



Quality of Life Indicators in Historic Urban Spaces: A Case Study of Al-Mustansiriya Madrasa, Baghdad / Iraq / Original article

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**تقييم مؤشرات جودة الحياة في الفضاءات الحضرية التاريخية:
دراسة حالة المدرسة المستنصرية في بغداد \ العراق**

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Abstract

Historic urban spaces play a central role in shaping social interaction, environmental comfort, and collective identity in cities with deep cultural heritage. Despite this importance, empirical assessments of their performance in terms of Quality of Life (QoL) from the perspective of contemporary users remain limited, particularly in the context of Baghdad. This study examines Quality of Life indicators within a historic urban space through a case study of **Al-Mustansiriya Madrasa**, one of Baghdad's most prominent historic educational complexes. A descriptive–analytical approach was adopted, integrating a structured questionnaire survey, systematic on-site observation, and spatial analysis based on **Space Syntax** techniques. The evaluation framework addressed six QoL domains: accessibility and orientation, environmental comfort, safety and security perception, uses and activities, sociability, and sense of place. The results indicate that the Madrasa continues to function effectively as an urban space, achieving **moderate to high levels of perceived quality of life**. Sociability and place attachment recorded the highest mean values, reflecting strong social interaction and emotional connection, while correlation analysis revealed that **accessibility, spatial legibility, and environmental comfort** were most strongly associated with overall QoL perception. Spatial analysis further identified the central courtyard as the most integrated, connected, and visually accessible element, providing a spatial explanation for observed patterns of use and user perception. The study demonstrates that historic urban spaces can sustain positive quality-of-life performance when their internal spatial structure remains coherent and adaptable, even under contemporary social and temporal conditions. These findings support the integration of **Quality-of-Life indicators** into conservation and management strategies for historic urban environments.

Keywords: Quality of Life; Historic Urban Spaces; Place Attachment; Space Syntax; Urban Heritage; User Perception; Baghdad

المستخلص

تؤدي الفضاءات الحضرية التاريخية دورًا محوريًا في تشكيل أنماط التفاعل الاجتماعي، وتحقيق الراحة البيئية، وتعزيز الهوية الجماعية في المدن ذات الإرث الثقافي العميق. وعلى الرغم من هذه الأهمية، ما تزال التقييمات التجريبية التي تبحث في أداء هذه الفضاءات من حيث **جودة الحياة (QoL)** من منظور المستخدمين المعاصرين محدودة، ولا سيما في سياق مدينة بغداد. تتناول هذه الدراسة مؤشرات جودة الحياة في فضاء حضري تاريخي من خلال دراسة حالة **المدرسة المستنصرية**، بوصفها أحد أبرز المجمعات التعليمية التاريخية في بغداد. وقد تم اعتماد منهج وصفي-تحليلي، جمعت بياناته من خلال استبانة منظمة، وملاحظة ميدانية منهجية في الموقع، إضافة إلى تحليل مكاني باستخدام تقنيات **تركيب الفضاء (Space Syntax)**. واستند إطار التقييم إلى ستة مجالات لجودة الحياة، شملت: سهولة الوصول والتوجّه، والراحة البيئية، وإدراك السلامة والأمان، وأنماط الاستخدام والأنشطة، والتفاعل الاجتماعي، والإحساس بالمكان. تشير النتائج إلى أن المدرسة المستنصرية ما تزال تؤدي وظيفتها بفاعلية كفضاء حضري، محققة مستويات متوسطة إلى مرتفعة من جودة الحياة المُدرَكة. وقد سجّل كل من **التفاعل الاجتماعي والارتباط بالمكان** أعلى القيم المتوسطة، بما يعكس قوة التفاعل الاجتماعي والارتباط العاطفي لدى المستخدمين. كما أظهر تحليل الارتباط أن سهولة الوصول، ووضوح التنظيم المكاني، والراحة البيئية كانت الأكثر ارتباطًا بإدراك جودة الحياة الكلية. وأكد التحليل المكاني بدوره الدور المحوري للفناء المركزي بوصفه العنصر الأكثر تكاملاً واتصالاً ووضوحاً بصرياً، مقدّمًا تفسيراً مكانياً لأنماط الاستخدام المُلاحظة وإدراكات المستخدمين. تُبيّن الدراسة أن الفضاءات الحضرية التاريخية قادرة على الحفاظ على أداء إيجابي من حيث جودة الحياة عندما تبقى بنيتها المكانية الداخلية متماسكة وقابلة للتكيف، حتى في ظل الظروف الاجتماعية والزمنية المعاصرة. وتدعم هذه النتائج أهمية دمج مؤشرات جودة الحياة ضمن استراتيجيات الحفاظ والإدارة الخاصة بالفضاءات الحضرية التاريخية.

الكلمات المفتاحية: جودة الحياة؛ الفضاءات الحضرية التاريخية؛ الارتباط بالمكان؛

التركيب الفضائي؛ التراث الحضري؛ إدراك المستخدم؛ بغداد



1. Introduction

Historic urban spaces constitute an essential layer of cultural identity and collective memory in cities with long and complex histories, such as Baghdad. These spaces were historically conceived not merely as architectural monuments, but as integrated urban environments that supported social interaction, education, and everyday activities. Over time, however, processes of urban transformation and changing patterns of use have influenced the way historic spaces function within the contemporary city [1;2]. In parallel with these changes, the concept of Quality of Life (QoL) has gained prominence as a multidimensional framework for evaluating urban environments. Beyond physical and functional conditions, QoL assessment incorporates users' perceptions of comfort, safety, accessibility, and social well-being. While this framework has been extensively applied to contemporary urban settings, its systematic application to historic urban environments remains relatively limited, particularly within developing and historically layered cities [3;4].

than static heritage artifacts. Despite this continued relevance, empirical assessments that examine how such spaces perform from a quality-of-life perspective remain scarce, with existing studies often prioritizing physical conservation over user experience and lived perception [5;6]. Al-Mustansiriya Madrasa represents one of the city's most significant historic educational complexes, valued for both its architectural character and cultural symbolism. Nevertheless, limited research has investigated how its spatial configuration and environmental qualities shape users' experiences and perceived quality of life. This study addresses this gap by evaluating Quality of Life indicators within a historic urban space through a focused case study of Al-Mustansiriya Madrasa. By integrating user perception, spatial analysis, and on-site observation, the research seeks to contribute to academic understanding of historic urban environments while offering insights relevant to conservation and management practices that support both heritage value and contemporary urban life.



2. Literature Review

2.1 Quality of Life in Urban Spaces and the Built Environment

Quality of Life (QoL) in urban contexts is commonly understood as a multidimensional construct that integrates physical, environmental, social, and psychological dimensions. Contemporary urban research increasingly recognizes that urban quality is shaped not only by measurable spatial and environmental conditions, but also by users' subjective perceptions, satisfaction, and sense of well-being.^{4;3}]. Accordingly, QoL assessment frameworks often combine objective indicators—such as accessibility, comfort, and safety—with perceptual measures that capture lived experience. Previous studies highlight the influence of spatial configuration, environmental comfort, and opportunities for social interaction on quality-of-life outcomes. In hot-climate cities, thermal comfort, shading, ventilation, and visual conditions play a particularly important role in outdoor and semi-outdoor spaces. [7]. Furthermore, social interaction and a clear sense of place are consistently identified as essential components of positive urban experience, reinforcing the need for evaluation approaches that extend beyond purely physical metrics. [8].

2.2 Quality of Life in Historic Urban Environments

Historic urban spaces introduce additional dimensions into quality-of-life assessment due to their cultural significance, symbolic meaning, and physical constraints. Unlike contemporary developments, these spaces were shaped by historical social, climatic, and cultural conditions, yet many continue to function as active components of modern urban life. Research increasingly argues that preserving historic character should not be limited to physical conservation alone, but should also ensure that historic spaces remain functional, comfortable, and meaningful for contemporary users^{10;9}]. Several studies indicate that historic



environments can contribute positively to quality of life by fostering identity, continuity, and place attachment at the same time, inadequate maintenance, incompatible interventions, or mismatched uses may undermine their environmental performance and usability [11]. Consequently, evaluating QoL in historic contexts requires indicators that balance heritage value with contemporary user needs, integrating functional, environmental, social, and emotional dimensions.

2.3 Indicators and Research Gap in Historic Contexts

Despite growing international interest in Quality of Life and urban heritage, empirical studies that examine user-based quality-of-life performance in historic urban spaces remain limited, particularly in cities such as Baghdad. Existing research in the local context often focuses on architectural documentation or conservation policies, with relatively little attention given to users' perceptions, social experience, and everyday use of historic sites. Recent literature advocates for indicator-based and case-study-oriented approaches when assessing QoL in historic environments, as site-specific characteristics strongly influence outcomes .[13;12] By integrating user surveys with on-site observation and spatial analysis, such approaches allow researchers to capture the complex relationship between spatial configuration, environmental performance, and lived experience. In this context, the present study positions Al-Mustansiriya Madrasa as an appropriate case study to operationalize Quality of Life indicators within an actively used historic urban space, addressing a clear gap in the existing body of knowledge.[15;14]

3. Methodology

A descriptive–analytical case-study approach was adopted to evaluate Quality of Life (QoL) within Al-Mustansiriya Madrasa, an approach commonly used to



examine complex spatial and social phenomena within their real-life context [17;16]]. The methodology integrates user-based perception data, systematic field observation, participant observation, and spatial analysis in order to capture both subjective and spatial dimensions of performance within a historic urban environment.

3.1 Questionnaire Survey

A structured questionnaire was designed to assess users' perceptions of Quality of Life using a five-point Likert scale (1 = strongly disagree, 5 = strongly agree), a widely accepted method for measuring attitudes and perceptions in environmental and urban studies [4;18]. The instrument addressed six QoL domains: accessibility and orientation, environmental comfort, safety and security perception, uses and activities, sociability, and sense of place, in addition to an overall quality-of-life evaluation. Data were collected on-site using intercept sampling, targeting users who had spent sufficient time within the Madrasa to form informed spatial perceptions. A total of 40 valid responses were obtained, primarily from participants with architectural and built-environment backgrounds. Given the exploratory nature of the study and the focus on spatial evaluation, this sample was considered appropriate for identifying perceptual trends and supporting qualitative interpretation.

3.2 Systematic On-Site Observation

Systematic field observation was conducted using a predefined observation checklist focusing on spatial characteristics, environmental conditions, user behavior, and management-related aspects. Observation as a qualitative research method allows direct documentation of spatial performance and social activity patterns in real settings, supporting the interpretation of perceptual data [19;20].



3.3 Participant Observation under Evening Conditions

Participant observation was conducted during an evening cultural and professional event held at Al-Mustansiriya Madrasa. This method enables the researcher to experience spatial conditions and social interactions directly, offering insights that may not be fully captured through surveys alone [20]. At the time of observation, surrounding commercial activity was limited, allowing assessment of spatial performance under reduced external urban stimulation. Observations focused on circulation efficiency, environmental comfort, sociability, and perceived safety during periods of active social use. This approach enabled the evaluation of quality-of-life indicators under a temporally sensitive and demanding use scenario that may not be fully captured through daytime observation alone.

3.4 Spatial Analysis (Space Syntax)

Spatial analysis was carried out using Space Syntax techniques implemented in DepthmapX (v0.8). Space Syntax has been widely applied to examine spatial accessibility, visual connectivity, and movement potential through configurational analysis [14;15]. Connectivity, visibility, choice, and integration analyses were conducted to examine spatial accessibility, visual connectivity, and hierarchical structure within the Madrasa. The spatial analysis served as a supportive analytical tool, complementing perceptual and observational findings by providing a configurational explanation for observed patterns of use and user experience. The spatial analysis was conducted based on the documented ground plan of Al-Mustansiriya Madrasa (Figure 1).

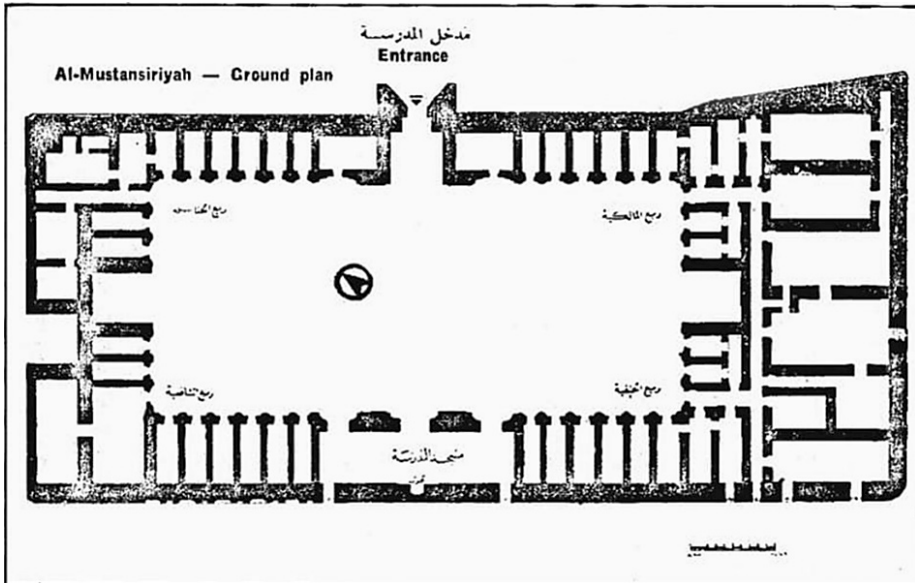


Figure 1. Ground plan of Al-Mustansiriya Madrasa used as the base model for Space Syntax analysis. Source: [21].

4. Results and Analysis

4.1 Sample Characteristics

The study sample consisted of 40 valid respondents who completed the questionnaire on-site at Al-Mustansiriya Madrasa. The participants represented a diverse group of users, with a predominance of architects and professionals related to the built environment, alongside students and visitors. This profile provided informed spatial feedback suitable for the exploratory and spatially focused nature of the study. Most respondents reported spending more than 15 minutes within the Madrasa during their visit, indicating sufficient exposure to the spatial, environmental, and social conditions required for meaningful perceptual evaluation. The diversity of user types and duration of stay supports the reliability of the collected responses in reflecting actual user experience within the historic space.

4.2 Reliability Analysis

To examine the internal consistency of the questionnaire, **Cronbach's Alpha** coefficients were calculated for each Quality of Life (QoL) domain. The results indicate **acceptable to excellent reliability** across most domains, supporting the suitability of the instrument for exploratory assessment in a historic urban context (Table 1).

Table 1: Descriptive and reliability statistics of Quality-of-Life indicators based on questionnaire survey.

QoL Domain	No. of Items	Mean	Cronbach's Alpha	Correlation (r)
Accessibility & Orientation	4	3.71	0.52	0.58
Comfort & Environmental Perception	5	3.72	0.77	0.53
Safety & Security	4	3.38	0.74	0.27
Uses & Activities	4	3.57	0.86	0.24
Sociability	4	4.15	0.74	0.21
Place Attachment	8	3.93	0.91	0.15
Overall QoL	3	4.18		

Higher reliability values were recorded for **Uses and Activities** ($\alpha = 0.86$) and **Place Attachment** ($\alpha = 0.91$), indicating strong internal consistency among items measuring these constructs. **Comfort and Environmental Perception** ($\alpha = 0.77$), **Safety and Security** ($\alpha = 0.74$), and **Sociability** ($\alpha = 0.74$) also demonstrated satisfactory reliability levels commonly accepted in perception-based urban studies. The **Accessibility and Orientation** domain recorded a lower alpha value ($\alpha = 0.52$), reflecting greater variability in user responses. Given the exploratory nature of the study and the complexity of spatial legibility in historic environments, this variability is considered acceptable and indicative of diverse user interpretations rather than measurement weakness. Overall, the reliability analysis confirms that the questionnaire provides a consistent basis for analyzing user perceptions of Quality of Life within Al-Mustansiriya Madrasa and supports subsequent descriptive and correlational analyses.



4.3 Descriptive Analysis of Quality of Life Indicators

4.3.1 Accessibility and Orientation

The results indicate that users generally perceived a **high level of spatial legibility and ease of movement** within Al-Mustansiriya Madrasa. Respondents reported that circulation paths were clear and that spatial organization supported intuitive orientation despite the historic complexity of the layout. The mean score for this domain ($M = 3.71$) reflects a **moderate to high level of satisfaction**, suggesting that the spatial structure remains accessible to contemporary users. Qualitative observation supported these findings by revealing well-defined movement paths leading toward the central courtyard, which functions as a primary orienting element within the spatial system. The hierarchical arrangement of entrances, corridors, and open spaces contributed to users' ability to navigate the Madrasa with minimal confusion. Variability in responses may be attributed to differences in users' familiarity with the site and individual expectations regarding accessibility in historic environments. Overall, the findings suggest that the historic spatial configuration of the Madrasa continues to provide effective accessibility and orientation, balancing its heritage character with functional clarity for present-day use.

4.3.2 Comfort and Environmental Perception

The analysis of environmental comfort indicates **moderate to high levels of user satisfaction** within Al-Mustansiriya Madrasa. The mean score for this domain ($M = 3.72$) suggests that users generally perceived the space as climatically responsive and visually comfortable, despite its historic character and open configuration. Field observations revealed that **shading provided by arcades**, along with the spatial openness of the central courtyard, contributed positively to thermal comfort and air movement. Users frequently occupied shaded transitional spaces, particularly during periods of social



interaction and circulation, indicating adaptive use of the environment in response to climatic conditions. Visual comfort was also supported by the proportional scale of spaces and controlled exposure to direct sunlight. Variations in comfort perception were observed among respondents, reflecting sensitivity to **temporal and seasonal conditions**, which is typical in outdoor and semi-outdoor historic spaces. These findings suggest that environmental comfort in the Madrasa is influenced not only by physical form but also by time-dependent factors, reinforcing the importance of considering temporal dynamics when evaluating Quality of Life in historic urban environments.

4.3.3 Safety and Security Perception

Perceptions of safety and security within Al-Mustansiriya Madrasa recorded a moderate level of satisfaction compared to other Quality of Life domains, with a mean score of $M = 3.38$. While this value is lower than those recorded for sociability and place attachment, it remains within a moderate level of satisfaction, which is considered acceptable within the context of open historic urban spaces. User responses indicate that the enclosed spatial configuration, combined with the visual openness of the central courtyard, contributed positively to perceived safety. The presence of other users and continuous visual connections across the space supported a sense of passive surveillance and reduced feelings of isolation. Field observations further confirmed that areas with clear sightlines and active use were perceived as more comfortable and secure. Variability in safety perception appears to be influenced by temporal conditions, particularly during evening use when surrounding commercial activities were limited. Despite reduced external urban activity, the internal spatial clarity and social presence within the Madrasa helped maintain a reasonable level of perceived safety. This suggests that safety perception in historic urban spaces is shaped by the interaction between spatial configuration, user presence, and time-based urban dynamics rather than by spatial form alone.



4.3.4 Uses and Activities

The analysis of **Uses and Activities** indicates that Al-Mustansiriya Madrasa effectively supports a range of everyday and cultural activities. This domain achieved a **moderate to high mean score** ($M = 3.57$), reflecting general user satisfaction with the space's ability to accommodate multiple forms of use without functional conflict. Survey responses and field observations revealed that the Madrasa supports activities such as walking, resting, informal social interaction, and cultural visitation. The spatial layout allows for the coexistence of movement-oriented and stationary activities, particularly around the courtyard and along the surrounding arcades. This functional flexibility contributes positively to the overall quality-of-life experience.

Lower scores within this domain were primarily associated with the **limited availability of seating and auxiliary services**, rather than with spatial constraints or incompatibility of use. These findings suggest that minor functional enhancements, rather than spatial reconfiguration, could further improve the performance of the space while preserving its historic character. Ground-level observation further illustrates organized seating arrangements and sustained social presence during evening use (Figure 2).



Figure 2. Ground-level view showing organized seating and social interaction during evening use of the courtyard. Source: Author's field documentation.

4.3.5 Sociability and Social Interaction

Sociability emerged as one of the strongest Quality of Life dimensions within Al-Mustansiriya Madrasa, recording a **high mean score** ($M = 4.15$). This result indicates that users strongly perceive the space as socially supportive and conducive to interaction, reinforcing its role as an active urban environment rather than a passive historic setting. Survey responses suggest that the Madrasa is perceived as welcoming to diverse user groups and capable of accommodating social presence without generating disturbance or conflict. The spatial organization, particularly the central courtyard and surrounding transitional spaces, facilitates visual connection and co-presence, which are essential conditions for informal social interaction. Field observations further confirmed the use of these spaces for group gatherings, conversation, and shared activities (Figure 3). The high sociability score reflects the continued effectiveness of historic courtyard-based typologies in supporting social life within dense urban contexts. This finding highlights the resilience of traditional spatial forms in sustaining social interaction over time and contributes to understanding how historic urban spaces can remain socially relevant under contemporary patterns of use.

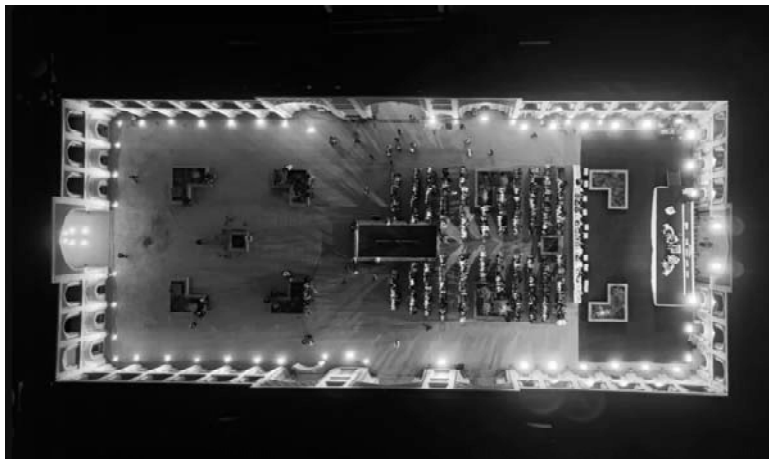


Figure 3. Aerial nighttime view of the courtyard during an evening cultural event, illustrating patterns of social interaction and spatial occupation. Source: [22]



4.3.6 Sense of Place and Place Attachment

The analysis of **Sense of Place and Place Attachment** revealed **high levels of emotional and symbolic connection** between users and Al-Mustansiriya Madrasa. This domain recorded one of the highest mean scores among all Quality of Life indicators ($M = 3.93$), indicating that users strongly associate the space with cultural identity and collective memory. Survey responses suggest that **place identity** contributed more significantly to overall attachment than functional dependence. Users expressed a strong sense of belonging to the Madrasa and perceived it as an integral part of Baghdad's historic and cultural landscape. This emotional connection appears to be reinforced by the architectural character of the space and its continued role as a venue for social and cultural activities. Field observations further supported these findings, as users were frequently observed engaging in reflective and social behaviors within the courtyard, suggesting a deep-rooted sense of familiarity and attachment. The strong performance of this domain highlights the importance of symbolic meaning and cultural continuity in shaping quality-of-life perception within historic urban environments.

4.4 Overall Quality of Life Evaluation

The overall Quality of Life evaluation indicates a **high level of user satisfaction** within Al-Mustansiriya Madrasa. The mean score for overall QoL ($M = 4.18$) reflects a strong positive perception of the space as a comfortable, socially supportive, and meaningful urban environment.

Most respondents agreed that the Madrasa provides a positive quality-of-life experience and expressed willingness to revisit the space in the future. This overall assessment appears to be influenced primarily by the strong performance of **sociability** and **place attachment**, supported by coherent spatial organization and



environmental comfort. The high overall QoL score confirms that the Madrasa functions effectively as an active historic urban space, capable of accommodating contemporary use while maintaining its cultural and symbolic value. This finding reinforces the suitability of using integrated perceptual and spatial evaluation approaches when assessing quality of life in historic environments.

4.5 Correlation Analysis

Correlation analysis was conducted to examine the relationships between individual Quality of Life domains and overall QoL perception. The results indicate **varying degrees of positive association**, reflecting the multidimensional nature of quality-of-life evaluation. The strongest correlations with **Overall Quality of Life** were observed for **Accessibility and Orientation** ($r = 0.58$) and **Comfort and Environmental Perception** ($r = 0.53$). These findings suggest that spatial legibility, ease of movement, and environmental comfort play a significant role in shaping users' overall quality-of-life perception within the Madrasa. Other domains, including **Safety and Security** ($r = 0.27$), **Uses and Activities** ($r = 0.24$), **Sociability** ($r = 0.21$), and Place Attachment ($r = 0.15$), demonstrated positive but weaker correlations with overall QoL. This indicates that while these dimensions contribute to user experience, their influence on overall quality-of-life perception is more supportive than determinant in statistical terms. Overall, the correlation results highlight that perceived quality of life in Al-Mustansiriya Madrasa emerges from the interaction between functional spatial qualities and experiential factors, rather than from a single dominant variable. These findings support the use of integrated evaluation frameworks when assessing Quality of Life in historic urban environments.

5. Spatial Analysis Results (Space Syntax)

Spatial analysis was conducted using Space Syntax techniques to examine the configurational properties of Al-Mustansiriya Madrasa and to support the interpretation of user perception and observed behavior. The analysis focused on **connectivity, integration, choice, and visibility**, providing a quantitative assessment of spatial accessibility, movement potential, and visual structure.

5.1 Connectivity Analysis

Connectivity analysis revealed that the **central courtyard** exhibits the highest number of direct spatial connections within the Madrasa (Figure 4). This indicates that the courtyard functions as a primary node linking surrounding spaces, including corridors, arcades, and adjacent functional areas. Spaces with higher connectivity values are more likely to support frequent movement and spatial interaction, while peripheral areas demonstrate lower connectivity levels consistent with their transitional or enclosed character.

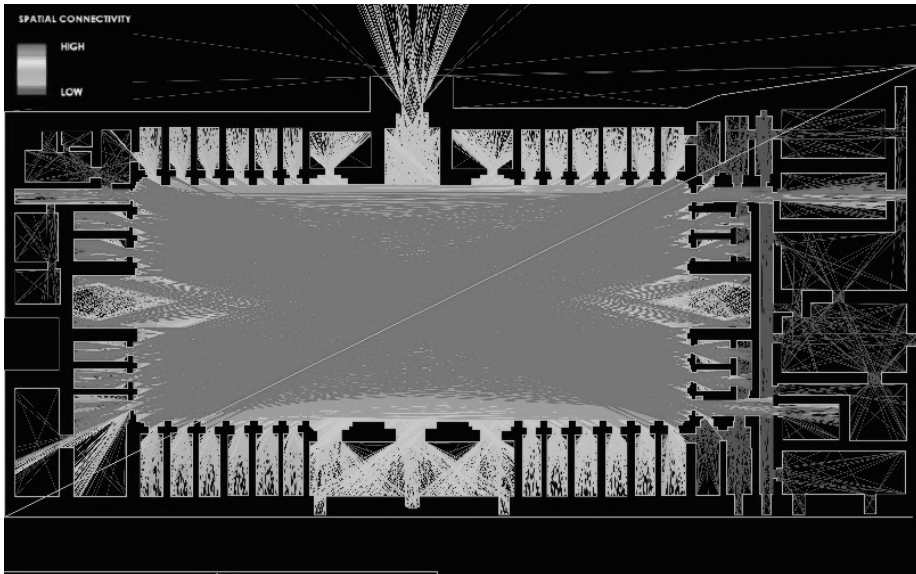


Figure 4. Connectivity analysis map illustrating spatial connectivity patterns within Al-Mustansiriya Madrasa. Source: Author's spatial analysis using DepthmapX (v0.8)

5.2 Integration Analysis

Integration analysis identified the **courtyard as the most globally integrated space** within the spatial system (Figure 5). High integration values indicate that this space is easily accessible from most other areas within the Madrasa, reflecting its central role in the overall spatial hierarchy. Secondary integrated spaces were observed along the main circulation routes surrounding the courtyard, reinforcing its function as the core organizing element of the spatial layout.

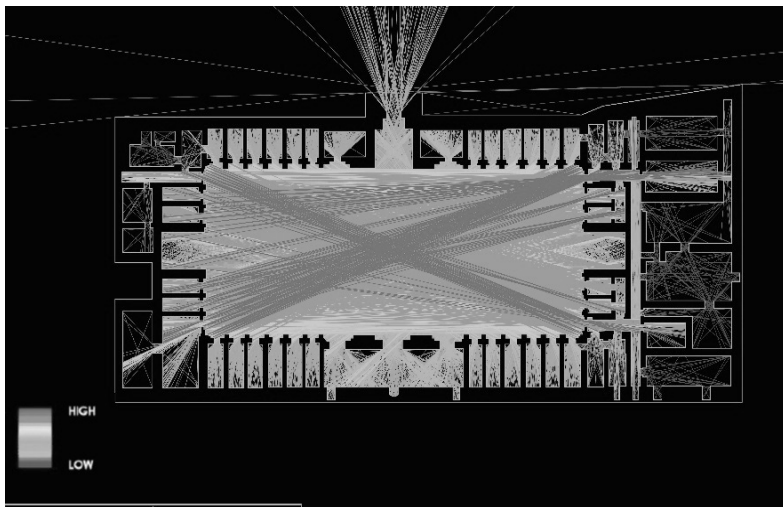


Figure 5. Integration analysis map showing the centrality of the courtyard within the spatial configuration. Source: Author's spatial analysis using DepthmapX (v0.8)

5.3 Choice Analysis

Choice analysis highlighted the courtyard and its immediate circulation paths as the most frequently traversed routes within the Madrasa (Figure 6). High choice values suggest that these spaces lie along the shortest paths connecting multiple destinations, confirming their importance in movement distribution. This pattern indicates that the spatial configuration naturally channels movement through the courtyard, enhancing its role as a convergence space.

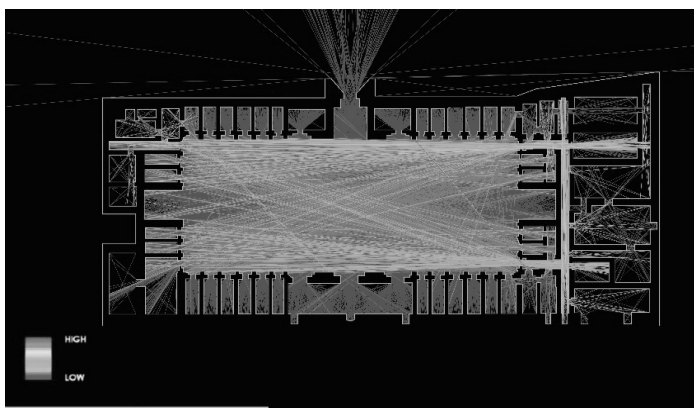


Figure 6. Choice analysis map illustrating potential movement paths within the Madrasa.
Source: Author's spatial analysis using DepthmapX (v0.8)

5.4 Visibility Analysis

Visibility analysis demonstrated that the courtyard offers the **highest level of visual connectivity**, with clear lines of sight extending toward surrounding arcades and circulation corridors (Figure 7). Spaces with high visibility values contribute to spatial legibility and orientation, while visually restricted areas correspond to more enclosed or specialized functions. The overall visibility structure supports intuitive navigation and reinforces the spatial coherence of the historic layout.

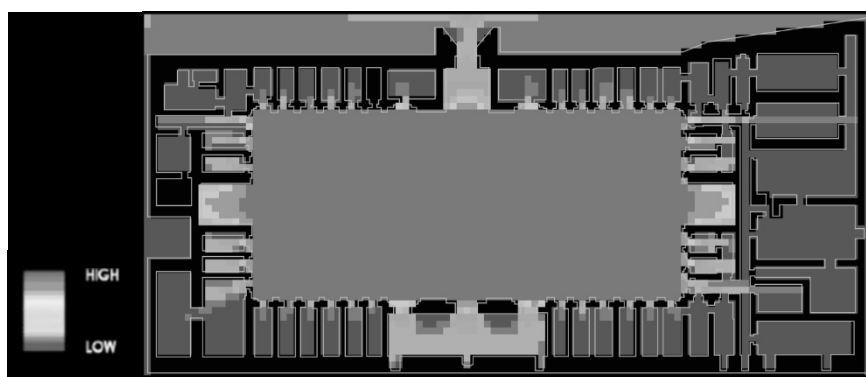


Figure 7. Visibility analysis map highlighting visual connectivity within the courtyard and surrounding arcades. Source: Author's spatial analysis using DepthmapX (v0.8)



5.5 Spatial Hierarchy Summary

Overall, the Space Syntax results indicate a **strongly centralized spatial configuration** dominated by the courtyard. High levels of connectivity, integration, choice, and visibility converge within this space, confirming its role as the primary organizational and functional core of Al-Mustansiriya Madrasa. These configurational characteristics provide a spatial foundation for understanding patterns of movement, gathering, and spatial use observed within the site.

5.5.1 Connectivity Analysis

The connectivity analysis reveals a highly centralized spatial structure within Al-Mustansiriya Madrasa. The central courtyard exhibits the highest connectivity values, indicating a large number of direct spatial connections with surrounding spaces. This confirms the role of the courtyard as the primary node linking circulation paths, arcades, and adjacent functional areas. Spaces surrounding the courtyard display moderate connectivity levels, reflecting their direct dependence on the central space for movement and access. In contrast, peripheral rooms and deeper interior spaces show significantly lower connectivity values, consistent with their more enclosed and specialized functions. The overall connectivity pattern highlights a clear spatial hierarchy in which movement potential and spatial interaction are concentrated within the courtyard. This configuration supports efficient circulation and reinforces the courtyard's role as the main organizational core of the Madrasa.

5.5.2 Integration Analysis

The integration analysis demonstrates a strongly centralized spatial configuration within Al-Mustansiriya Madrasa. The central courtyard records the highest integration values, indicating that it is the most globally accessible space



within the spatial system. This means that the courtyard can be reached from most other spaces through a relatively small number of spatial steps. Moderate integration values are observed along the arcades and circulation routes surrounding the courtyard, reflecting their functional dependence on the central space. In contrast, peripheral rooms and deeper interior spaces exhibit lower integration values, consistent with their more localized and specialized roles within the Madrasa. The integration pattern reveals a clear spatial hierarchy in which the courtyard functions as the primary organizing core of the historic layout. This configuration enhances spatial coherence and reinforces the role of the courtyard as the main point of convergence within the Madrasa's internal spatial structure.

5.5.3 Choice Analysis

The choice analysis highlights the role of the central courtyard as a primary route of movement within Al-Mustansiriya Madrasa. The highest choice values are concentrated along the longitudinal axis of the courtyard, indicating that this space lies on a large proportion of the shortest paths connecting different areas of the Madrasa.

Moderate choice values are observed along the surrounding arcades and main circulation paths, reflecting their function as secondary movement routes that depend on the courtyard for spatial continuity. In contrast, peripheral rooms and deeper interior spaces exhibit low choice values, consistent with their limited role in through-movement and their more localized functional use. The choice pattern confirms that the spatial configuration naturally channels movement through the courtyard, reinforcing its role as a central passage as well as a gathering space. This movement structure enhances spatial coherence and supports the efficient distribution of movement across the historic complex.



5.5.4 Visibility Analysis

The visibility analysis reveals a clear visual hierarchy within Al-Mustansiriya Madrasa. The central courtyard exhibits the highest visibility values, indicating extensive visual connectivity and uninterrupted lines of sight across the space. This suggests that the courtyard functions as the primary visual field within the spatial system. Transitional areas connecting the courtyard to surrounding arcades display moderate visibility values, reflecting their role as visual buffers between the highly exposed central space and more enclosed interior areas. In contrast, peripheral rooms and deeper interior spaces demonstrate low visibility levels, consistent with their controlled visual exposure and specialized functional use. The visibility structure enhances spatial legibility and supports intuitive orientation within the Madrasa. High visual connectivity in the courtyard contributes to a sense of openness and collective presence, while reduced visibility in peripheral spaces reinforces privacy and functional differentiation within the historic layout.

5.5.5 Spatial Hierarchy Summary

The combined results of connectivity, integration, choice, and visibility analyses reveal a strongly centralized and coherent spatial hierarchy within Al-Mustansiriya Madrasa. Across all configurational measures, the central courtyard consistently emerges as the most connected, integrated, visually accessible, and movement-intensive space within the system. This convergence of high configurational values confirms the courtyard's role as the primary organizational core of the Madrasa, structuring movement, visibility, and spatial interaction. Surrounding arcades function as secondary transitional spaces that mediate between the open collective core and more enclosed, function-specific rooms. Peripheral spaces display lower configurational values, reflecting their localized



roles within the overall spatial hierarchy. Overall, the Space Syntax analysis demonstrates that the historic spatial configuration of the Madrasa remains highly legible and functionally coherent, providing a strong spatial foundation for understanding observed patterns of movement, use, and user perception within the site.

6. Discussion

The present analysis reveals a strong alignment between user perceptions, spatial configuration, and observed patterns of spatial use within Al-Mustansiriya Madrasa. Rather than functioning merely as a preserved historic monument, the Madrasa continues to operate as an active urban space capable of supporting contemporary social and cultural activities. This reinforces the relevance of evaluating historic environments through Quality of Life indicators that extend beyond physical conservation.

Elevated scores for **Overall Quality of Life** and **Sociability** highlight social interaction as a key component shaping users' experiences within the Madrasa. The courtyard, historically conceived as a collective core, continues to facilitate interaction, gathering, and shared presence. This social performance is spatially supported by the highly centralized configuration revealed through the **connectivity and integration analyses**, which identify the courtyard as the most accessible and structurally dominant space within the system. Beyond facilitating social interaction, the Madrasa also fosters a strong sense of emotional and symbolic attachment. Closely related to sociability, **Place Attachment** emerged as a significant contributor to perceived quality of life. Users' emotional and symbolic connection to the Madrasa reflects its cultural significance and continued relevance within the urban memory of Baghdad. Although correlation analysis indicates a supportive rather

than dominant statistical relationship, the spatial configuration—particularly the clear spatial hierarchy and visual openness of the courtyard—provides a physical framework that reinforces identity, meaning, and continuity beyond purely functional considerations. Moreover, nighttime lighting conditions enhance the visual perception of architectural details, further contributing to users' sense of place and emotional attachment (Figure 8).

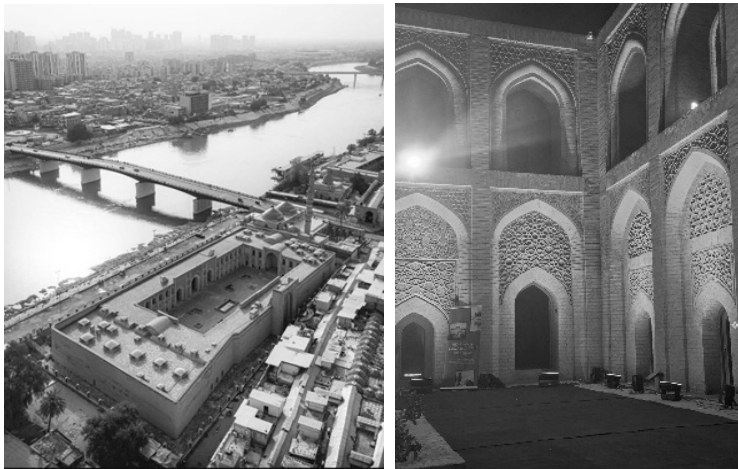


Figure 8. Nighttime view of the southern façade highlighting architectural details with lighting conditions and daylight view of the building. Source: Author's field documentation, [22]

Findings from the **Space Syntax analysis** offer a spatially grounded explanation for these perceptual patterns. High values of **integration and choice** confirm the courtyard's role as both a destination and a primary route of movement, facilitating co-presence and continuous social exposure. In parallel, **visibility analysis** demonstrates extensive visual connectivity across the courtyard, enhancing spatial legibility and passive surveillance. Together, these configurational properties help explain why social interaction and place attachment were perceived positively, as the spatial system naturally supports interaction without generating congestion or spatial conflict.



Perceptions of **Safety and Security**, while moderate compared to other domains, should be interpreted in relation to temporal conditions rather than as indicators of spatial inadequacy. Observation during evening use revealed that the internal spatial configuration—characterized by clear sightlines, integrated circulation, and social presence—maintained a reasonable level of perceived safety despite reduced activity in the surrounding commercial context. This suggests that safety perception in historic urban spaces is influenced by time-based urban dynamics while remaining strongly supported by internal spatial structure. Overall, the findings indicate that the quality-of-life performance of Al-Mustansiriya Madrasa is primarily driven by its coherent internal spatial organization and its capacity to support both social life and symbolic meaning. The convergence of perceptual data, Space Syntax analysis, and field observation highlights the adaptability of historic urban spaces when their spatial logic remains legible and inclusive. These results underscore the potential of integrating Quality of Life indicators into heritage management strategies, ensuring that historic spaces continue to function as meaningful and livable components of the contemporary city.

7. Conclusions and Recommendations

The findings of this study confirm that historic urban spaces can sustain a high level of perceived Quality of Life when their spatial structure, patterns of social use, and cultural significance remain coherent and mutually reinforcing. In the case of Al-Mustansiriya Madrasa, the overall quality-of-life performance is shaped by the interaction between spatial configuration and user experience rather than by physical preservation alone. Results from both the perceptual assessment and the Space Syntax analysis demonstrate that the **central courtyard functions as the primary spatial and social core** of the Madrasa. High levels of integration,



connectivity, choice, and visibility support ease of movement, visual clarity, and continuous social presence, which in turn reinforce sociability and users' emotional attachment to the place. These findings highlight the continued effectiveness of historic courtyard-based spatial typologies in accommodating contemporary social and cultural activities without compromising heritage value. Based on these conclusions, it is recommended that conservation and management strategies for historic urban environments extend beyond material preservation to incorporate **Quality of Life indicators**, particularly those related to social interaction, spatial legibility, and sense of place. Maintaining clear spatial hierarchies, visual openness, and adaptable collective spaces should be considered key priorities in heritage management practices for actively used historic sites. Future research may expand this evaluative framework to additional historic sites within Baghdad and comparable urban contexts. Comparative studies examining daytime and nighttime use patterns could further enhance understanding of the temporal dynamics of quality-of-life perception and the role of spatial configuration in shaping user experience in historic urban environments.



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