Multi-Functionality as a Tool to Accommodate the Needs of "Ziyarte Al-Arba'een" Visitors in the Holy Karbala Center, Iraq

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Abstract

This study addresses the challenges faced during the "Ziyarte Al-Arba'een" event in Karbala, focusing on the need for improved management of spaces to accommodate the large influx of visitors. The research explores the application of the concept of multifunctional space to enhance the infrastructure, particularly in managing crowds and providing essential services.

It employs a descriptive analysis of selected spaces within Karbala, examining specific variables such as size, location, and function. It evaluates the spaces identified there based upon a set of indicators derived from a review of literature.

The findings reveal that applying the concept of multifunctional space can significantly improve the utilization of the areas, providing a framework for accommodating diverse needs of the visitors. These results show that multifunctional spaces can enhance the efficiency of urban areas during events with high-densities. The study concludes that articulating multifunctionality should be an urban planning strategy to develop the area. It offering insights into managing large-scale religious gatherings in urban settings in Iraq

Keywords: Multifunctional urban space, " Ziyarte Al-Arba'een ", Visitors requirements, Holy Karbala, Crowd management.

Introduction

The sacred city of Karbala, during the "Ziyarte Al-Arba'een" event, faces a significant challenge in accommodating the immense influx of pilgrims to Imam Hussein's shrine. This annual event, drawing millions, not only embodies deep religious significance but also presents substantial logistical difficulties. Despite the city's rich historical and spiritual heritage, its current infrastructure struggles to provide essential services to this vast number of visitors.

This study investigates the application of multifunctional urban space concepts in addressing these challenges. It is assumed that by exploring the potential of repurposing and optimizing existing urban spaces, it is possible to develop strategies for efficiently managing the crowd, and ensuring the provision of vital services such as food, shelter, and medical care, while maintaining the sanctity and order of the event.

Its aim is to help enhance the experience of pilgrims in Karbala during "Ziyarte Al-Arba'een" by improving urban space utilization, reflecting a long-term vision for sustainable and adaptable urban planning. Its objectives are:

- To identify underutilized urban spaces within Karbala that can be transformed for multifunctional use.
- To develop a set of preliminary evaluation indicators for optimizing these spaces.
- To propose practical, immediately actionable solutions for crowd management and service provision during the event.

Theoretical Framework

Urban space -multifunctionality

In architecture and urban design, the term "function" is pivotal, referring to a building's purpose and the activities conducted within it. This term is commonly used in architectural literature alongside "form, space, and beauty." As a result, the concept of "multifunctional spaces" has been frequently utilized in conjunction with multifunctional buildings and mixed-use, often without clear distinction. Multifunctionality implies varied uses of space at different times, adding a dynamic aspect to urban and architectural design **(**Zeidler, 1985**)**. The concept of mixed-use in urban design entails the coexistence of various functionalities within a space, with at least three of these functions generating income during a specific time frame. This concept differs from multifunctional urban space, which, as defined by Ziedler (1985) has a more precise interpretation focused on 'space' and 'function'. Zeidler links multifunctional spaces to the versatility seen in ancient Greek and medieval architecture. The application of these concepts extends beyond individual buildings to comprehensive urban planning, advocating for an integrated network of spaces. This network aims to bolster functional integration among various public areas in a city, guided by the principle of proximity, thus enhancing overall urban utility and coherence (Pinto & Remesar, 2009).

Urban Space: Activity and Time

An examination of the full life cycle of a space reveals its varying degrees of activity. Spaces can be highly active and detailed at times, while at others, they may be less active or even unused. For instance, areas opposite universities in European countries are bustling during academic months but quiet during vacation periods. Even within active months, such spaces are frequented by students on weekdays but remain empty on weekends. Additionally, these spaces might serve multiple purposes, such as hosting vegetable markets or experiencing high foot traffic during peak university hours yet have minimal activity at other times. This illustrates how a single space can function more effectively with adaptations to different periods (daily, weekly, or yearly). For example, school grounds can be opened to the public during holidays. The concept of intensifying space functions aims to maximize its capacity, not just in terms of space but also time, suggesting that spaces, while accommodating planned numbers of users, can also offer diverse activities across different periods.

Multifunctionality as an Urban Space Concept

Firstly, the concept of multifunctional or multi-use land uses, prevalent in architecture and urban design, lacks a comprehensive definition. In urban planning, it's a relatively new concept, intertwined with land use, aiming to create spatial and economic synergies. This approach seeks to save space by enhancing functional efficiency while maintaining spatial quality. Synergy arises from the interaction of different activities and manifests in three forms: diverse functions in adjacent spatial units, varied functions within a single unit at different times, and integrated, simultaneous functions in one space. These approaches converge on the principle of selecting the "optimal" arrangement for the most efficient land use (Ghafouri, 2020). According to this assertion, Ghafouri defines the notion of a multifunctional urban space. Such a space is distinguished by the presence of various functions, diverse stakeholders, and different users across various periods, or its capacity to accommodate two or more activities

simultaneously (enabling the integration of multiple functions within a single activity cycle) (Ghafouri, 2020) Urban spaces, whether at the scale of a residential complex, a neighborhood, or an entire city, often serve specific functions that are restricted to certain hours of the day, specific days of the month, or particular months of the year. However, these spaces have the potential to accommodate additional functions during their off-hours, and areas originally intended for private or semi-private use can be repurposed for public activities. For instance, schoolyards can be made accessible to the public during school holidays and temporarily transformed into communal spaces. (Ghafouri & Weber, 2020)**.**

Numerous examples of such spaces, characterized by the mentioned attributes, can be found worldwide. For instance, in the capital city of Iran, Tehran, the open grounds of the University of Tehran are utilized for Friday prayers. In the Vietnamese capital, Hanoi, sidewalks have been transformed into venues for playing badminton. Meanwhile, in the French capital, Paris, streets along the Seine River transform into urban beaches during the summer season. Furthermore, in numerous cities and towns around the world, sidewalks serve as suitable venues for permanent art exhibitions, and parking spaces are allocated for local markets in commercial complexes or office areas (Ghafouri, 2020). The multifunctional utilization of urban spaces has the potential to mitigate the necessity of creating new spaces to accommodate the growing number of users and the increasing urban density (Ghafouri & Weber, 2020). This concept exhibits greater vitality in developing nations, where it tends to manifest organically due to fewer usage restrictions compared to developed countries. Consequently, populations in these countries enjoy more freedom in utilizing urban spaces, resulting in the spontaneous attribution of additional functions to existing spaces beyond their original design purpose (Ghafouri, 2020)

Literature Review

The concept of multifunctional urban space, a contemporary urban planning theme, has been extensively examined in various research. Most of these studies present this concept as a solution for enhancing the quality of life in densely populated areas. For example, Ghafouri and Weber (2020) introduce multifunctional urban spaces as a strategy to counteract the reduced quality of life in densely populated future cities. They highlight the flexibility of such spaces to serve various functions, actors, and users across different times, or even simultaneously host multiple activities. Similarly, Li (2000) emphasize the importance of multifunctional spaces in adapting building designs to rapidly changing social and economic conditions in high-density regions. Dufrasnes et al. (2015) show that multifunctionality in urban development can curb urban sprawl, increase density, and enhance both environmental and spatial quality. This approach saves space by intensifying its use, improves economic performance, and creates vibrant areas. On the contrary, Ferwati et al. (2021) demonstrate that the quality of public spaces is crucial for social interaction. Thus, they propose five dimensions (Inclusiveness, Desirable activities, Comfort, Safety, and Pleasurability) and corresponding assessment factors to plan and implement high-quality urban spaces. This underscores the need for an assessment model for evaluating multifunctional public spaces.

Some studies also deal with it as a strategy for developing public health, which has conducted by: For example, Lafrenz (2022) contributes significantly to the understanding of developing multifunctional green spaces, with a focus on community engagement and public health principles. He acknowledges the unique contextual factors inherent in design and development of each green space. He further emphasizes the value of involving public health experts and local communities in the process. This inclusive approach facilitates the restoration of natural areas while integrating the vital health benefits derived from human interactions in these natural settings.

Other studies deal with the concept of multifunctional urban space as a strategy for achieving sustainability. For example, Lotfata (2022) delves into the multifunctionality concept in urban planning, emphasizing its application across various urban scales and the dynamics between them. He proposes a phenomenological approach to test urban space

multifunctionality. This approach includes diverse stakeholders like community groups, civic organizations, and residents in decision-making, policy design, and planning to ensure spaces function efficiently. Adding to these, Belmeziti et al. (2018) introduce a novel typology aimed at enhancing the multifunctionality of urban green spaces, addressing the challenge of limited available areas. This typology advocates for integrating green space components with urban green services, allowing planners and managers to optimize the combination of green space components to maximize expected services.

Studies dealt with the concept of multifunctional urban space as a solution to revive the neglected parts of the city or historical places are also not rare. Among them, Tomovska et al. (2022) emphasize the need to develop multifunctional public spaces that invigorate city life with joy and sustainability. They advocate for raising awareness among city inhabitants about resource conservation, by encouraging changes in behavior and consumption patterns. They highlight the importance of repurposing "brownfield" sites to enhance urban qualities, suggesting the revitalization of central city areas that have lost their original purpose by introducing new urban elements that foster social cohesion and nature. Moreover, Hatch (2016) explores the potential transformation of single-function infrastructural elements and the residual urban spaces they create into multifunctional community amenities. This concept aims to connect residents with ecological and recreational opportunities. Similarly, Souidi & Bestandji (2019) discuss the intricate relationship between time, space, and function in defining multifunctionality. They propose considering these three aspects, along with users and scale, to assess the concept of multifunctional use of urban space, particularly in the context of two ancient urban cores.

Interestingly, there are some papers that have reviewed studies that deal with the issue of “Ziyarte Al-Arba’een”. For example, Maher et al. (2023) observe a consistent annual increase in the number of "Ziyarte Al-Arba'een" visitors, emphasizing the growing demand for additional spaces to accommodate these visitors. They also note a shift in crowd density levels, moving from moderate to restricted movement, owing to the rising number of visitors and the inadequacy of existing areas. At the same time, Mahdi et al. (2021) argue that the components of urban spatial quality significantly influence the attractiveness of Arbaeen walking routes. They emphasize the need to enhance the spatial quality of these routes and to identify and prioritize them based on specific criteria and sub-criteria, aiming to better meet the environmental needs of visitors.

It is clear that the existing literature establishes that the concept of multifunctional space can address several urban challenges, notably land and public space scarcity in cities and the underutilization of spaces at certain times. These spaces range from private areas like universities and schools to public ones like parks and gardens. However, an analysis of these spaces based on specific parameters and components is essential to determine the optimal exploitation of these spaces under the multifunctional space concept. This article explores the potential of multifunctional public urban spaces in managing large crowds, particularly during the "Ziyarte Al-Arba'een" in Karbala's city center, which faces a shortage of public spaces and the need to provide various services to visitors (like food, rest, prayer, and other religious and social activities).

Indicators of the Multifunctional Urban Space

Urban spaces are subject to a set of indicators extracted from various literature sources, which will be comprehensively examined as follows:

1- Quality: The quality of space encompasses factors such as lighting, ventilation, sunlight, and temperature. Generally, a space suitable for a particular function is likely to be suitable for other functions due to their similar requirements. In some cases, incorporating new functions into a space may necessitate modifications (LI, 2000).
   - Appropriate Infrastructure: Adding new functions often requires basic infrastructure availability. The space must possess infrastructure that makes it

adaptable to hosting functions different from its original purpose. Priority should be given to spaces requiring minimal new infrastructure.

- Temperature and Sunlight: Temperature variations from one space to another can depend on geographical location, infrastructure, treatments, or guidance. Some added functions may not require specific temperature conditions, while others necessitate shaded areas.
- Freedom from Pollution and Noise: Introducing new functions into space requires a pollution-free and noise-free environment to ensure user suitability and avoid health risks.
- Availability of protection means: Especially for functions serving large numbers of users, protection from structural, environmental hazards, or other dangers is crucial when considering adding new functions.
- Adequate Lighting: Whether natural daylight during the day or artificial lighting at night, adequate illumination is essential when adding functions that require extended periods of use (Ghafouri, 2016).

2- Size: To accommodate a specific function, the space must possess the necessary dimensions. To host various functions, the space's size must be suitable for all intended activities.
    - Sufficient Area: Transforming a unitary urban space into a multifunctional one often involves calculating the area required for each function. Some spaces may accommodate multiple functions without requiring changes in the area, particularly noticeable in residential areas that encompass both social functions for the elderly and recreational activities for children. In other cases, changes in area may be necessary (LI, 2000).
    - Size and Adaptability: Many urban spaces initially designed for single functions due to land limitations and the need for other activities have evolved into multifunctional spaces. This adaptation maximizes space utilization (Ghafouri, 2016).

3- Location: The location of a space plays a critical role in determining its suitability as a multifunctional space. Spaces situated in city centers or areas characterized by high population density and limited space are often preferred.
    - Accessibility: Accessibility is a fundamental factor, and spaces directly accessible for additional functions are prioritized (Ghafouri, 2016) (Nassir &Othman,2020).
    - Connectivity: Some spaces can host multiple functions independently, while others require interconnected spaces to provide comprehensive services. A connected chain of spaces can integrate functions to benefit users (Lotfata, 2022).

4- Shape: The space's shape is another important consideration. It must align with the requirements of the intended functions. Some multifunctional spaces can accommodate various functions without altering their shape, particularly if the functions require similar configurations. However, other cases may necessitate shape modifications (LI, 2000).

5- Time: This indicator pertains to when the space can be used, specifically when it becomes unoccupied. Space must have periods when its primary activity pauses (for minutes, hours, days, or months), and suitable activities should be chosen accordingly (Ghafouri, 2016).

6- Responsible Management Authority: Urban spaces require primary and secondary bodies responsible for the management and coordination of various functions. The primary body is typically affiliated with the space itself, while voluntary civil associations often serve as the secondary body, facilitating communication between the primary body and the public benefiting from the functions (Lotfata, 2022).

7- Legal Ownership and Management Basis: Legal ownership and management underpin the sustainability of a space. A space should have a clear and responsible owner capable of negotiating ownership and management for multifunctional purposes (Ghafouri, 2016).

These indicators are tangible and measurable physical factors that align with the research topic and case study nature. It's important to note that there are other intangible indicators such as comfort, desirability, and safety, (Ferwati et al., 2021) which require input from users or service providers during visitation seasons and fall outside the scope of this research.

Research Methodology

This study utilizes a case study approach to investigate the urban space challenges during the "Ziyarte Al-Arba'een" in Karbala. The reserach was executed through three main phases:

- Field Study Collaboration: In collaboration with the Center for Studies of the Shrine, our team conducted extensive field research. This involved systematic observations and data collection about urban space usage, visitor movements, and service availability during the Arba'een pilgrimage in July 2023.
- Field Surveys and Observations: Researchers actively engaged in field surveys, meticulously documenting the urban layout, visitor behavior, and spatial challenges. These surveys were conducted strategically in various locations within Karbala to capture a comprehensive view of the urban dynamics during the event.
- Data Collection and Analysis: The data collected from field observations and surveys were analyzed to identify key patterns and challenges in urban space management. This analysis was instrumental in understanding the multifunctional needs of urban spaces and in developing recommendations for urban planning improvements.

The Case study: Karbala City

The city of Karbala is part of Karbala Governorate which is situated 105 kilometers to the southwest of Baghdad, the capital of Iraq. It covers an area of 52,856 square kilometers (SACHIT, 2022) located within the location coordinates (latitude: 32°36′57″ N Longitude: 44°01′29″ E Elevation above sea level: 32 m (Albasri et al. 2023). The population of Karbala Governorate is 1,003,516 residents, The population of Karbala city is 487827 residents in 2018 (Nassir &Othman,2019). It gained prominence following the martyrdom of Imam Hussein during the Battle of Karbala in the year 61 in the Hijri calendar, particularly in the Battle of Tuff (Farhan et al., 2018). As a result, the holy city of Karbala holds significant importance as one of the most vital Islamic pilgrimage destinations. It is distinguished by its historical and urban significance, with a unique urban core characterized by the presence of two prominent shrines that serve as the heart of the city center: the shrine of Imam Hussein (peace be upon him) and the shrine of Abbas (peace be upon him) (Muwafaq, 2017). The study area corresponds to the boundaries of the traditional city of Karbala, comprising eight neighborhoods, as depicted in Map 1.

The Ziyarte Al-Arba’een

It is necessary to recognize the importance of understanding place identity in the context of urban planning. It highlights how this understanding reflects the interaction between human values and spatial characteristics (Almansuri & Alkinani,2023). The observance of "Ziyarte Al-Arba’een" on the 20th of Safar in the Hijri calendar is a sacred ritual in Islam, affirmed by Islamic jurisprudence to honor its profound significance and lofty objectives. Pilgrims perceive the visit to Imam Hussein (peace be upon him) as holding a distinct symbolism and importance, as emphasized by Prophet Muhammad (peace be upon him) and the Ahl al-Bayt (peace be upon them). In a Hadith narrated by Prophet Muhammad (peace be

upon him), he stated: "Whoever visits the tomb of Al-Hussein bin Ali (peace be upon him) on the day of Al-Arba'een is truly seeking God's forgiveness for their sins" (Al-Kulayni, 2013).

As a result, millions of pilgrims from various parts of the world journey to the holy city of Karbala each year to express their love and unwavering loyalty to the master of martyrs, Imam Hussein, recognizing the profound human values he embodies (Mohsen & Jawad, 2019). The practice of walking to Imam Hussein's shrine during "Ziyarte Al-Arba'een" has ancient origins, but it witnessed a substantial increase after 2003, with a growing number of visitors each passing year (Karbala Center for Studies, 2022). Consequently, it stands as one of the largest pilgrimages, characterized by the substantial crowds converging in the city center of Karbala for consecutive days, spanning from the 10th to the 20th of Safar, with numbers escalating as the visitation date draws nearer (Alrawe & Muwafaq, 2018).

Visitors' Needs

During our field visits accompanying pilgrims along the route to the sacred Karbala center, we have identified the primary requirements and essential services that pilgrims require. These include services related to providing food and beverages, purification facilities, resting areas, accommodations, and medical assistance.

Additionally, there are various secondary services and other primary services that fall outside the scope of this research, such as transportation services and guiding lost pilgrims. The Arbaeen pilgrimage route is brimming with a multitude of services that cannot be comprehensively enumerated within the confines of a single study, as depicted in the Figure 1.

Urban Spaces in the Karbala Center

Through our field study, we have identified four types of spaces with the potential for multifunctionality: outdoor school spaces, vehicle parking areas, open spaces, and green areas, as depicted in Map 2. These spaces are dispersed throughout the historical district of the city, with many of them strategically situated near key visitor traffic intersections.

Despite their potential, many of these spaces remain underutilized during the "Ziyarte Al-Arba'een" period. This is often due to their private ownership or because they are government institutions that are typically closed to the public during this time, as is the case with schools.

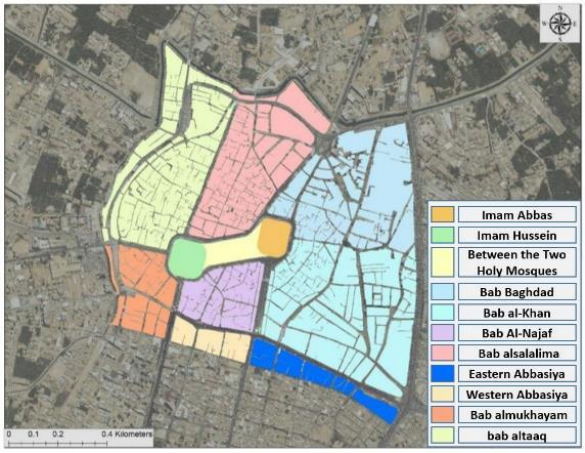
Pedestrian Axes in the Study Area

Within the sacred Karbala center, particularly during the "Ziyarte Al-Arba'een" period, pedestrian pathways are categorized into two primary types. The first type encompasses the main pedestrian routes, which typically coincide with the city's major thoroughfares. These main routes are characterized by a high volume of pedestrian traffic.

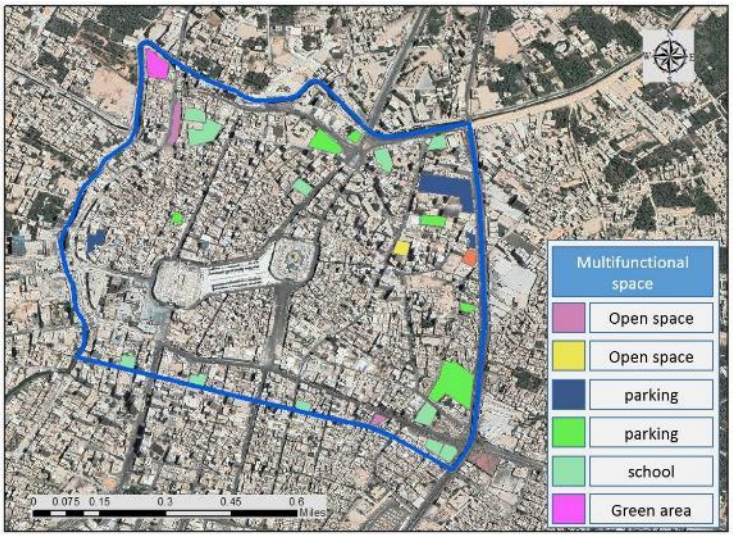
Conversely, the second type includes secondary pedestrian routes, which witness a lower density of pedestrians compared to the primary routes. These secondary pathways often consist of alleys and streets that interconnect with the primary routes, as depicted in Map 3.

In addition to serving as hubs of pedestrian movement, these pathways host a multitude of services catering to the needs of visitors. These services encompass provisions such as food, prayer facilities, healthcare services, and others. These services are typically offered through temporary structures situated along the sidewalks and even on the street itself, at times obstructing the flow of pedestrian traffic. This obstruction frequently results in congestion points that can lead to suffocation incidents and security concerns.

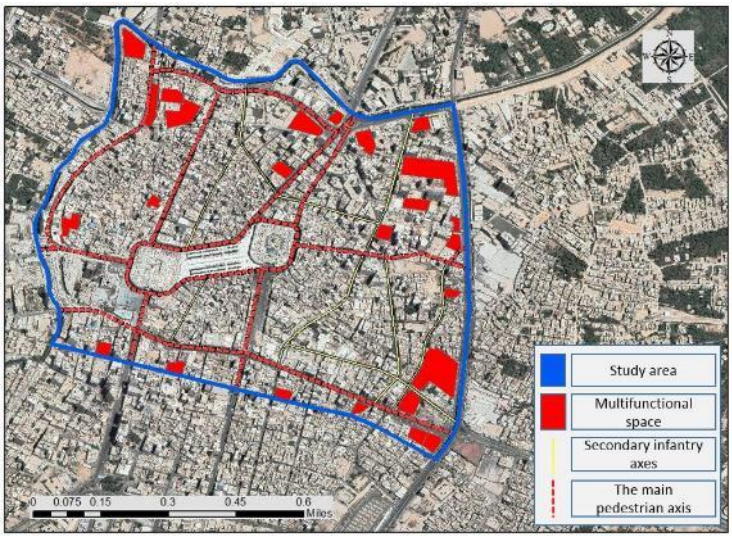
Fig. 1: The " Ziyarte Al-Arba'een "
Source: Pinterest



Map 1: The study area,
Source: Muwafaq,,2017



Map 2: The multifunctional spaces in the holy Karbala center
Source: Authors based on the 2021 aerial photograph and arc map GIS program



Map 3: pedestrian movement axes in the holy Karbala center
Source: Authors based on the 2021 aerial photograph and arc map GIS program

Urban Spaces: A Comparison

Following the identification of key spaces with the potential for multifunctionality in the preceding paragraph, this section aims to evaluate the degree to which these spaces align with the established indicators. Additionally, it assesses their proximity to pedestrian axes and determines their designated function and the overseeing authority responsible for their management.

Given the abundance of such spaces, many sharing similarities in terms of their original function and characteristics, a subset of these spaces has been selected for analysis. These selected spaces have an area exceeding 5000 square meters, except open spaces.

- **The first space:** It is the external spaces of Sidra School which is located at the coordinate point X (44°1'59.855"E), Y (32°371'17.113"N), Fig. 2.
- **The second space:** It is the space represented by the open green area which is located at the coordinate point X (44°1'54.704"E), Y (32°37'24.407"N), Fig. 3.
- **The third space:** It is the space represented by the vehicle parking (car garage) which is located at the coordinate point X (44°2'30.012"E), Y (32°36'46.888"N), Fig. 4.
- **The fourth space:** It is the space represented by the open urban space which is located at the coordinate point X (44°2'23.877"E), Y (32°37'2.721"N), Fig. 5.

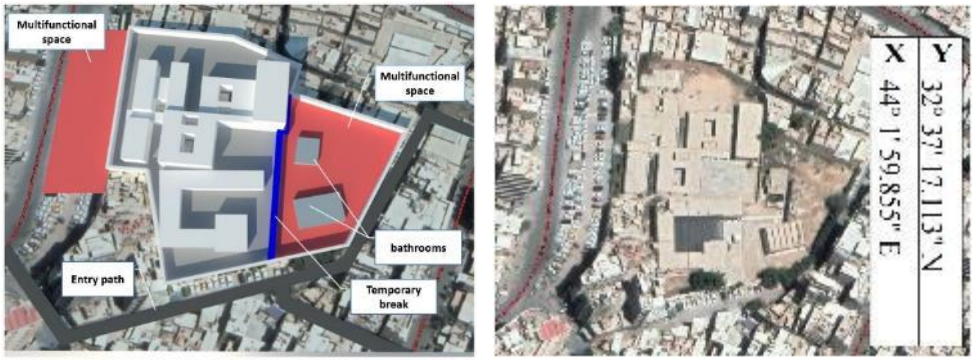


Fig.2: the external spaces of Sidra School
Source: Authors based on the 2021 aerial photograph and arc map GIS program

Fig.3: open green area
Source: Authors based on the 2021 aerial photograph and arc map GIS program

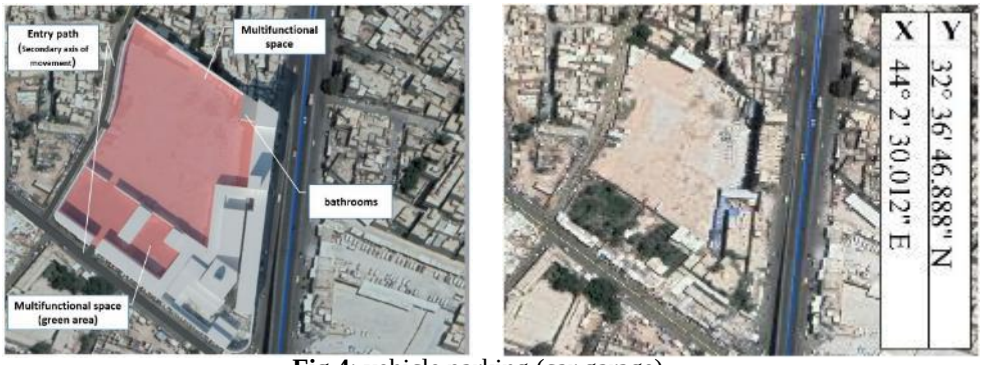


Fig.4: vehicle parking (car garage)
Source: authors based on the 2021 aerial photograph and arc map GIS program

Fig.5: open urban space
Source: Authors based on the 2021 aerial photograph and arc map GIS program

The Evaluation

After reviewing the four spaces. In this paragraph, we have applied the indicators extracted in the theoretical framework on the selected spaces by relying on field observation to know the characteristics of each of them, as shown in the Table 1.

Table 1: Application of the extracted indicators on the selected spaces
Source: Authors

major Indicators	Minor Indicators	Space (1)	Space (2)	Space (3)	Space (4)
Quality	Appropriate Infrastructure	Availability of sanitary facilities, water supply,	Not suitable due to lack of infrastructure	Availability of sanitary facilities, water supply,	Not suitable due to lack of infrastructure

		sewage, and electricity		sewage, and electricity	
	Temperature and sunlight	The space is open and not shaded	The space is almost completely shaded by trees	The greater part of the space is open and the other part is shaded by trees	The space is open and not shaded
	Freedom from pollution and noise sources	Free from pollution and noise sources	Free from pollution and noise sources	Free from pollution and noise sources	Free from pollution and noise sources
	Availability of protection means	Fairly available	Unavailable	Unavailable	Unavailable
	Adequate lighting	Lighting available (natural and artificial)	Lighting available (natural and artificial)	Lighting available (natural and artificial)	Lighting available (natural and artificial)
Size	Sufficient area	Fairly appropriate	Appropriate	Large and appropriate	Appropriate
	Size and ability to accommodate other activities	Fairly appropriate	Appropriate	Good size and holding capacity	Appropriate
Location	Accessibility	Appropriate due to direct accessibility	Appropriate due to direct accessibility	Appropriate due to direct accessibility	Appropriate due to direct accessibility
	Communication	Appropriate due to location near main pedestrian axes	Appropriate due to location near main pedestrian axes	Far from main pedestrian axes	Far from main pedestrian axes
Shape		Fairly appropriate	Appropriate	Appropriate for accommodating different functions	Appropriate
Time		Summer vacation period	Available at all times	Arbaeen visitation time is closed	Available at all times
Responsible Management Authority		Team of the Education Directorate with service organizations	Team from the Karbala Municipality Directorate with service organizations	Team of parking owners with service organizations	Team of space owners with service organizations
Legal Ownership and Management Basis		Public property, it is possible to use it in coordination with the Directorate of Education	Public property, it is possible to use it in coordination with the Municipality Directorate	Private property, it is possible to use it by renting it from the owners	Private property, it is possible to use it by renting it from the owners

To analyze the descriptive data in the Table 1, it was converted into numerical data through scoring, where (2) points were given for the indicator that was achieved, (0) points for the indicator that was not achieved, and (1) point for the indicator that was achieved to some extent, in the Table 2.

Table 2: Scoring indicators for the selected spaces
Source: Authors

Major Indicators	Minor Indicators	Space (1)	Space (2)	Space (3)	Space (4)
Quality	Appropriate Infrastructure	2	0	2	0
	Temperature and sunlight	1	2	2	1
	Freedom from pollution and noise sources	2	2	2	2
	Availability of protection means	1	0	0	0
	Adequate lighting	2	2	2	2
Size	Sufficient area	1	2	2	2
	Size and ability to accommodate other activities	1	2	2	2
Location	Accessibility	2	2	2	2
	Communication	2	2	0	1
Shape		1	2	2	2
Time		1	2	1	2
Responsible Management Authority		2	2	2	2
Legal Ownership and Management Basis		2	2	1	1

By representing the data in the Table 2 with graphs in the Fig. 6, it is noticed that in (6a) regarding the quality indicator, the two sub-indicators (Freedom from pollution and noise sources) and (adequate lighting) are achieved in the four spaces with the same points. Therefore, they are neutral and not decisive indicators in the process of selecting appropriate functions for the space. From (6b) regarding the size indicator, we notice that two sub-indicators (Sufficient area) and (Size and ability to accommodate other activities) are equal in four spaces and achieved in three of them. in (6c), which concerns the location indicator, we notice that the sub-indicator (Accessibility) is an indicator that is achieved and equal in four spaces, therefore it is a neutral indicator, while the other sub-indicator (connectivity) varies in level of achievement in four spaces, thus showing the importance of proximity to the axis of movement. Through (6d) regarding the indicators (Figure - Management - Time - Ownership), we notice that the management indicator is also neutral.

Therefore, it is concluded that there are neutral indicators, while there are decisive indicators in the process of choosing the appropriate function for the space, and from figures (6a -6b -6c -6d), it is noticed that space (2) is the space that achieves the most basic indicators and therefore it is the closest to being a multi-functional space than the other spaces.

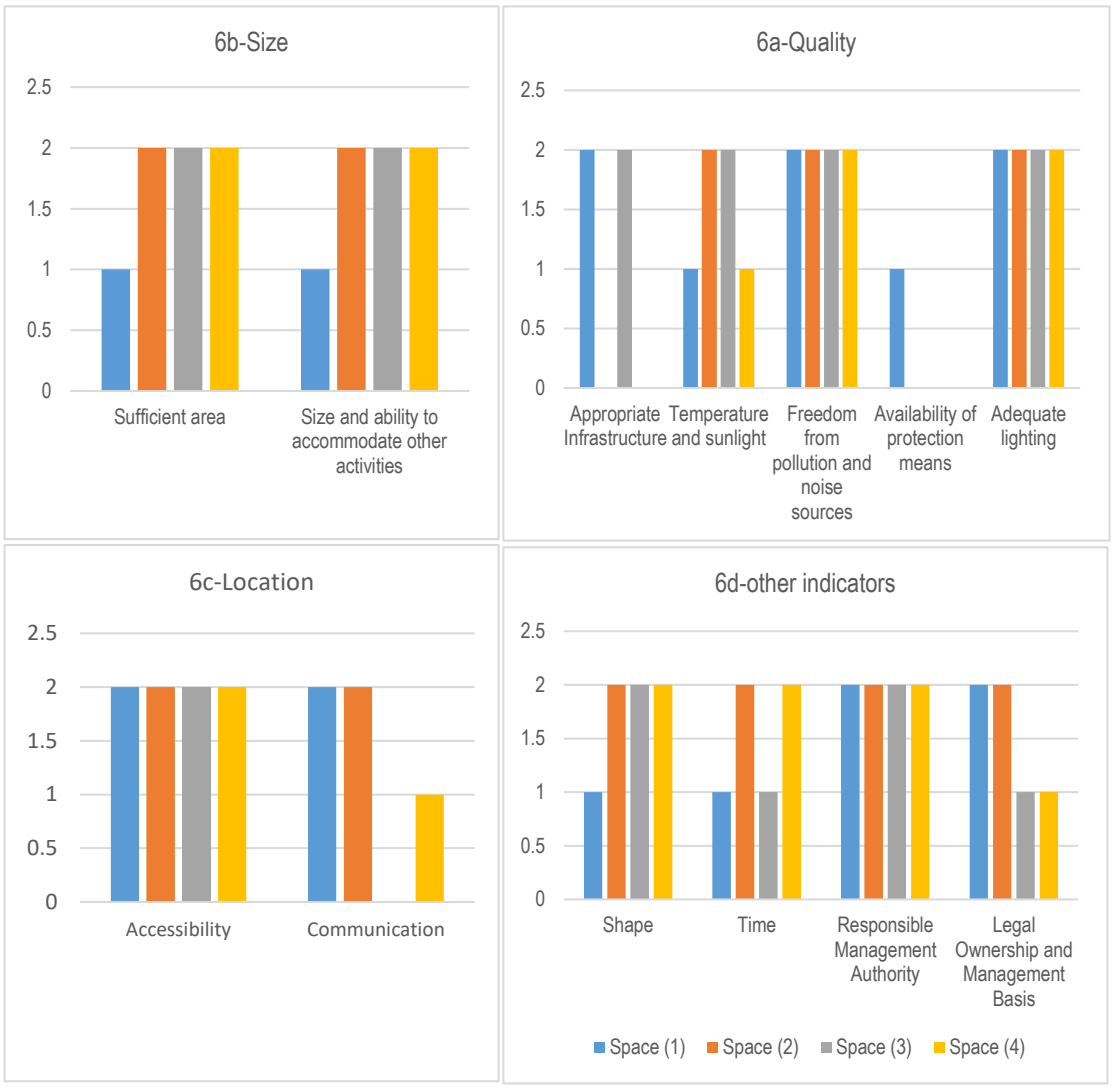


Fig.6: Scoring indicators for the selected spaces
Source: authors

Discussion and Conclusion

In this section of the article, we determine the most appropriate functions for each space based on the analysis presented in the previous results. It's important to note that some functions are interconnected. For example, the function of performing visitation rituals is closely related to purification services, and serving food and beverages is linked to comfort services, which, in turn, are associated with medical services. Therefore, these functions can overlap within the same space, divided over different periods, depending on the measured indicators and the proximity of these spaces to religious event sites, as explained below:

- Space (1): This space offers infrastructure services and is easily accessible. During the "Ziyarte Al-Arba'een" period, it remains vacant, but it lacks adequate shading, making it unsuitable for comfort. Hence, it's appropriate for purification services. If shading is added, it could accommodate visitation rituals and resting. This space can serve these functions at different times, offering purification services throughout the day, making it suitable for prayer and visitation rituals during prayer times, and providing a rest area during other times.
- Space (2): This space is mostly shaded, free from pollution and noise, easily accessible, and always available. Therefore, it's suitable for resting, providing food and beverages,

and offering medical services. However, it lacks the necessary infrastructure for purification services, visitation rituals, and prayer. With temporary infrastructure, it could become suitable for these functions.

- Space (3): This space has infrastructure, partial shading, a large area, and easy accessibility. It's ideal for purification services, and the shaded area can also serve as a resting place, hosting visitation rituals and providing food and beverages at different times. The unshaded part could be temporarily shaded or utilized at night, especially when many visitors gather for specific visitation rituals.
- Space (4): This space lacks shading and infrastructure but is easily accessible. It's always unsuitable for purification services but could be suitable for resting and visitation rituals with temporary shading, particularly during the night.

These indicators provide a logical means of evaluating spaces for multifunctionality, but future development should consider additional variables related to visitor behavior and their evolving requirements. The success of applying the concept of multifunctional urban spaces relies on collaboration among urban planners, religious authorities, and the local community, along with continuous communication and feedback from visitors to refine and adapt the spaces to their changing needs.

Recommendations

Based on the research conducted, the following recommendations are proposed to address the challenges posed by the "Ziyarte Al-Arba'een" event in Karbala's city center and to maximize the potential of multifunctional urban spaces:

1. Enhance Infrastructure: It is crucial to improve the existing infrastructure within the traffic routes leading to Karbala's city center. This includes expanding roads, improving transportation systems, and implementing traffic management strategies to alleviate congestion and facilitate the movement of visitors.
2. Identify and Designate Multifunctional Spaces: Conduct a comprehensive assessment of the holy Karbala center to identify underutilized spaces that can be adapted for multifunctional purposes during the Al-Arba'een period. These spaces should be strategically selected based on their size, location, accessibility, and proximity to key pilgrimage sites.
3. Provision of Essential Services: Develop a plan to provide necessary services and amenities to visitors during the event. This includes ensuring an adequate supply of food and beverages, sanitation facilities, resting areas, sleeping accommodations, and medical services within the identified multifunctional spaces.
4. Crowd Management Strategies: Implement effective crowd management strategies to ensure the smooth flow of visitors and maintain safety and security. This can involve the deployment of trained personnel, the use of technology for monitoring and controlling crowds, and the establishment of designated entry and exit points.
5. Stakeholder Collaboration: Foster collaboration between relevant stakeholders, including government authorities, urban planners, local communities, and religious organizations, to collectively address the challenges and optimize the utilization of multifunctional urban spaces. This collaboration should involve regular communication, coordination, and joint decision-making processes.
6. Continuous Evaluation and Adaptation: Regularly evaluate the effectiveness of the implemented strategies and make necessary adjustments based on visitor feedback, changing requirements, and emerging trends. This iterative process will ensure the continuous improvement and optimization of the multifunctional urban spaces.
7. Consider Visitor Behavior and Evolving Needs: Future research should focus on understanding visitor behavior, preferences, and evolving needs during the "Ziyarte Al-Arba'een" event. This will help in refining the evaluation indicators and designing multifunctional spaces that cater to the specific requirements of the visitors.

8. Documentation and Knowledge Sharing: Document the experiences, lessons learned, and best practices from the implementation of multifunctional urban spaces during the event. This knowledge should be shared with other cities and communities facing similar challenges to facilitate learning and replication of successful strategies.

These recommendations aim to create a holistic approach to address the logistical challenges posed by the "Ziyarte Al-Arba'een" event in Karbala's city center and enhance the experience of the visitors. By implementing these recommendations, Karbala can establish itself as a model for effective crowd management and the utilization of multifunctional urban spaces during large-scale religious gatherings.

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