

Understanding the Significance of Urban Lingering Factor of Built Environments in the Socio-Climatic Decision-Making Process for Urban Open Spaces: Field Survey Alexandria University Campus

Sagda Gamaleldin, Zeyad El-Sayad, Mohamed Ibrahim

(Ass. Lect. Sagda W. Gamaleldin, Alexandria University, Alexandria, Egypt; sagda.wael@alexu.edu.eg)

(Ass Prof. Zeyad M. El-Sayad, Alexandria University, Alexandria, Egypt; zelsayad1@alexu.edu.eg)

(Prof. Em. Mohamed A. Ibrahim, Alexandria University, Alexandria, Egypt; abdelallmai@alexu.edu.eg)

1 ABSTRACT

Urban lingering is the practice of spending time in public spaces for leisure, socializing, or simply being outdoors. It is a critical urban factor that is influenced by various factors related to the built environment and climate. Urban open spaces, such as University campuses, plazas, and streetscapes, play a bilateral role with the lingering factor in promoting social and environmental sustainability. However, it is highlighted that the urban space's lingering factor understanding process is essentially affected by the aspects of the built environment especially the climatic considerations, to ensure their resilience and future adaptability.

This paper provides a literature review on urban lingering factor with the built environment and their role behind the climatic-based decision-making of urban spaces. The review is structured around several key themes that provide a comprehensive overview of urban lingering, illustrating its causes, effects, and potential solutions. It emphasizes the importance of understanding the complex and multifaceted phenomenon of urban lingering, which is shaped by a range of social, environmental, and economic factors. The research also discusses the implications of urban lingering for urban design, public policy, and community development, and identifies key areas for future research.

Overall, this review emphasizes the importance of considering the lingering factor and built environment on the climatic design and management of urban open spaces, and how this approach of design can support urban lingering behavior and promote social and environmental sustainability. The findings have implications for urban policy and well-being in urban open spaces especially on university campuses as been the focus of the research. Overall, this research review paper provides comprehensive insights into urban lingering factor and the built environment's potential impact on climatic-based decision-making. then, offers essential recommendations for addressing this crucial issue. The review research is aided by a preliminary comparative field survey that supports the research hypothesis.

Keywords: Climate-Informed Decision-making in Urban Open Spaces, Urban Personality, Urban Built Environment, Urban Lingering Factor, Urban Personality

2 URBAN LINGERING FACTOR

2.1 Lingering Factor Definitions: General Overview

Urban public spaces play a critical role in the social, economic, and cultural life of a city. However, not all public spaces are created equal, and some spaces attract more people and activities than others. The concept of the "urban lingering factor" refers to the qualities and typologies of urban public spaces that encourage people to linger and engage in activities. Understanding this factor is crucial for architects and urban planners to design public spaces that are attractive and inclusive(Wang, Liao, Brandhorst, & Clark, 2022).

Lingering is a complex phenomenon that has been studied in a variety of contexts, including urban open spaces, retail environments, and public transportation. Lingering can be defined as the act of staying in a particular location for an extended period of time, often for social or recreational purposes(UN-Habitat, 2020). Lingering can be influenced by a variety of factors, including the physical design of the space, the social and cultural context of the community, and the perceived safety and comfort of the space. Understanding the factors that influence lingering is important for designers and planners who seek to create urban spaces that are vibrant, dynamic, and well-utilized. This part provides a general overview of the lingering factor definitions that have been identified in the literature and discusses their implications for urban design and planning.

2.1.1 Definitions of Urban Lingering

Urban Lingering is a complex concept that has been defined and studied in various ways by different scholars. In this section, we will review some of the key definitions and understandings of Urban Lingering that have been put forth in the literature. The term "Urban Lingering" was first coined by the sociologist Sharon Zukin's book in 1996 "The Cultures of Cities." In this work, Zukin defines Urban Lingering as the practice of occupying in public spaces for pleasure, entertainment, or social interaction (Zukin, 1996). According to Zukin, Urban Lingering is an important aspect of urban life, as it allows individuals to engage with their surroundings and with each other in meaningful ways.

Since Zukin's initial definition, scholars have expanded the concept of Urban Lingering to include a variety of different practices and activities. For example, some researchers have focused on the importance of Urban Lingering for mental health and well-being, arguing that spending time in public spaces can help to reduce stress and increase feelings of happiness and connection (Pretty, Peacock, Sellens, & Griffin, 2005). Others have emphasized the political and social dimensions of Urban Lingering, highlighting how public spaces can be sites of resistance and contestation, particularly for marginalized groups (e.g., McFarlane, 2010).

The term "urban lingering factor" refers to the tendency of individuals to spend time in public spaces without a specific purpose or activity. The concept of urban lingering is closely related to the idea of "loitering," but generally has a more positive connotation, as it is often associated with social interaction, leisure, and community building.

On the other hand, it may refer to the impact of past decisions on the current state of the urban environment. It recognizes that the built environment of cities is a product of past decisions and that these decisions can have extended effects on the sustainability and resilience of urban areas. The urban lingering factor highlights the need for extensive and comprehensive decisions in urban planning and design (Abd Elrahman & Asaad, 2021).

Broadly, it is argued that there are several definitions of the urban lingering factor, depending on the context and perspective of the researcher. Some definitions focus on the physical presence of individuals in public spaces, while others emphasize the social and cultural dimensions of urban lingering. Here, the following table (1) summarizes several definitions of urban lingering:

Definitions	Reference
The occupying practice in public spaces for pleasure, entertainment, or social interaction	(Zukin, 1996)
It refers to the act of spending time in public spaces without a specific purpose or activity and is often associated with social interaction and community building.	(UN-Habitat, 2020)
The urban lingering factor refers to the degree to which public spaces are conducive to social interaction and leisure activities and can impact the quality of life and sense of community in urban environments.	(Wang, Liao, Brandhorst, & Clark, 2022)
Urban lingering is a form of informal social activity that occurs in public spaces and can contribute to social cohesion, community building, and cultural exchange.	(Aelbrecht & Stevens, 2019)
To describe how past choices have affected the state of the current urban environment. It acknowledges that decisions made in the past have an impact on the built environment of cities and can have a long-term impact on their sustainability and resilience.	(Asadpour, Razmara, Heidari, & Taghipour, 2022)

Table 1: Definitions of Urban Lingering. Source: authors.

Overall, the definition of the urban lingering factor depends on the specific context and research question but generally involves the concept of spending time in public spaces without a specific purpose or activity, and the potential impact of this behavior on social interaction, community building, and urban development.

2.2 Parameters of Urban Lingering

The observation of people's presence is the standard way to visualize urban lingering in existing urban open spaces. This could be considered a basic method to measure the current state of the urban linger factor for an urban space. However, this concept may not be beneficial for analyzing futuristic scenarios of urban open spaces. Urban lingering factors refer to the factors that influence people's tendency to spend time in public spaces, such as streets, parks, and squares. Therefore, measuring the urban lingering factor involves measuring the parameters of the desirable urban built environment that stimulate people to stay in urban open spaces, as well as highlighting the parameters that could affect people's eagerness to stay outside.

It is important to highlight that this research argues that the urban lingering factor should be considered both as an effective urban parameter and as a nominal numeric factor of numerator and denominator.

The urban lingering factor is a complex and multifaceted concept that is influenced by various factors. Here are some parameters that could be used to measure the urban lingering factor:

- Historical and cultural significance of urban spaces (Shinbira, 2012).
- Accessibility and connectivity of urban spaces (Gehl, 2010).
- Diversity of uses and activities in urban spaces (Elshater & Abusaada, 2022).
- Sense of place and identity associated with urban spaces (Relph, 2022).
- Perception of safety and security in urban spaces (Fleming, Manning, & Ambrey, 2016).
- Environmental and sustainable qualities of urban open spaces (Beatley, 2011).

It is important to note that the parameters for measuring the urban lingering factor may vary depending on the context and location of the urban area being studied. Additionally, the selection of parameters should be based on a comprehensive understanding of the interplay between social, economic, and environmental factors in shaping the urban environment.

The table below (Table 2) provides a projection of the previously mentioned parameters on real examples of university campuses. The examples in the table illustrate the uniqueness of each campus, as well as the subsequent effect of each parameter.







Historical and cultural significance	Accessibility and connectivity of urban spaces
	
An evaluation has been done of the historical and cultural significance of the University of Virginia's urban open spaces. This evaluation assisted in locating campus areas that required preservation or restoration, which are more likely for people to linger in and integrated with. (Neuman, 2007)(Baldwin, 2020).	Analyzing pedestrian and bicycle traffic patterns allowed researchers at the University of California, Los Angeles (UCLA) to evaluate the connection and accessibility of urban open areas. Which was used to identify places that required upgrading accessibility and promoting amenities. (Critique Access, 2022).
Diversity of uses and activities in urban spaces	Sense of place & identity related to urban spaces
	
The multi-functionality of the University of Massachusetts Amherst's urban spaces was assessed by users' surveys to classify their favorite outdoor spaces and their engaged activities. The results were used to inform decision-makers in the campus's renovation process. (Sleegers, 2010) (Toom, 2022).	The sense of place and identity At the University of British Columbia was evaluated among urban open spaces by a series of workshops with users to determine their unique characteristics and qualities. Comprehensive development steps have occurred to enhance this parameter (Covin, 2009).
Perception of safety and security in urban spaces	Urban Environmental and sustainable qualities
	
A study at the University of Melbourne conducts to investigate the perception of safety and security in various campus open spaces. The study found that spaces tended to be perceived as safer are more likely to be used for lingering and socializing. (Piroozfar, et al, 2019).	At the Arizona State University campus, the ecological function of various urban spaces was evaluated and analyzed, which helps to identify areas that require restoration. and guide developers to a comprehensive plan for sustainable campus development. (ASU, 2023)

Table 2: Examples of Urban Lingering Factor Parameters. Source: authors.

2.2.1 The Challenges & Limitations of the Urban Lingering Factor Parameters

- **Subjectivity:** subjective parameters, which are based on people's perceptions and experiences rather than objective data. For instance, the sense of place is extremely subjective and based on the background, experiences, and culture of the individual.
- **Context-dependency:** parameters are highly contextual dependent and locational for the studied urban area. As an example, the urban space's cultural significance may be differentiated between old and new cities.
- **Data availability:** Due to a lack of data, some parameters are more challenging to be measured than others. For instance, they may entail advanced equipment or expertise that might not be available in all contexts.
- **Interdependence:** they are intertwined and cannot be isolated considered. Such as the urban space's multifunctionality could be influenced by its historical and cultural significance, its accessibility and connectivity, and the users' perception of safety and security.
- **Resource limitations:** the measurement process could be time-consuming and expensive and may require interdisciplinary expertise.

Finally, it is believed to consider the challenges and limitations which are synchronized with these parameters, while interpreting the urban lingering factor results. This process can provide valuable insights into the social, economic, and environmental factors that shape urban open spaces.

3 URBAN BUILT ENVIRONMENT

The urban built environment has a significant role in the overall aspects of areas. Urban activity, social interaction, and access to resources all could be influenced by the design and layout of the urban context. Additionally, it can associate and reinforce social and economic disparities, affecting health and opportunities for residents. A growing need for examining the relationship between the built environment and urban outcomes has appeared. Such research can support planning and designing decisions, assisting to produce more viable, equitable, and sustainable urban environments (Paudel & States, 2023). Researchers have examined the design and management of open and green spaces, as well as the health, psychological, economic, and social outcomes (Nguyen, Astell-Burt, & Rahimi-Ar, 2021).

Generally, the study of the urban built environment is crucial for understanding how the physical environment affects urban spaces, both tangibly and intangibly. By examining the relationship between the built environment and urban outcomes, researchers can inform planning and design decisions that promote the desired outcomes.

3.1 The Definitions of Urban Built Environment

Several definitions could be associated with the urban built environment. However, it generally involves the tangible assets of urban areas, including buildings, transportation systems, public spaces, streets, ...etc. Urban open spaces users' health and well-being are significantly impacted by the design and management of the urban built environment, which is influenced by various social, economic, and cultural elements. Table (3) is illustrating the specific definition of both built and urban built environments.

Terms	Definition	Citation
Built Environment	The human-made physical context in which people live, work and play	(Habash, 2022)
Urban Built Environment	The physical environment of cities and towns, including buildings, streets, public spaces, and transportation systems	(Roe, et al., 2020)

Table 3: Definitions of Built Environment and Urban Built Environment. Source: authors.

The interaction between the urban built environment and the climatic and natural elements is a crucial aspect. Urban spaces, such as parks and plazas, are distinctly endangered by environmental threats, including extreme temperatures, air pollution, ...etc. These threats can affect the viability and vitality of urban open spaces and may negatively impact the health and well-being of their users. Urban designers and planners hold the responsibility to address these challenges and increasingly incorporate green infrastructure, such as trees, green roofs, rain gardens, etc. through their designs, as well as help relieve their effects (Habash, 2022).

The World Health Organization (WHO) highlights the importance of urban built environment integration with natural elements, to enhance the urban quality. WHO emphasizes through their “Urban Green Spaces and Health” report that the human association with green spaces, such as parks and gardens, can promote physical activity, reduce stress, and improve mental health (WHO Regional Office for Europe, 2022). Overall, it is considered that the urban built environment is a complex system. It is shaped by various interconnected factors. It has an essential relationship with the climate and natural elements, (Roe, et al., 2020).

3.1.1 Urban Built Environment and Urban Lingering Factor

Urban built environment has received significant concern, through research, is the role of urban open spaces, such as parks and plazas. These spaces provide important opportunities for relief and social, economic, and cultural interaction. They can also play a role in promoting their users both physical and psychological health. Moreover, the design of urban open spaces can have a significant impact on how they are used and perceived by users, which are generally described as urban lingering factors (WHO Regional Office for Europe, 2022).

It is believed that the overall layout of the urban built environment has an impact on its urban outcomes. For instance, high walkability neighborhoods, connectivity, and mixed land uses have been associated with high physical activity and low obesity rates (Gehl, 2010). Similarly, access to public transportation also can improve mobility for users and reduce reliance on individual vehicles (Berg & Ihlström, 2019).

In other words, exposure to air pollution, noise pollution, and other environmental hazards can create negative effects on users' mental and physical health (WHO Regional Office for Europe, 2022). Additionally, social and economic factors, such as destitution and segregation, have reflections on the built environment, creating disparities in accessibility, security & safety, well-being...etc (Aelbrecht & Stevens, 2019).

Abdelaal (2019) proposes that the urban built environment plays a crucial role in the urban spaces users' existence and well-being, both tangibly and intangibly, directly and indirectly. By incorporating aspects of the built environments, and climatic and sustainable parameters, urban designers and planners can create more livable, equitable, and resilient urban open spaces (Abdelaal, 2019) (Abd Elrahman & Asaad, 2021).

Thus, it is believed that the urban lingering factor is significantly impacted by the urban built environment of space. University campuses are distinctive urban settings that provide a various range of open spaces, such as courtyards, plazas, and green areas. The way that people utilize and two-way interaction with these spaces, as well as their general satisfaction and well-being, could be influenced by their design (Abdelaal, 2019).

3.2 Parameters of Built Environment in Desirable University Campuses' Urban Open Spaces

Desirable university campuses' urban open spaces are significant campuses' outdoor areas that are used as gathering locations for visitors, staff, and students (Hanan, 2013). These spaces are designed to provide a comfortable and attractive environment for relaxation, socialization, and physical activity. The success of these spaces relies on their design, which should incorporate various characteristics, that could be considered as the conceptual shape of a space's built environment parameters, including multifunctionality, accessibility, sustainability, aesthetics, and safety and security. These characteristics are essential for developing a setting that encourages well-being, stresslessness, and fosters a sense of community. Universities build open-space environments in order to improve the student experience and feeling of community by considering these parameters (Abdelaal, 2019).

The Characteristics of Desirable University Campuses' Urban Open Spaces					
Chars	Multi-functionality	Accessibility	Sustainability	Aesthetics	Safety and security
Description	Spaces which serve multiple purposes, such as providing socialization, studying, and physical activities.	Accessible spaces to all users, including people with disabilities.	Spaces which are designed or functioned with sustainable features such as green roofs, rain gardens, ...etc.	Open spaces should be visually appealing and designed in a way that reflects the campus culture and values.	These spaces should be well-lit and designed to minimize the risk of accidents and crime.
Ref.	(Hanan, 2013)	(Qurratul, Henny, & A, 2019)	(Abdelaal, 2019)	(Yu Lau, Gou, & Lu, 2014)	(Piroozfar, et al., 2019)
Examples	 The University of Sydney	 University of British Columbia, Canada	 UCLA, Los Angeles' Sculpture Garden	 The UC Berkeley Strawberry Creek Plaza	 The University of Melbourne's South Lawn

Figure 1: A brief about the characteristics of desirable university campuses urban open spaces. Source: authors.

Fig. 1 illustrates a brief about the characteristics of desirable university campuses urban open spaces. The table categorizes the characteristics, supported with relevant examples of university campuses' urban open spaces.

The urban spaces characteristics of desirably university campuses are deeply related to the urban built environment parameters. Various factors should be taken into consideration through designing and planning such as shape and layout, management and system, ...etc. For instance, sustainable features such as solar lighting, green roofs, and greenery, are considered as ingredients of a built entity and can enhance spaces' sustainability and vitality. Similarly, accessibility features such as ramps, sidewalks, and seating areas can be considered through the built environment as accessibility insurance for the space. Additionally, the visually appealing welcoming environment of the space could be achieved by incorporating aesthetically pleasing design elements. By considering these factors in the design of the urban built environment, universities can create desirable urban open spaces that have positive urban impacts (ASU, 2023). Table (4) illustrates the parameters of desirable urban built environments through university campus urban spaces.

Parameter		Description	References
Form	Size	Review space size and proportions, related to function and surroundings	(Çakmak Mehmet & Topcu, 2018)
	Configuration & Aesthetics	The space's optimal shape and layout, based on the intended use and the surrounding environment	
Landscape	Materials	The space-appropriate materials, considering the function and surrounding.	(Hendel, 2020)
	Vegetation	The necessary greenery ratio in the space.	(ASU, 2023)
	Lighting	Space lighting considerations, of timing, load, and intensity.	(Gokhale, 2013)
	Furniture	Considering the space's furniture availability, suitability, and sustainability.	(Allahdadi, 2017)
System Management	Maintenance	The space maintenance schedule & degree, based on the intended function.	(UN-Habitat, 2020)
	Long-term viability / Permanence	It is the ability of urban assets, buildings, ..etc. to remain functional, safe, and aesthetically appealing over time. Resilient and sustainable design and management policies are essential to achieving long-term viability.	

Table 4: Built Environment Parameters in Desirable University Campus Urban Open Spaces . Source: authors.

It is believed that the urban built environment of open spaces plays a crucial role in shaping the university campus experience. By considering the built environment aspects and parameters of desirable urban open spaces, there is the ability to create spaces with a wide range of supported activities, enhance well-being, and the overall campus experience. Figure (2) illustrates the interrelationships between the urban built environment and the role of the characteristics of desirable urban open spaces in the formulation of the desirable built environment.

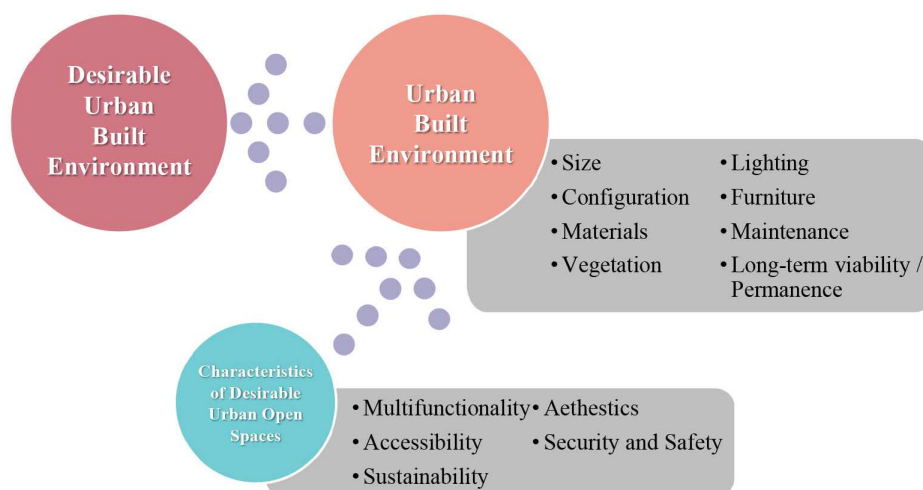


Figure 2: The Hinge Between the Urban Built Environment and the Characteristics of Desirable Urban Open Space. Source: authors.

In conclusion, the intent of desirable university campuses' urban open spaces is to promote well-being, stresslessness, and increase users' sense of community. Developing parameters such as multifunctionality, accessibility, sustainability, aesthetics, and safety can enhance these spaces built environmental conditions. It is thought that these parameters can also enhance the urban lingering factor of users through the urban space, and have multifaceted effects, affecting their performance, decision-making process, and overall experience

of the space for both users and designers. Thus, it is proposed that the designing, controlling, or upgrading processes of these urban open spaces in a way that engages these characteristics, can significantly impact the user experience and the overall success of the space. It is believed that this process could be achieved, through the concept of a socio-climatic informed decision-making process.

4 SOCIO-CLIMATE INFORMED DECISION-MAKING PROCESS OF URBAN OPEN SPACES

Urban open spaces serve as places for recreation, social interaction, and cultural events, while also important ecological functions are provided such as air and water purification, carbon sequestration,...etc. However, with the increasing impacts of climate change, open spaces are facing new challenges that threaten their ability to provide these benefits (WHO Regional Office for Europe, 2022). Socio-climatic factors can affect the use and accessibility of urban spaces, as well as the presence, health, and well-being of their users. To ensure that urban open spaces continue providing their intended benefits in the face of environmental changes, especially climatic changes, it is necessary to incorporate socio-climatic considerations into the decision-making process for managing, designing, and utilizing these spaces (Berkman, Vylegzhanin, & Young, 2023).

This part explores the socio-climate-informed decision-making process for urban open spaces. The socio-climatic factor, effects and integrated with the design and management of urban open spaces, will be investigated, through their users and decision-makers, and how this can lead to more resilient and equitable urban environments. This part will also explore the comprehensive complementary role of these elements through a bilateral bias. Overall, this part seeks to achieve a better understanding of how socio-climatic considerations can integrate with the decision-making process of urban open spaces, and how this can lead to more positive lingering urban factors in the universities' urban environments.

4.1 Socio-Climate Informed Decision-making - General Definition

It is a theory that acknowledges the interdependence of social, economic, and environmental systems as well as how each of these systems is impacted by climate change. Support climate change-related decision-making, it entails merging scientific data and societal data. As it enables decision-makers to recognize and address the social and economic implications of climate change, this approach is particularly pertinent to public policy, sustainable development, urban planning, and business strategy.

The development of climate change adaptation plans in the agricultural sector is one practical example of the utilization of socio-climate-informed decision-making. The effects of climate change, such as altered precipitation patterns, a rise in the frequency and severity of extreme weather events, and changes to the growing season, are especially harmful to agriculture (Waldman, et al., 2020). Agricultural decision-makers can create strategies that not only address the environmental effects of climate change but also take into account the social and economic repercussions on farmers and rural communities by adopting a Socio-Climate informed decision-making strategy. For instance, to assist farmers in adapting to changing climate circumstances, decision-makers may take into account making investments in crops that are resistant to drought, creating water storage systems, and putting in place training programs for farmers. Figure (3) presents the conceptual framework for the factors affecting decisions made by American farmers in response to climate change (Chatrchyan, et al., 2017).

On the other hand, the development of climate change adaptation strategies for the transport sector is another utilization of socio-climate informed decision-making. The greenhouse gas emissions caused by transportation are an important factor in climate change. Transportation decision-makers can build plans that not only lower emissions but also consider the social and economic implications on communities by adopting a Socio-Climate informed decision-making strategy.

In general, it is proposed that the integration of social, economic, and environmental systems, as well as the climate change effects on each system is recognized as socio-climate informed decision-making theory (Manteaw, Amoah, Ayit, & Enu, 2022). It is believed that this strategy refers to the process of making decisions in an urban built environment with considering both social, environmental, and climatic factors. It is a holistic approach that allows the interplay between these factors and the need for an inclusive understanding of the urban system (Mendoza, et al., 2018).

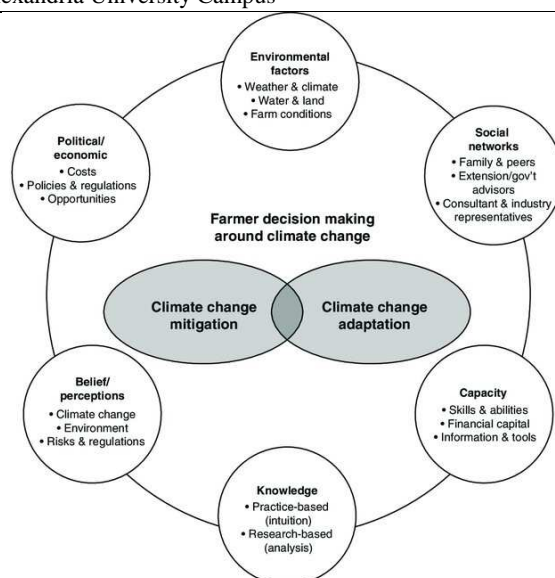


Figure 3: Conceptual framework for the elements influencing how American farmers execute climate change-related decisions. Source: Chatrchyan, et al., 2017.

Decision makers can create plans that address the social, economic, and environmental effects of climate change by adopting the socio-climate informed decision-making strategy. These actual instances show how crucial it is to consider both the environmental and social effects of climate change, as well as the necessity for a multidisciplinary approach to decision-making (Gargiulo & Zucaro, 2023).

4.2 Interdisciplinary Definitions and Viewpoints

Socio-climate informed decision-making is a complex strategy, that involves incorporating social, environmental, and climate change issues into decision-making processes. Across a range of fields, including environmental research and studies, politics, public health, community development, and engineering, the main definition of socio-climate informed decision-making is comparatively similar. Ensuring that decisions are sustainable, equitable, and resilient to the effects of climate change, is the central idea behind socio-climate informed decision-making (Orlove, Shwom, Markowitz, & Cheong, 2020). This approach is crucial for dealing with the complex issues brought on by climate change and promoting sustainable development. The procedure entails taking into account how climate change may affect social and environmental variables and using this knowledge to guide decision-making in creating policies, designing infrastructure, planning healthcare, and involving the community. Overall, making decisions based on socio-climate information is essential for reducing and adjusting the effects of climate change and promoting sustainable development (Santamouris, 2013). Table (5), summarizes the different perspectives and definitions of the Socio-Climatic informed decision-making strategy. The table highlights the approached definition of each perspective that shows the fixed essence of the main concept behind this strategy.

Perspective	Definition	Ref.
Environmental Science	Process of making climate change informed decisions and its social impact.	(Koh , Loc, & Park, 2022)
Sustainable Development	The process that integrates social, economic, and environmental factors to produce sustainable decisions.	(Mendoza, et al., 2018)
Public Policy	Using scientific evidence and social data to, related to climate change, inform public policy decisions.	(Orlove, Shwom, Markowitz, & Cheong, 2020)
General Policy Making	Process of integrating climate change considerations into policy development, implementation, and assessment to ensure policies climate change impacts resilience and support sustainable development.	(Manteaw et al., 2022)
Urban Planning	Considering the social and economic impacts of climate change on urban areas planning and design.	(Waldman, et al., 2020)
Business Strategy	Making business decisions that take into account the social and environmental impacts of climate change.	(Aelbrecht, 2022)
Community Development	is a participatory process that involves engaging communities in decision-making processes related to climate change adaptation and mitigation to ensure that decisions reflect the needs and priorities of the community.	(Berkman et al. 2023)
Engineering Perspective	Incorporating climate change impacts and vulnerabilities into engineering design and decision-making processes to ensure that infrastructure and buildings are resilient to climate change impacts.	

Table 5: Socio-climate informed decision-making from Different Perspectives. Source: authors.

4.3 The Implementation of Socio-Climatic Informed Decision-Making Process Through the Urban Open Spaces

The concept of socio-climate informed decision-making process (SCIDM) of urban open spaces refers to the framework that considers the socio-climatic factors that impact these spaces through the designing, managing, and using processes. Socio-climatic factors involve both the environmental and social aspects of a given location. To create a SCIDM process for urban open spaces, a various range of stakeholders is necessary to be engaged, including urban planners, designers, community groups, and policymakers. These stakeholders must work together to recognize the most relevant socio-climatic factors to the specific urban open space, and to develop approaches for addressing these factors. One substantial aspect of the SCIDM process is the climate data and projections incorporation into the design and management of urban open spaces (Waldman, et al., 2020). A climate model can be included to predict, for example, future temperature and precipitation patterns, and design urban open spaces that can adapt to these changes (Koh, Loc, & Park, 2022). Another key aspect of the SCIDM process is social equity and community engagement involvement. It is important to ensure that the responsiveness of design and management of urban open spaces to the needs and affinities of local communities, and the equitable distribution of these spaces benefits across different socio-economic groups. This includes the community groups' engagement in the design and management process and the incorporation of their feedback through decision-making (Aelbrecht, 2022).

4.4 The Study Three Aspects -The Triangulated Relationship

Through this paper, it is believed that a comprehensive understanding of these factors is essential for creating sustainable, vital, and viable urban built environments. Urban open spaces are complex mechanisms that are moulded by intertwined factors, including the built environment, social & economic conditions, and climatic conditions. The interplay between these factors is critical to the vitality and viability of these urban open spaces. This part highlights the interrelationship between the urban built environment, the SCIDM process, and the urban lingering factor. It is believed that the interrelationship between these three factors is simple, logical, tangled, and multifaceted. The built environment is influenced by past decisions and current and future socio-climatic projections. The SCIDM process recognizes the interplay between these factors and seeks to make decisions that are based on a comprehensive understanding of the urban system. The urban lingering factor is reflecting the urban affections of the other factors, which are represented through the innate presence of users in the urban spaces while considering the past decisions' impact on the sustainability and vitality of urban areas. Ideally, Urban spaces' users urban lingering critically depended on the interplay between these three variables. It is crucial to have a comprehensive understanding of them. Cities may have the ability to create built environments that suit the demands of the present and future generations while minimizing the effects of previous actions by adopting a holistic approach to urban planning and design decisions that consider the interaction between social and environmental elements, as well as, controlling the urban lingering factor of each urban open space as it is proposed by its designers through controlling the other factors.



Figure 4: The Study Three Interrelationship Aspects. Source: authors.

Overall, the interrelationship between the Urban Built Environment, Socio-Climatic Decision informed making process, and the urban lingering factor is believed to be significant. Both the urban built environment

and the socio-climatic informed decision-making process play important roles in shaping the current and future conditions of urban open spaces. On the other hand, the urban lingering factor plays a role as a representative key value in the urban open spaces. Fig. 4 presents the interrelationship between these three factors, as well as the role of each factor as either a stimulus or an indicator.

5 FIELD SURVEY –URBAN OPEN SPACES OF THE UNIVERSITY CAMPUS, FACULTY OF ENGINEERING, ALEXANDRIA UNIVERSITY

5.1 Introduction

University campuses are often considered as microcosms of urban areas, with unique characteristics and challenges that play a crucial role in shaping the overall campus experience. The urban open spaces on these campuses have great potential for development through an updated decision-making process based on various aspects that guarantee the achievement of specific goals.

This field survey reviews the literature on the built environment of university campuses and the urban lingering factor, with a focus on urban open spaces. The survey provides an initial sensory evaluation to test the research hypothesis, which proposes a positive relationship between the implementation of built environment parameters and students' urban lingering factor. It also highlights the importance of a decision-making process that considers social and climatic factors (SCIDM).

The field survey identifies the parameters of both the built environment and the urban lingering factor while emphasizing the need for a socio-climatic informed decision-making process for existing, future, or proposed steps that would achieve a positive urban lingering factor for urban open spaces. Finally, the study summarizes the findings through a table with figures and recommendations.

5.2 Methodology

The surveys consist of, firstly, creating a social and climatic comprehensive background regarding the study-selected locations. This has involved conducting surveys or focus groups to determine how people use outdoor spaces in different day times, and weather conditions, and what their most valuable features are in these spaces. Once this data has been collected, it could be possible of creating comprehensive viewpoints of each space's urban environment, both current and designed ones. Next, it is important to monitor uses and effectiveness over time. This has occurred through tracking the number of users, observing how people use the space, and collecting feedback from the community about their experience. The researcher used a basic field observation method in this study. The observation process took place for three continuous days, with ninety minutes of observation each day, on the Faculty of Engineering campus at Alexandria University. Figure (5) shows the observation zone that the researcher covered on the campus. As well as, illustrates the construction locations on the campus. It is important to note that approximately 80% of the students were on summer break during the first and second days of observation, while 100% were present on the third day.



Figure 5: Campus Zones Illustration (right), Construction Location (Middle) & Green Area (left). Source: authors.

5.3 Experimental Phase

Below are the results of the field survey for six different zones. Each zone is illustrated with its urban built environment rate based on the parameters of a desirable urban environment. Additionally, the survey includes the urban lingering factor (ULF) for both the observed factor and the expected factor, taking into account the design intentions of the urban area.

Zone 01		Zone 02	
			
Built Environment: 70%	Existing ULF: 60% Expected ULF: 90%	Built Environment: 10%	Existing ULF: 0% Expected ULF: 80%
Notes: ULF is affected by the continuity of cars among the seating areas		Notes: When desirable urban built environment parameters are lacking, users are discouraged from lingering.	
Zone 03		Zone 04	
			
Built Environment: 80%	Existing ULF: 45% Expected ULF: 90%	Built Environment: 10%	Existing ULF: 0% Expected ULF: 20%
Notes: The lack of a green built environment and informed socio-climatic decisions have negatively impact the ULF		Notes: Despite the suitability of climatic conditions, the lack of built environment parameters has a negative impact on the ULF	
Zone 05		Zone 06	
			
Built Environment: 70%	Existing ULF: 55% Expected ULF: 95%	Built Environment: 5%	Existing ULF: 0% Expected ULF: 80%
Notes: the ULF is affected by the density of cars and the location of construction sites.		Notes: the absence of the characteristics of built environments have affected directly users' ULF.	

5.4 Findings and Recommendations

- Provide and emphasize the reasons for users to stay in the urban open space to increase their engagement and enhance their experience.
- Acknowledge that the campus is considered as a gathering hub by some users during vacations and use this to promote lingering among the campus's urban areas.
- Prioritize greenery and climate-controlled urban areas in the development decision-making process, considering social aspects through the SCIDM process.
- Improve the condition of the urban built environment to positively impact the urban lingering factor.
- Adjust the design of the space to better meet the needs of the community in different weather conditions, such as adding sheltered areas or warming stations to encourage more use during the winter months.
- Students and users concentrate on specific areas for lingering during the construction circumstances and hard climatic conditions.
- It is believed that, by implementing these recommendations, the FOE AU can create a more desirable urban environment that promotes user engagement and enhances the overall campus experience.
- This field survey needs to be more expanded by using more advanced observation techniques in order to produce more accurate results and outcomes.

- It is important to take into consideration the aspects of social cohesion.
- The case study should highlight renowned contributions to "campus design on an international/global scale." By examining prominent examples from around the world, the study aims to identify influential approaches and principles that have shaped campus designs on a global level.
- It is important to note that the impact of the studied examples may not directly relate to the specific case used in the empirical study. The empirical study focuses on a particular campus, and it is crucial to consider similar contextual and environmental aspects when drawing conclusions and making recommendations based on the precedence study. By acknowledging these contextual differences, the research aims to provide a comprehensive understanding of campus design while tailoring the findings to the specific case under investigation.
- It is recommended to create an in-depth verification of built environment definitions through a deeper literature review.

6 CONCLUSION

In conclusion, the interrelationship between the urban lingering factor, the urban built environment, and the SCIDM process is a complex and multifaceted issue that requires a holistic approach to address. Through the field survey conducted on the FOE AU campus, it is clear that the lack of desirable urban built environment parameters can negatively impact the urban lingering factor, despite the suitability of climatic conditions. The field survey also revealed that students are more likely to linger in greenery-covered and climatic-controlled urban areas, which should be considered through the development decision-making process, in consideration of social aspects using the SCIDM process.

Overall, the socio-climatic informed decision-making process through urban open spaces involves gathering data, using that data to inform the design of the space, monitoring its use and effectiveness over time, and making adjustments as needed to better meet the needs of the community in different weather conditions. The FOE AU is recently under reconstruction or renovation, and the concepts and recommendations made through this field survey can be presented to decision-makers to inform the design of the space, in a way that guarantees a positive impact on the users' urban lingering factor. However, it is essential to recognize that the ULF of the same place may differ from one time to another, and there is a necessity to reconsider and analyze the ULF parameters to produce more accurate ones. Future field surveys should expand the scope of the study and utilize new technologies for observation and visualization of outcomes for more accurate results.

7 REFERENCES

- Abd Elrahman, A. S., & Asaad, M. (2021, March). Urban design & urban planning: A critical analysis to the theoretical relationship gap. *Ain Shams Engineering Journal*.
- Abdelaal, M. S. (2019). Biophilic campus: An emerging planning approach for a sustainable innovation-conducive university. *Journal of Cleaner Production*.
- Aelbrecht, P. (2022). *Fourth Places Informal Social Life and Interaction in New Designed Public Spaces*. Cardiff: Springer International Publishing.
- Aelbrecht, P., & Stevens, Q. (Eds.). (2019). *Public Space Design and Social Cohesion: An International Comparison*. Routledge, Taylor & Francis Group.
- Allahdadi, M. (2017). Explaining the Criteria of Designing Urban Furniture and Landscape, with a Cultural-social Design Approach. *Journal of History Culture and Art Research*.
- Asadpour, H., Razmara, M., Heidari, A., & Taghipour, M. (2022). Privacy, patterns, and factors in urban open spaces (Case study: Jannat Park in Shiraz City). *Megaron*.
- ASU. (2023). Sustainability goals and vision. Retrieved from Arizona State University.
- Baldwin, E. (2020, July). "Style is Superficial": Alice Raucher on Social Justice and Sustainability at the University of Virginia. Retrieved from ArchDaily.
- Beatley, T. (2011). *Biophilic Cities: Integrating Nature into Urban Design and Planning*. Springer.
- Berg, J., & Ihlström, J. (2019). The Importance of Public Transport for Mobility and Everyday Activities among Rural Residents. *Social Sciences*.
- Berkman, P. A., Vylegzhanin, A. N., & Young, O. R. (Eds.). (2023). *Informed Decisionmaking for Sustainability*. Springer.
- Çakmak Mehmet, B. Y., & Topcu, M. (2018, October). An evaluation of urban open spaces in Historical City Center of Konya in the context of pedestrian mobility. *Journal of Human sciences*.
- Chatrchyan, A. M., Erlebacher, R. C., Chaopricha, N. T., Chan, J., Tobin, D., & Allred, S. B. (2017, May). United States agricultural stakeholder views and decisions on climate change. *WIREs Climate Change*.
- Covin, C. L. (2009). *Cartographies of place and identity*. University of British Columbia.

- Critique Access. (2022). University of California Los Angeles. Retrieved from Critique Access.
- Elshater , A., & Abusaada, H. (2022). Effects of nightlife activities on urban spaces and design: a case study of Cairo, Egypt. City, Territory and Architecture.
- Fleming, C. M., Manning, M., & Ambrey, C. L. (2016). Crime, greenspace and life satisfaction: An evaluation of the New Zealand experience. *Landscape and Urban Planning*.
- Gargiulo, C., & Zucaro, F. (2023). A Method Proposal to Adapt Urban Open-Built and Green Spaces to Climate Change. Sustainability.
- Gehl, j. (2010). *Cities for people*. Island Press.
- Gokhale, V. (2013). People's Perception of Urban Lighting in Public Space. *The Journal of Architecture*.
- Habash, R. (2022). Urbanization as an intelligent system. Sustainability and Health in Intelligent Buildings.
- Hanan, H. (2013). Open Space as Meaningful Place for Students in ITB Campus. *Procedia - Social and Behavioral Sciences*.
- Hendel, M. (2020). *Eco-Efficient Pavement Construction Materials*. Woodhead Publishing.
- Koh , Y. F., Loc, H. H., & Park, E. (2022, January). Towards a "City in Nature": Evaluating the Cultural Ecosystem Services Approach Using Online Public Participation GIS to Support Urban Green Space Management. Sustainability .
- Manteaw, B. O., Amoah, A. B., Ayit, B., & Enu, K. B. (2022, April). Climate-Informed Decision-Making in Data-Poor Environments: Managing Climate Risk Through Citizen Science Networks. *Frontiers in Climate*.
- Mendoza, G., Jeuken, A., Matthews, J., Stakhiv, E., Kucharski, J., & Gilroy, K. (2018). Climate Risk Informed Decision Analysis (CRIDA): collaborative water resources planning for an uncertain future. UNESCO & International Centre for Integrated Water Resources Management.
- Neuman, D. J. (2007). University of Virginia Historic Preservation Framework Plan. Documentary.
- Nguyen, P.-Y., Astell-Burt, T., & Rahimi-Ar, H. (2021). Green Space Quality and Health: A Systematic Review. *International Journal of Environmental Research and Public Health*.
- Orlove, B., Shwom, R., Markowitz, E., & Cheong, S.-M. (2020). Climate Decision-Making. *Annual Review of Environment and Resources*.
- Paudel, S., & States, S. L. (2023). Urban green spaces and sustainability: Exploring the ecosystem services and disservices of grassy lawns versus floral meadows. *Urban Forestry & Urban Greening*.
- Piroozfar, P., Farr, E., Nimo, E. A., & Osei-Berchie, J. (2019, December). Crime prevention in urban spaces through environmental design: A critical UK perspective. *Cities*.
- Pretty , J., Peacock, J., Sellens, M., & Griffin, M. (2005, October). The mental and physical health outcomes of green exercise. *International Journal of Environmental Health Research*.
- Qurratul, A., Henny, M., & A, N. (2019). Evaluation of Accessibility for People with Disability in Public Open Space. IOP Conference Series: Materials Science and Engineering. South Aceh: IOP Publishing.
- Relph, E. (2022). *Place and Placelessness*. SAGE Publications Ltd.
- Roe, J., Mondschein, A., Neale, C., Barnes, L., Boukhechba, M., & Lopez, S. (2020). The Urban Built Environment, Walking and Mental Health Outcomes Among Older Adults: A Pilot Study. *Frontier Public Health*.
- Santamouris, M. (Ed.). (2013). *Energy and Climate in the Urban Built Environment*. Routledge.
- Shinbira, I. A. (2012). Conservation of the Urban Heritage to Conserve the Sense of Place, a Case Study Misurata City, Libya. *American Transactions on Engineering & Applied Sciences*.
- Slegers, F. (2010). University urban design centers in the planning and implementation of urban greenways. – Possible strategies for the UMass Amherst Design Center in Springfield, MA. the Fábos Conference on Landscape and Greenway Planning 2010. Scholarworks.UMASS.
- Toorn , M. v. (2022). Public space and public health related to green space in urban landscape architecture. Proceedings of the Fábos Conference on Landscape and Greenway Planning. Scholarworks.UMASS.
- UN-Habitat. (2020). *City-Wide Public Space Strategies: A Guidebook for City Leaders*. Nairobi: UN-Habitat.
- UN-Habitat. (2020). Public space site-specific assessment Guidelines to achieve quality public spaces at neighbourhood level. Nairobi GPO KENYA: United Nations Human Settlements Programme.
- Waldman, K. B., Todd, P. M., Omar, S., Blekking, J. P., Giroux, S. A., Attari, S. Z., . . . Evans, T. P. (2020, November). Agricultural decision making and climate uncertainty in developing countries. *Environmental Research Letters - IOPscience*.
- Wang, X., Liao, C., Brandhorst, S. M., & Clark, P. E. (2022). Sedentarization as an adaptation to socio-environmental changes? Everyday herding practices in pastoralist communities in southern Ethiopia. *Ecology & Society*.
- WHO Regional Office for Europe. (2022). *Urban planning, design and management approaches to building resilience – an evidence review*. London: World Health Organization.
- Yu Lau, S. S., Gou, Z., & Liu , Y. (2014, December). Healthy campus by open space design: Approaches and guidelines. *Frontiers of Architectural Research*.
- Zukin, S. (1996). *The Cultures of Cities*. Blackwell Publishers.