

# Enhancing the Relation between the Individuals and Society through Interactive Outdoor Communal Spaces in Public Buildings: An Analytical Study for Multi-Commercial Complexes

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## Abstract

The “Human-Centered Planning” approach, as outlined by many researchers, has been utilized by designers and planners to evaluate individuals’ satisfaction with urban environments. Durkheim’s exploration of collective consciousness highlights how social interactions shape individual attitudes and sentiments [1]. In modern society, Multi Commercial Complexes serve not only practical spaces but also significantly impact economic, social, and cultural aspects of urban development and sustainability. This research aims to assess the quality of interactive communal spaces in Cairo, Egypt, as public urban destinations to gauge user satisfaction from a visual perspective. To achieve this, the study proposes a methodological framework that integrates Kevin Lynch’s “Image of the City” theory with principles of interactive space design. Additionally, it introduces a refined concept of “Ground,” referring to the unoccupied areas within existing urban settings. The findings suggest that thoughtful design considerations can enhance urban development and improve user satisfaction in public open spaces.

**Keywords:** Multi-Commercial Complexes, Public Spaces, Interactive Communal Spaces, Human-Centered Planning, “Ground” Concept, Interactive Space Design Principles.

## 1 Introduction

Urban public spaces serve as vital platforms for fostering interaction, strengthening social bonds, and shaping identity within communities. Multi-commercial complexes (MCCs) as modern urban destinations have evolved from economic activities to cultural and social hubs [2], the quality and design of interactive outdoor communal spaces playing a crucial role in connecting individuals with their surroundings and enhancing their community relationships [3,4]. This study explores how well-designed outdoor communal spaces can enhance user experience and satisfaction by integrating spatial design elements with urban design principles and emotional design aspects. The research uses a dual-methodology approach, including a user survey to measure user perceptions of interactive design applications in MCCs and a case study analysis to assess the spatial configuration and functionality of these elements. Through this comprehensive approach, the findings emphasize the transformative potential of well-planned outdoor spaces in MCCs, highlighting the importance of creating vibrant, inclusive environments that enhance individual well-being and strengthen social cohesion. The study aims to provide a robust framework for future urban developments, demonstrating how thoughtful design can bridge the gap between personal experience and collective identity in public spaces.

## **2 Literature Review**

### **2.1 Public Spaces for Social Interaction**

Social interaction, including verbal and non-verbal communication, is crucial for personal growth and development, according to sociologists Cooley, Mead, and others. Society provides structure and behavioural norms, while individuals constantly reform society through diverse relationships [4]. Public spaces are vital for community building, social interaction, and identity formation, influencing individual and collective needs and displaying social life dynamics through social interactions [5]. Shared identities foster a sense of belonging in communal spaces, enhancing social cohesion and strengthening bonds, thus supporting Durkheim's concept of collective consciousness [1,3]. Gehl; 2010 highlights a shift in public spaces towards sustainable, user-centric designs, promoting social interaction and connection building. Outdoor activities are categorized into necessary, social, and optional, influenced by seating, fruit trees, water, and legibility [6,7].

### **2.2 The Development of the Outdoor Communal Spaces in MCCs**

Urban spaces are categorized into private, public, semi-private, and semi-public, with public spaces being inclusive and hubs for events, and semi-private spaces being private property visible from outside [8]. Gehl (2011) defined semi-public spaces as areas accessible to all but often controlled by one person, such as common areas in office buildings, open spaces around shopping centers, and housing groups [9]. Throughout history, communal public spaces served as social hubs, including marketplaces, gathering spots, and town squares, facilitating economic and cultural interactions. Contemporary urbanism extends public spaces beyond economics to address environmental and social needs, as suggested by Lefebvre's "Space Production" concept, reflecting city collective identity [5].

Contemporary urban development has incorporated communal public spaces into multi-commercial complexes, transforming them into cultural, social, and economic spaces. They promote cultural consumption and revitalization, increasing social interactions and urban navigation, aligning with Kevin Lynch's "Image of the City".

### **2.3 Sustainable Design in Outdoor Communal Spaces in MCCs**

Sustainable design of communal spaces in Multi Commercial Complexes is crucial for economic viability, ecological balance, and social inclusion. Integrating economic, social, and environmental principles maximizes functionality and resilience. Key elements identified by Kim & Han include passive circulation systems, amenities, and mobility [10]. Passive Circulation utilizes natural ventilation and airflow to reduce energy consumption and greenhouse gas emissions [11]. Amenities foster community connections through seating areas, landscapes, and pedestrian pathways. Mobility emphasizes seamless accessibility and free movement for users [12].

#### **2.3.1 Urban Planning Challenges for Public Communal Spaces in MCCs**

Urban planners face challenges in MCCs, including balancing public use with commercial interests, addressing space and budget constraints, and adhering to design guidelines [13]. This research focuses on the relationship between urban and architecture design principles of "Spatial Elements" for communal spaces in multi-commercial buildings. It aims to develop a comprehensive design guideline using the proposed mythology Fig.1, which adopts "Human-Centered Design" approach and integrate the "User Environmental Perception Theories", and "Urban Fundamental Principles" to assess and design user experiences in outdoor communal spaces in MCCS.

### 3 Theoretical Methodology

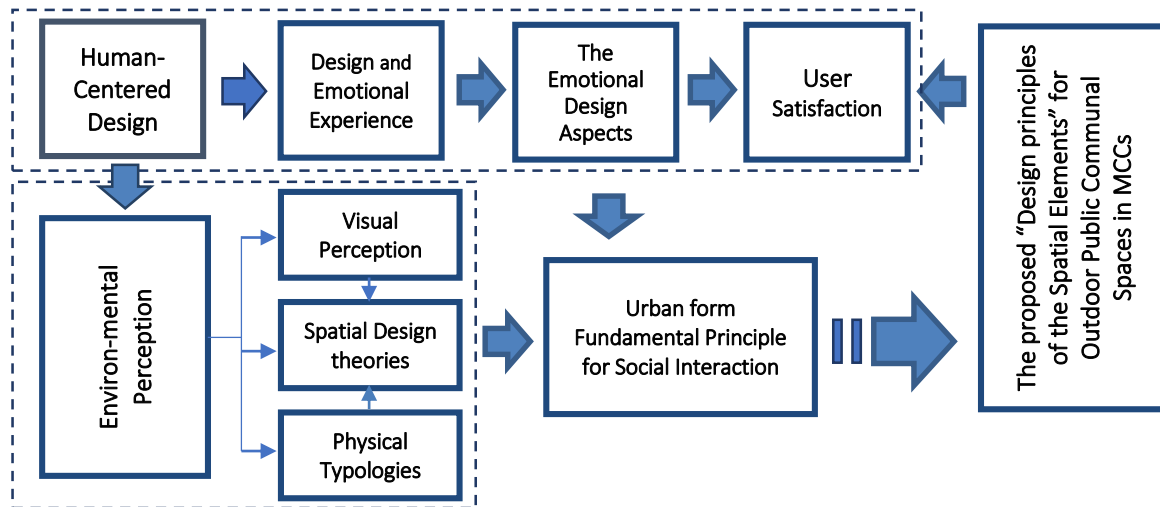


Fig.1 The Research "Theoretical Methodology, source: author

#### 3.1 Human-Centered Design for User's Emotional Experience and Satisfaction

Human-centered design aims to enhance user satisfaction by creating social hubs that cater to both practical and emotional needs clarified in Fig.2, with studies indicating that design directly influences user emotions [14,15]. Plutchik (2001) and Engel's (1977) researches highlight the role of environmental, social, and biological factors in shaping emotions through emotional design, which intentionally influences mood, behavior, and mental health [16,17].

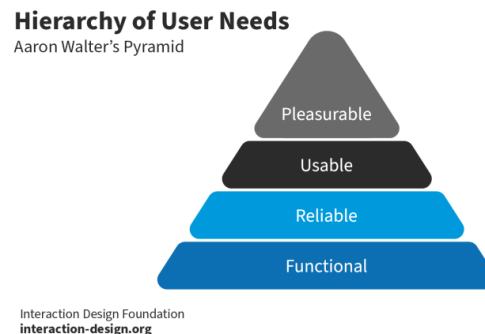


Fig.2 The Hierarchy of User Needs, source: [18]

Emotional design is crucial for the success of a service or product, as it resonates with users, fostering engagement, motivation, personal growth, and satisfaction, thus ensuring the overall functionality and emotional impact of a space [18]. Norman (2004) emphasizes the significance of emotional design, arguing that users prefer products that evoke positive emotions. He identifies three levels of user cognitive response: visceral, behavioral, and reflective, which create a holistic user experience, ensuring a strong first impression, effortless goal achievement, and lasting emotional connection [18,19].

#### 3.2 The Emotional Design Aspects

Emotional design impacts the user's experience in multi-commercial buildings as it increases engagement, satisfaction and well-being. Thus, based on the previous levels of "user cognitive response", the following conclusions can be drawn from various readings and the aforementioned discussion as design aspects for emotional design that enhance the overall user's experience, Fig.3:

- **User Well-being;** is elements of design that create a relaxing and comfortable environment. Studies show that thoughtfully incorporated green spaces and "Biophilic design" help in reducing anxiety and creates a sense of ease for the user [16,17]. Also, reducing environmental stressors by controlling acoustics and aesthetics affect the user's well-being positively [17,20].
- **Perception of Safety and Comfort;** enhancing the user's sense of safety in a building is crucial as it invites them to relax and explore. This can be achieved through thoughtful lighting, intuitive navigation and spatial arrangement [21,22].
- **Connection and Sense of Belonging;** evoking a sense of belonging by creating a deep emotional connection with the user is crucial to designing a space. Integrating local and cultural elements can create the feelings of warmth and inclusivity needed to create such a connection [18,23,24].
- **Usability and Satisfaction;** prioritizing usability, way-finding aids and accessible design features through functional layouts can evoke positive emotional responses therefore leads to user satisfaction [20, 22].
- **Memorability/ Identity and Differentiation;** creating a memorable experience for the user will increase the likelihood of them returning and recommending the place [17,23,24]. Incorporating engaging and unique features like public art, symbolic architecture and thematic décor develops a sense of identity to the place that leaves an impact on the visitor and makes the place recognizable [16,23,24].
- **Motivation and Engagement;** designing the space with the intention to motivate and engage the user will leave an impact. This can be done by incorporating interactive features and vibrant aesthetics, creating social spaces [18,25,26].

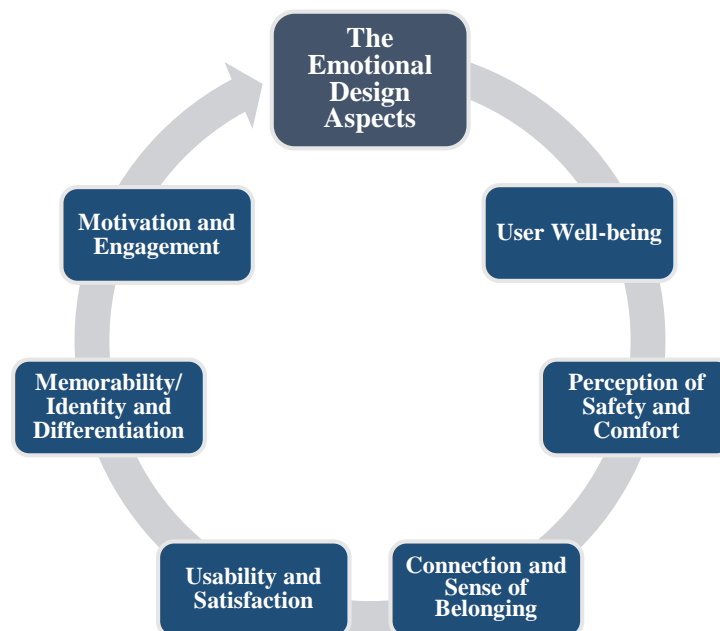


Fig.3 The Emotional Design Aspects, source: author

### 3.3 Environmental Perception

#### 3.3.1 User's Visual Perception from Psychological Perspective

Visual perception is a cognitive process that involves the brain interpreting and organizing objects and events from the external world in a structured manner. The work of RJ Taylor, Affective Perception, underlines the intangible cultural aspects of the built environment that can evoke emotional responses influenced by both functional and symbolic meanings [27,28].

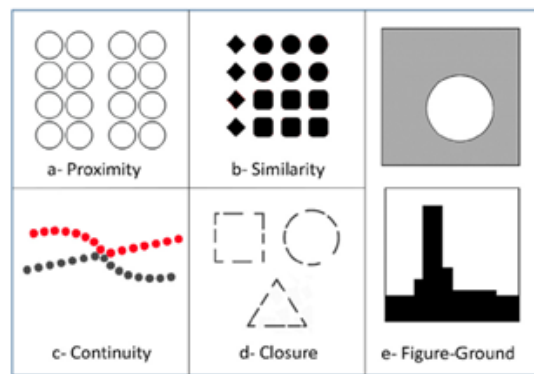


Fig.4 Gestalt's Key Principles of Perception, source: [28]

Gestalt's theory, shown in Fig.4, has been developed in the 1920 by many psychologists and it emphasizes perceiving elements as organized wholes rather than isolated parts. This perception is based on key principles like closure, continuity, similarity, proximity and figure-ground distinction. Gestalt further elaborates by saying that continuity and closure help create organized patterns and complete forms based on separate elements, while proximity and similarity help in grouping similar or nearby stimuli together. The figure-ground principle creates engaging environments by distinguishing objects from their backgrounds [28,29]. M. W. Self's research highlights the significance of figure-ground segregation in object recognition, a crucial step in the visual system. The visual system separates objects from their backgrounds, enabling the recognition and location of objects in a visual scene. Figure-ground segregation is deeply processed by the visual system, leading to their shape being encoded in short-term memory. Studies have shown that regions designated as figures are more deeply processed, affecting contrast discrimination ability and perceived contrast [30].

### 3.3.2 Environmental Perception and Spatial Design Theories

#### - The Figure-Ground Theory

Aldo Rossi argued that buildings are not only structural forms, they shape and define the spaces surrounding them, with the ground interacting and creating a cohesive and inviting urban setting [31]. Figure-ground theory is a concept that aids urban planners in balancing built environments with open spaces for environmental sustainability. It promotes better air quality, reduced carbon footprints, and increased social interaction. Saeed et al. (2020) emphasize the importance of green spaces in urban areas for enhancing environmental sustainability and social well-being [32]. The figure-ground relationship also influences human interaction in urban environments, with the distinction between figure (buildings) and ground (open spaces) influencing how people interact with their environment [33]. Therefore, Whyte's perspective on public open spaces emphasizes the importance of considering physical factors, visual factors, and symbolic factors in public spaces. Physical factors relate to the area associated with circulation, while visual factors make it easier for people to see a visual picture. Symbolic factors, in the form of areas capable of developing historical and cultural values are essential for public spaces to be inclusive, open and accessible [34].

#### - Kevin Lynch's "Image of the City" Theory

Kevin Lynch's work on urban design and landscape architecture has significantly influenced our understanding of how physical environments shape human interaction and user experience. He argued that individuals create their own image, but consensus exists among group members [33].

Kevin Lynch's "cognitive map" in *The Image of the City* (1960) integrates Gestalt principles to understand urban spaces. He identifies five key elements: paths, edges, districts, nodes, and landmarks. Paths and edges correspond to continuity, districts with proximity and similarity, nodes with closure, and landmarks embody

figure-ground relationship. Lynch's work is foundational in understanding how people navigate and remember urban spaces, demonstrating the importance of Gestalt principles in urban planning [28,33].

### 3.3.3 Physical Typologies in Outdoor Communal Spaces in MCCs

From the “Figure-Ground” visual perspective which was explained earlier, various physical typologies for outdoor open spaces within multi-commercial buildings (MCCs) drawing on established urban design literature and relevant case studies. Here's an outline of common urban typologies and their implications for outdoor open spaces in multi-commercial buildings:

- **Central Courtyards:** are open-air spaces that enhance social cohesion by providing shaded seating, greenery, and focal points. They are often used for events, pop-up markets, and communal dining areas [33,34,35].
- **Promenades and Walkways:** connect various sections, fostering social interaction and leisurely strolling encounters [6,22].
- **Plazas and Town Squares:** are flexible open spaces that host various social activities, creating a communal atmosphere [33,36].
- **Green Spaces:** introduce nature into urban MCCs, providing tranquil spaces for relaxation and socialization. These spaces promote sustainability, aesthetics, and biodiversity, making them environmentally beneficial and socially engaging [32,37].

### 3.4 Urban Form Fundamental Principle for Social Interaction

The design of public spaces is guided by fundamental principles such as character, continuity, enclosure, quality, movement, legibility, adaptability, diversity, and sustainability. The urban form of communal spaces in multi-commercial complexes significantly influences social interactions and user experience. Therefore, Accessibility, variety of activities, comfort, and social interaction are essential attributes. The following analysis delves into essential urban design fundamental principles in MCCs [13,34].

- **Accessibility and Connectivity:**

Urban form principles emphasize the importance of accessible, well-connected spaces for social interaction, such as pathways and central nodes, which promote both planned and spontaneous interactions [6,33].

- **Human-Scale Design & Enclosure**

Lynch and Hall emphasize the importance of human-scale design in large-scale projects, focusing on creating comfortable and engaging spaces. Carr's work highlights the importance of understanding scale by correlating spatial dimensions with users' physical presence [35]. Lynch's Proxemics framework, which outlines spatial zones (intimate, personal, social, and public) and their impact on perception and connection, highlights the significance of human-scale measurements in shaping urban spaces.

Enclosure refers to the configuration and boundaries of a space, shaping user experience and flow. It guides movement and encourages gathering. Enclosure transforms spaces into meaningful places, influencing identity and visual perception through a holistic urban design approach [6,29].

- **Visual and Physical Permeability**

Urban design promotes inclusivity through visual and physical permeability, with transparent facades and glass barriers connecting indoor and outdoor areas, enhancing social interaction and accessibility [13,36].

- **Mixed-Use and Diversity of Functions**

Diverse functionalities, offering a range of activities catering to different user needs in one space and attract a wide variety of people, leading to more frequent and diverse social interactions [5,6].

- **Landmarks and Focal Points**



Landmarks are visual anchors that serve as reference points within the urban landscape. These focal areas naturally attract visitors, offering a place to pause, gather, and interact. Strategically placing landmarks in open, central locations enhances their visibility and accessibility, making them effective tools for fostering social [33,34].

#### ▪ **Environmental Meaning and Symbolism**

Public spaces, according to Ralph's concept of place identity, evoke different levels of attachment based on user experience. Rossi emphasizes considering surrounding context when designing urban spaces. This perspective is crucial for transforming spaces into symbols that enhance user sense of belonging and interaction [30].

#### ▪ **Green and Open Spaces and Passive Circulation**

Green spaces in urban areas enhance aesthetic value, mental well-being, and social interaction by providing a tranquil environment that encourages longer stays, promoting active and passive interactions [32,37]. Passive circulation in urban design maintains a comfortable climate year-round without high energy costs, promoting fresh air flow and mitigating heat through shaded, open areas [11].

### 3.5 The Proposed "Design guideline" for Outdoor Public Communal Spaces in MCCs

The paper aims to evaluate user satisfaction in outdoor communal spaces in Multi-Commercial Complexes (MCCs) using a design guideline shown in Table 1, that aligns with Lynch's urban design elements and "The Emotional Design Aspects" and "The Fundamental Design Principles for Social Interaction." The study examines the design of outdoor spaces, considering them as "ground" and surrounding buildings as "figures." The above-mentioned methodology includes spatial design elements; urban design principles, emotional design aspects, and design applications.

Table 1: The Proposed "Design Guideline".

Spatial Design Elements		Urban Design Principles Contribution		Emotional Design Principles Contribution		Interactive Design Applications in MCCs
Paths		<ul style="list-style-type: none"><li>▪ <b>Accessibility and Connectivity</b></li><li>▪ <b>Human-Scale Design and Enclosure</b></li><li>▪ <b>Passive Circulation</b></li></ul>	<ul style="list-style-type: none"><li>- Easy movement across zones.</li><li>- Enhancing foot traffic and casual encounters.</li><li>- Provide a sense of flow.</li><li>- Encourage leisurely movement and orientation.</li><li>- Promoting fresh air flow and mitigating the urban heat effect through shaded walkways.</li></ul>	<ul style="list-style-type: none"><li>▪ <b>User Well-being</b></li><li>▪ <b>Perception of Safety and Comfort</b></li><li>▪ <b>Usability and Satisfaction</b></li></ul>	<ul style="list-style-type: none"><li>- Design features reduce stress and create a calming environment.</li><li>- Intuitive layouts create a sense of security.</li><li>- Good lighting promotes comfort feeling.</li><li>- Availability of shaded walkways and seating area enhances user satisfaction.</li></ul>	<ul style="list-style-type: none"><li>- Promenades/ Walkways leading to central nodes.</li><li>- Bath Ways.</li><li>- Shaded walkways.</li><li>- Lighting.</li><li>- Green paths.</li><li>- Availability of seating area.</li></ul>
Description	<ul style="list-style-type: none"><li>○ Streets</li><li>○ Promenade / Walkway</li><li>○ Pathways</li></ul>					
Edges		<ul style="list-style-type: none"><li>▪ <b>Visual and Physical Permeability</b></li></ul>	<ul style="list-style-type: none"><li>- Semi-permeable edges promote visual connectivity between zones.</li></ul>	<ul style="list-style-type: none"><li>▪ <b>Connection and Sense of Belonging</b></li></ul>	<ul style="list-style-type: none"><li>- Edges with seating and greenery encourage inclusivity.</li></ul>	<ul style="list-style-type: none"><li>- Transparent or low hedges.</li><li>- Transparent walls.</li><li>- Clear Edges.</li><li>- Seating.</li><li>- Greenery.</li></ul>
Description	<ul style="list-style-type: none"><li>- Physical or perceptual boundaries defining</li></ul>					

Spatial Design Elements		Urban Design Principles Contribution		Emotional Design Principles Contribution		Interactive Design Applications in MCCs
	different zones: o Walls o Landscape features	▪ <b>Green and Open Spaces</b>	- Greenery along edges enhances aesthetics and supports relaxation.	▪ <b>Usability and Satisfaction</b>	- Clear edges provide navigation. - Use semi-permeable edges with seating and greenery, to promote informal gatherings and engagement.	
<b>Districts</b>		▪ <b>Mixed-Use and Diversity of Functions</b>	- Offering various activities. - Attracting diverse visitors.	▪ <b>Memorability / Identity and Differentiation</b>	- Thematic design with aesthetic cohesive elements that aligned with their function.	- Different function zones. - Unique design (colors, shapes and materials).
<b>Description</b>	- Distinct zones o Retail o Dining o Leisure/Recreational - Shape the outdoor communal space boundaries: o Open o Semi-open o Closed	▪ <b>Human-Scale Design &amp; Enclosure</b>  ▪ <b>Environmental Meaning and Symbolism</b>	- Intimate, human-scale zones shape the outdoor space boundaries. - Provide comfort for social interactions. - Considering the surrounding context (history, typology, and culture).	▪ <b>Usability and Satisfaction</b>	- Different function zones including recreational activities create a social hub.	
<b>Nodes</b>		▪ <b>Landmarks and Focal Points</b>	- Naturally attracting visitors. - Facilitating both planned and spontaneous interactions.	▪ <b>Motivation and Engagement</b>	- Incorporating interactive features and vibrant aesthetics.	- Flexible open space. - Variety of social activities: o Food courts o Markets o Events/Festivals
<b>Description</b>	- Focal meeting points surrounded by high-traffic zones: o Entryways o Plazas o Courtyards	▪ <b>Accessibility and Connectivity</b>	- Nodes simplify navigation by converging paths.	▪ <b>Perception of Safety and Comfort</b>	- Clear layouts make users feel secure.	- Seating. - Art installations / Sculptures. - Landscaping.
<b>Landmarks</b>		▪ <b>Landmarks and Focal Points</b>	- Helping people navigate the space.	▪ <b>Memorability/ Identity and Differentiation</b>	- Create lasting impressions. - Different aesthetic elements where people take memorable photos.	- Art installations / Sculptures. - Fountains. - Unique architectural elements.
<b>Description</b>	- Central visual and social anchor.	▪ <b>Environmental Meaning and Symbolism</b>	- Providing memorable and recognizable meeting spots.	▪ <b>Connection and Sense of Belonging</b>	- Fosters shared identity and social bonding.	



## 4 Analytical Study

### 4.1 Analysis Methodology

This study evaluates the effectiveness of interactive design applications in outdoor communal spaces within multi-commercial buildings (MCCs). To achieve this, a dual approach has been adopted, combining user feedback and project analysis, to assess the impact of these elements on user experience and satisfaction. The first method involves a user survey to measure the importance of interactive design applications in creating a cohesive environment. The second method is a ground floor plan analysis of similar projects, focusing on spatial design elements like paths, edges, districts, nodes, and landmarks. This analysis provides critical insights into the spatial arrangement and practical application of the proposed methodology in real-world contexts.

### 4.2 The User's Survey

To assess the effectiveness of outdoor communal spaces in Multi-Commercial Complexes (MCCs) and understand user experiences, a survey was conducted as a primary analytical method. The survey targeted a sample of 50 respondents; represent a diverse cross-section of users, including individuals of varying ages, genders, and social backgrounds. This method was employed to capture subjective perceptions and preferences, aligning with the study's aim of integrating urban and emotional design principles into communal space design. The survey included a series of structured questions designed to evaluate key aspects of spatial design elements such as paths, edges, districts, nodes, and landmarks. Additionally, it addressed emotional aspects like relaxation, safety, connectivity, motivation, and engagement.

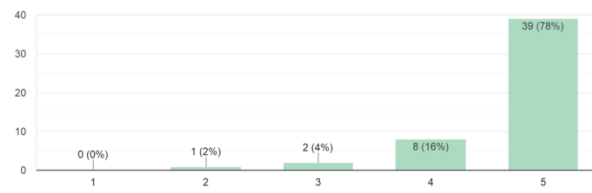
The survey results as detailed in table 6 provide critical insights into user preferences and perceptions regarding the design and functionality of communal spaces in multi-commercial complexes (MCCs).

Table 6: Reflects users' respondents.



5- How effective are the shaded walkways in creating a comfortable environment for walking?

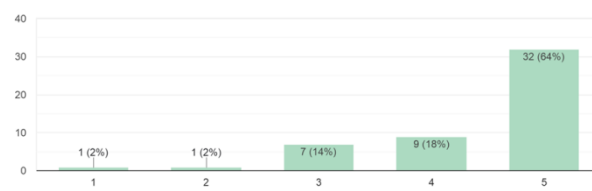
50 responses



### ■ User Well-being

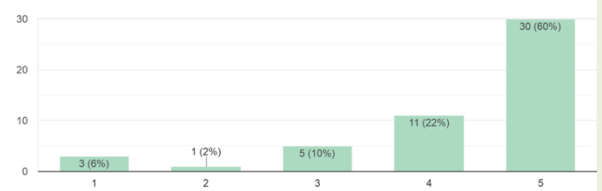
1- To what extent do you see the impact of having seating areas surrounded by a fence of plants or transparent glass on the feeling of connection with the surrounding space?

50 responses



2- How do you see the impact of having seating areas with plant hedges, glass barriers, or positioned next to building exteriors in encouraging social interaction among visitors?

50 responses

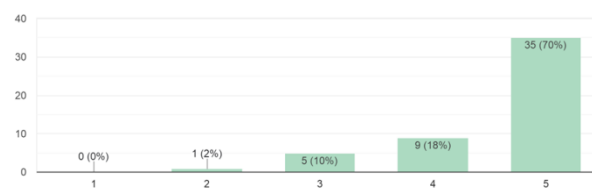


## Edges

### ■ Connection and Sense of Belonging

3- To what degree does the absence of visual barriers in front of exterior walls or greenery affect your ability to determine directions in the space? ...

50 responses

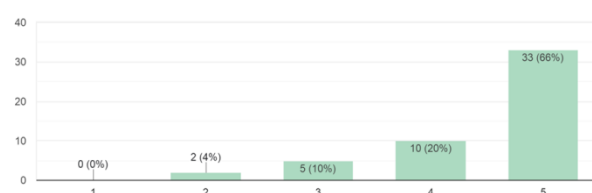


### ■ Usability and Satisfaction

### ■ Usability and Satisfaction

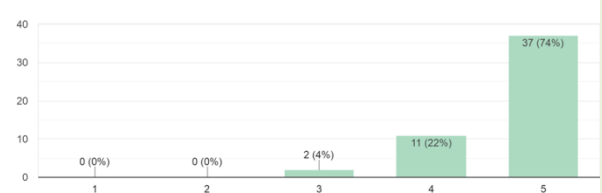
1- To what extent does the mix diversity of activities in a space help create a sense of uniqueness, shaping its identity as a social hub?

50 responses



2- How does the building's distinctive design in terms of its shape, color, and materials, contribute to creating a memorable and unique character for the space?

50 responses



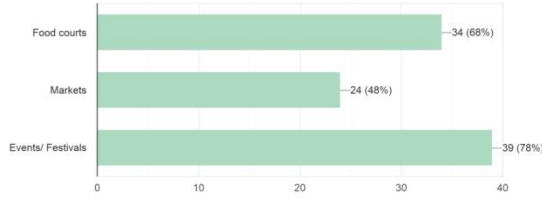
## Districts

### ■ Memorability/ Identity and Differentiation

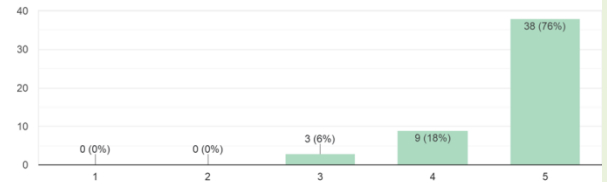
### ■ Memorability/ Identity and Differentiation

Nodes

1- Choose one or more of the above-mentioned social activities that encourage engagement and interaction among people in the space.  
50 responses

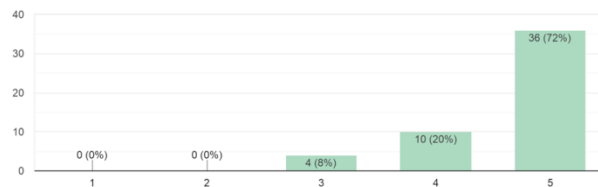


2- To what extent do clear organized layouts and pathways that guide users to focal meeting points enhance their feelings of security and comfort?  
50 responses



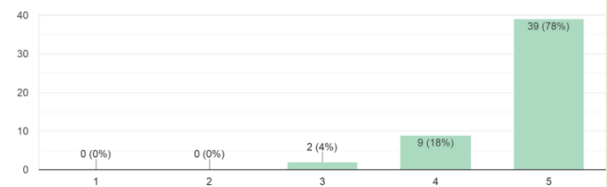
■ Motivation and Engagement

1- To what extent do central visual and social landmarks like sculptures, fountains, and unique architectural features help guide people through the space?  
50 responses



■ Perception of Safety and Comfort

2- To what extent do central visual and social landmarks (such as sculptures, fountains, and unique architectural elements) create memorable places where people are likely to take photos?  
50 responses



■ Memorability/ Identity and Differentiation

■ Connection and Sense of Belonging

### 4.3 Case Studies Analysis

#### 4.3.1 Case study 1: Mall of Arabia Extension– 6th October City, Giza

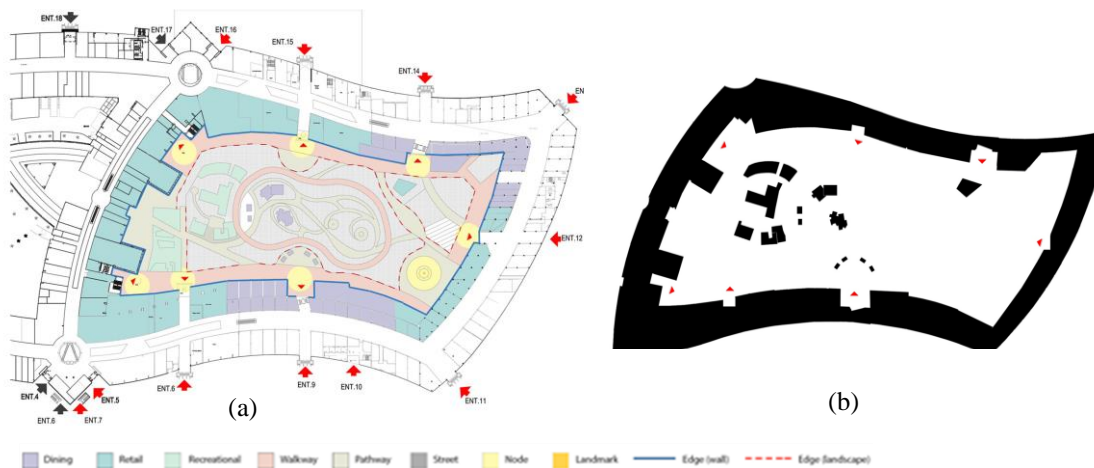


Fig.4 Mall of Arabia ground floor analysis: (a) Spatial analysis (b) Figure & ground analysis, source: author



Fig.5 Mall of Arabia ground floor features, source: author

Table 2: Reflects the implementation of the proposed design elements in the case study (1).

		Spatial Design Elements									
		Paths		Edges		Districts		Nodes		Landmarks	
Case Study (1)	Description	Streets	✗	Walls	✓	Retail	✓	Entryways	✓	Central visual and social anchor	✓
		Promenades/ Walkway	✓	Landscape features	✓	Dining	✓	Plazas	✓		
		Pathway	✓			Leisure/ Recreational	✓	Courtyards	✓		
						Enclosure	closed				
	Design Applications	Promenades/ Walkways leading to central nodes	✓	Transparent wall edges	✓	Different function zones	✓	Flexible open space	✓	Sculptures	✗
		Path ways	✓	Clear wall edges	✓	Unique design	✓	Different social activities	✓	Fountains	✓
		Shaded walkways	✗	Seating	✓			Seating	✓	Unique architectural elements	✓
		Lighting	✓	Greenery	✓			Art installations	✗		
		Green paths	✓	Transparent or low- hedges	✓			Landscaping	✓		
		Seating area	✓								

#### 4.3.2 Case study 2: Americana Plaza – Elsheikh Zayed City, Giza



Fig.6 Americana Plaza ground floor analysis: (a) Spatial analysis (b) Figure & ground analysis, source: author



Fig.7 Americana Plaza ground floor features, source: author



Table 3: Reflects the implementation of the proposed design elements in the case study (2).

		Spatial Design Elements									
		Paths		Edges		Districts		Nodes		Landmarks	
Case Study (2)	Description	Streets	✗	Walls	✓	Retail	✓	Entryways	✓	Central visual and social anchor	✗
		Promenades/Walkway	✓	Landscape features	✗	Dining	✓	Plazas	✗		
		Pathway	✓			Leisure/Recreational	✓	Courtyards	✓		
						Enclosure	close d				
	Design Applications	Promenades/Walkways leading to central nodes	✓	Transparent wall edges	✗	Different function zones	✓	Flexible open space	✗	Sculptures	✗
		Path ways	✓	Clear wall edges	✗	Unique design	✗	Different social activities	✓	Fountains	✗
		Shaded walkways	✗	Seating	✗			Seating	✗	Unique architectural elements	✗
		Lighting	✓	Greenery	✗			Art installations	✗		
		Green paths	✓	Transparent or low- hedges	✗			Landscaping	✓		
		Seating area	✗								

#### 4.3.3 Case study 3: Capital Business Park – Elsheikh Zayed City, Giza



Fig.8 Capital Business Park ground floor analysis: (a) Spatial analysis (b) Figure & ground analysis, source: author



Fig.9 Capital Business Park ground floor features, source: author

Table 4: Reflects the implementation of the proposed design elements in the case study (3).

		Spatial Design Elements									
		Paths		Edges		Districts		Nodes		Landmarks	
Case Study (3)	Description	Streets	✓	Walls	✓	Retail	✓	Entryways	✓	Central visual and social anchor	✓
		Promenades/ Walkway	✓	Landscape features	✓	Dining	✓	Plazas	✓		
		Pathway	✓			Leisure/ Recreational	✗	Courtyards	✗		
						Enclosure	Semi- closed				
	Design Applications	Promenades/ Walkways leading to central nodes	✓	Transparent wall edges	✓	Different function zones	✗	Flexible open space	✓	Sculptures	✓
		Path ways	✓	Clear wall edges	✓	Unique design	✓	Different social activities	✓	Fountains	✓
		Shaded walkways	✗	Seating	✗			Seating	✗	Unique architectural elements	✓
		Lighting	✓	Greenery	✓			Art installations	✓		
		Green paths	✓	Transparent or low- hedges	✓			Landscaping	✓		
		Seating area	✗								

#### 4.4 Case studies Analysis Results

The study explores the integration of urban and emotional design principles in urban spaces. Table 5 represent the extent to which the case studies met the recommended methodological principles.

Table 5: Reflects how well the case studies achieved the recommended methodological principles.

	Paths						Edges				District				Nodes				Landmark			
	Urban Design Principles			Emotional Design Principles			Urban Design Principles		Emotional Design Principles		Urban Design Principles		Emotiona l Design Principles		Urban Design Principles		Emotiona l Design Principles		Urban Design Principles		Emotional Design Principles	
Case Study 1	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Case Study 2	✓	✓	✗	✓	✓	✗	✗	✗	✗	✗	✓	✓	✗	✗	✓	✗	✓	✗	✗	✗	✗	
Case Study 3	✓	✓	✗	✓	✓	✗	✓	✓	✓	✓	✗	✓	✗	✗	✓	✓	✓	✓	✓	✓	✓	



## 4.5 Findings

- Survey findings emphasize the importance of accessible pathways with shaded walkways and seating areas for relaxation and ease of movement. Good lighting is crucial for safety and comfort. Case studies 1 and 3 show well-designed promenades and pathways improve accessibility and connectivity. However, passive circulation is poor, restricting the flow of natural cooling air and intuitive navigation. Effective paths should incorporate shaded walkways, seating, and intuitive layouts for improve emotional well-being.
- The survey found that semi-permeable edges with greenery or transparent barriers promote inclusivity and connection with the space. Case study 1 and 3 excelled in using transparent edges and greenery, while case study 2 fell short in edge design, lacking green spaces and visual permeability. The study concluded that edges combining greenery and semi-permeable materials are crucial for emotional engagement and usability.
- The survey highlights the importance of mixed-use zones in fostering community and promoting diverse interactions. Case Study 1 and 2 successfully integrated leisure, retail, and dining zones, creating a vibrant social hub. However, case study 3 lacked functional diversity, limiting its ability to engage a broad user base and reduce monotony. Overall, mixed-use diversity is crucial for successful districts, with case study 1 and 2 aligning with survey findings and case study 3 highlighting the need for prioritizing diverse activities.
- The survey highlights the importance of central meeting points with seating, shade, and vibrant activity options for fostering social interaction and engagement. Nodes associated with social activities, such as festivals and food courts, enhance motivation and create vibrant communal spaces. Case studies 1 and 3 effectively utilized plazas and courtyards as central nodes, while case study 2 lacked vibrant nodes.
- Survey findings show that landmarks, such as fountains and sculptures, are crucial for creating memorable experiences, aiding navigation, and fostering a sense of belonging. Case studies 1 and 3 successfully integrated visually striking landmarks, while case study 2 underperformed. Landmarks that combine aesthetic appeal with functionality are essential for emotional connections, supporting survey findings that landmarks are keys to user engagement and satisfaction.

## 5 Conclusion

The proposed design guideline provides a thoughtful framework for enhancing the quality of outdoor communal spaces in Multi-Commercial Complexes (MCCs). Considering the “Ground” visual perspective, and integrating urban design principles and emotional design aspects, these spaces can be transformed into vibrant, inclusive, interactive and functional environments. Case study 1 aligns with these principles, while case studies 2 and 3 highlight areas for improvement. The survey results validate the aforementioned findings, emphasizing the importance of green spaces, well-designed paths, diverse activities, and focal points for user satisfaction and social cohesion. In conclusion, the "grounding" concept in MCC design promotes social interaction and engagement, integrating aesthetic, behavioral, and physical components for a visually engaging and functional design, this defines "ground" areas as spaces to connect and compliment the buildings "figures". The study emphasizes the need to address gaps in urban and emotional design principles to create vibrant, inclusive, and user-friendly interactive communal outdoor spaces in (MCCs), leading to greater satisfaction and long-term project success.

## 6 Recommendations

- **Enhance Passive Circulation:**
  - Incorporate shaded pathways, natural ventilation, and intuitive layouts to improve user comfort and environmental sustainability.
- **Expand Green and Open Spaces:**
  - Increase greenery along paths, edges, and nodes to support relaxation and foster biophilic connections.
  - Design green spaces as multi-functional zones for relaxation, social interaction, and events.
- **Integrate Social Seating:**
  - Include flexible seating arrangements near key interaction zones to support both social and solitary activities.
- **Prioritize Lighting Design:**
  - Incorporate intuitive and aesthetically pleasing lighting that ensures visibility and safety across pathways and nodes.
- **Strengthen Mixed-Use Diversity:**
  - Integrate retail, dining, leisure, and cultural functions to attract a broader user base and ensure vitality.
- **Prioritize Landmarks and Identity:**
  - Use distinctive architectural elements, public art, and thematic design to create memorable landmarks that reinforce place identity and aid navigation.
- **Improve Visual and Physical Permeability:**
  - Implement semi-transparent edges and open facades to enhance visual connections between indoor and outdoor spaces, promoting inclusivity and accessibility.
- **Foster Emotional Engagement:**
  - Incorporate culturally significant symbols, interactive installations, and vibrant aesthetics to evoke emotional responses and deepen user connection.
- **Promote Social Interaction:**
  - Design flexible communal nodes with seating, shade, and open areas for informal gatherings, festivals, and other activities that encourage social cohesion.
- **Further Researches:**
  - Building management and acoustics control are two other crucial factors that affect user's satisfaction in outdoor communal areas in MCCs. As a result, more research be done to address this problem is recommended.

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