to other park locations (Mean = 2.15, SD = 0.755), perceiving the space as moderately sufficient for outdoor activities (Mean = 1.91, SD = 0.579), and considering it moderately suitable for group activities (Mean = 1.94, SD = 0.609). Physically, larger canopies create shaded microclimates that enhance comfort, while benches beneath or near the trees encourage longer visits, as observed in Trees 5–10, which had higher engagement compared to minimally equipped trees such as 13 and 15. Behaviorally, the area supports both social interaction and individual leisure, accommodating small to medium groups effectively, though larger gatherings are constrained by spatial layout. Ecologically, the shade and cooler microclimate provided by the canopy further enhance comfort and encourage prolonged use, demonstrating that physical, behavioral, and ecological factors collectively shape moderate yet meaningful engagement in the *Samanea saman* area.

The *Samanea saman* area at Taman Tasik Taiping shows moderate but meaningful visitor engagement, with mean values for area choice (Mean = 2.15, SD = 0.755), space adequacy (Mean = 1.91, SD = 0.579), and group suitability (Mean = 1.94, SD = 0.609). Physical features such as large canopies and benches create shaded, comfortable spaces, while the ecological benefits of cooler microclimates support longer stays and varied activities. These findings align with studies showing that well-designed green spaces with shade, amenities, and accessibility enhance social interaction and overall park use (Yin et al., 2024). Overall, the *Samanea saman* area demonstrates how ecological and user-centered design together promote functional and social engagement in urban parks.

Table 6 : Engagement in Outdoor Setting

	N	Mean	Std. Deviation
1. How frequently do you choose the rain tree area compared to other areas of the Taman Tasik Taiping? / Seberapa kerap anda memilih kawasan pokok hujan-hujan berbanding kawasan lain di Taman Tasik Taiping?	33	2.15	0.755
2. Do you feel that the rain tree areas provide enough space for your outdoor activities? / Adakah kawasan pokok hujan-hujan menyediakan ruang yang mencukupi untuk aktiviti luar anda?	33	1.91	0.579
3. How suitable is the rain tree area for group activities? / Sejauh mana kawasan pokok hujan-hujan sesuai untuk aktiviti berkumpulan?	33	1.94	0.609

Referring to research objective 03 : to evaluate Generation Z's perceptions and suggestion toward Taman Tasik Taiping as a socially engaging space within the park with *Samanea saman* environment. Using Atlas ti, the analysis were divide into 3 theme : i) comfort, ii) safety and iii) accessibility.

SectionA:Comfort

Generation Z respondents strongly associate social engagement under the *Samanea saman* canopy with physical comfort, particularly the availability and quality of seating. Suggestions for comfortable benches (1:1), sheltered seating (1:3), and picnic tables (1:2) indicate a preference for shaded and supportive facilities that encourage informal gatherings, relaxation, and peer interaction. Requests for benches in lower or quieter areas (3:2) further highlight the desire for flexible spaces that can accommodate both individual and small-group activities. While the expansive *Samanea saman* canopy already provides natural thermal comfort, these responses suggest that its social potential can be enhanced through improved and varied seating infrastructure.

SectionB:Safety

Safety emerged as a critical factor influencing Generation Z's willingness to use and remain in the space. Respondents emphasised the need for adequate and improved lighting (1:9; 3:3) to enhance visibility, particularly during late afternoon and evening hours. Concerns related to environmental risks were also evident, including slippery surfaces (1:5), appropriate permeable paving (1:4), and prevention of tree collapse (3:1). Maintenance-related issues such as trimming dead branches (1:6), regular cleaning (1:7), and vandalism prevention (1:8) further reinforce the importance of a well-maintained environment. These responses indicate that Generation Z closely links safety with cleanliness, maintenance, and visual order, all of which affect their sense of comfort and willingness to engage socially.

Section c : Accessibility

Accessibility was highlighted through suggestions aimed at improving movement, inclusivity, and spatial clarity within the *Samanea saman* area. Respondents recommended clearer pedestrian pathways (1:10) to enhance circulation and reduce user conflicts, as well as the incorporation of universal design features (1:11) to ensure inclusivity for users of varying abilities. Additionally, the inclusion of informative signage about the *Samanea saman* (1:12) reflects an interest in environmental learning and stronger place connection. Together, these responses suggest that Generation Z values park spaces that are easy to navigate, inclusive, and informative, reinforcing the role of accessibility in supporting meaningful and sustained social engagement under the *Samanea saman* canopy.

The analysis shows that Generation Z's social engagement in the *Samanea saman* area is strongly influenced by comfort, safety, and accessibility. Preferences for shaded seating and resting facilities highlight the importance of physical comfort in supporting prolonged use and social interaction (Chen & Ng, 2022), while concerns about lighting, maintenance, and hazards indicate that safety and cleanliness are critical to encouraging continued use (Liu et al., 2021). Recommendations for clear pathways, universal design, and informative signage further reflect expectations for inclusive and legible public spaces that foster place attachment (Zhao et al., 2024). Overall, enhancing these three aspects can strengthen the *Samanea saman* area's role as a socially engaging and user-centred space within Taman Tasik Taiping.

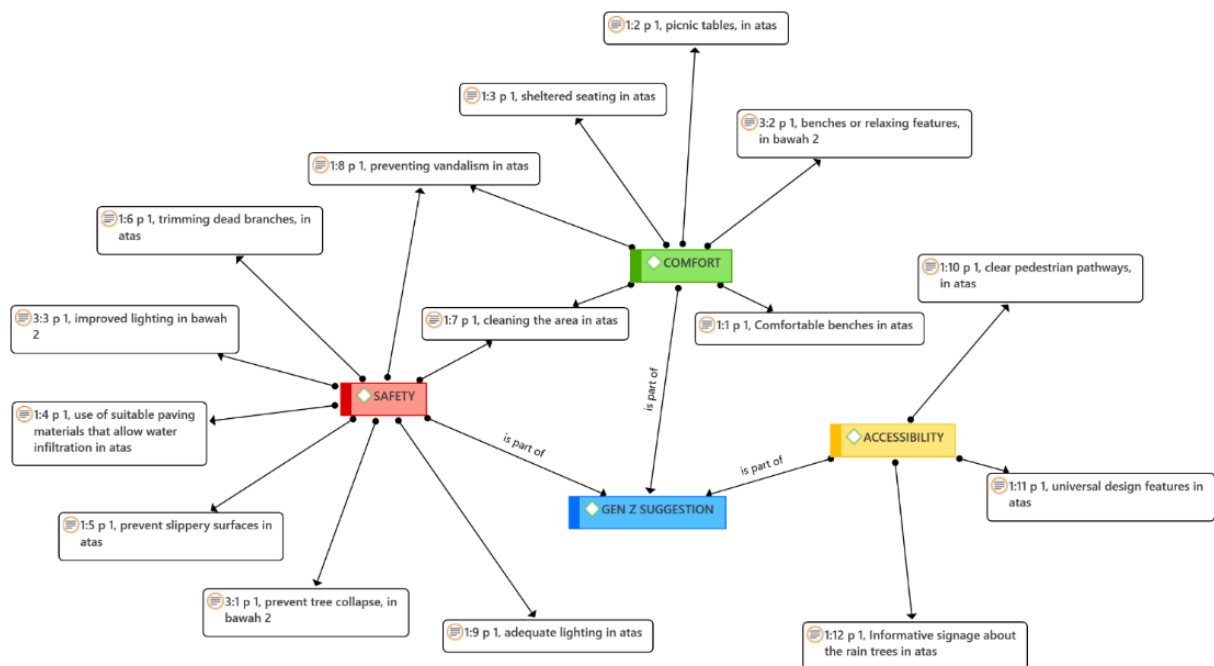


Figure 5 : Open -ended Analysis

CONCLUSION AND RECOMENDATIONS

This study shows that *Samanea saman* has a significant influence on physical comfort, social behavior, aesthetic satisfaction, and participation in the environment of Taman Tasik Taiping. The *Samanea saman*

canopy adds to the improvement of thermal comfort, social, and relaxation activities, and it significantly adds to spatial identity and place attachment, especially in the Generation Z community. This study supports the fact that mature trees not only contribute to the value of the environment but also significantly add to the social and cultural infrastructure of the environment, influencing people to spend time in the open, adding to the landmark character, and maintaining the experience of the environment of urban recreation areas (Rahman et al., 2021; Zhao et al., 2024). From an ecological and aesthetic perspective, respondents consistently rated the *Samanea saman* canopy as comfortable, visually appealing, and effective in moderating temperature, confirming the species' role in creating favourable microclimatic conditions and attractive park environments. The high appreciation of natural soundscapes, spatial arrangement, and overall sensory experience further highlights that the value of *Samanea saman* extends beyond shade provision to shaping a holistic and immersive landscape experience. These attributes contribute to the strong place identity of Taman Tasik Taiping, reinforcing the *Samanea saman* as iconic visual anchors and heritage symbols within the park.

For Generation Z, improvement in perception regarding *Samanea saman* and outdoor living might be facilitated in connection with heightened environmental awareness and interaction. Engagement in outdoor learning, content production, and community activities under *Samanea saman* might improve affection, awareness of ecosystem services, and healthy outdoor behavior. Environmental learning through signage, storytelling in social media platforms, and experiential programs might also assist in raising awareness of the ecological, cultural, and social significance of *Samanea saman* among young generations, which aligns with studies confirming that knowledge and experience increase place attachment and pro-environmental behavior (Park et al., 2023).

Long-term conservation for Taiping Municipal Council should focus on proactive management of *Samanea saman*, including regular health checks, pruning, soil management, and mitigating risks to safety while maintaining the integrity of the canopy. Seating, lighting, pathways, and universal access can be improved under the *Samanea saman* to strengthen its function as a social node and promote sustainable outdoor use. Conservation policies identifying *Samanea saman* as heritage and a landscape landmark will go a long way in securing its continued importance as a defining identity of Taiping and a main driver of recreation and social use. Such ecological and user-centered integrated management is in line with best practice in urban green space planning and landmark tree conservation.

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