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Article

Space Syntax Analysis of Gated Communities in Jordan: Examining Urban Connectivity and Social Impact

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Abstract: The trend of gated communities is becoming the new alternative housing for the high-end residents of Jordan, reflecting global patterns of urbanisation. However, their emergence on the outskirts of Amman on vacant lands requires an early proactive planning approach to ensure their development in response to the growth of the surrounding areas, fostering an integrated urban fabric. This article examines whether gated communities contribute to urban discontinuity and lead to social segregation. The study employs a space syntax analysis on two cases in Amman to assess their integration, accessibility, and navigability to address the study's key questions related to its integration, design implications, and spatial layout. Findings reveal significant spatial segregation, with low levels of integration and high step depth values, indicating potential challenges in navigation, connectivity, residents' mobility, accessibility, and safety. The article suggests the importance of re-evaluating the design and planning approaches for these developments to promote organic townscape growth to ensure smooth integration with the surroundings.

Keywords: gated communities; urban discontinuity/connectivity; spatial segregation; sustainable growth; design adaptability

1. Introduction

The design of gated communities, in general, is based on providing strict security measures, dedicated services and amenities, and limited access for non-residents. While this approach offers safety and privacy, it often raises concerns regarding the potential social and physical separation from the urban fabric [1]. The novelty of this article lies in its focus on the limited research context of Jordan, providing a quantitative assessment of spatial integration and social segregation using space syntax analysis. The study contributes to the growing body of literature on urban segregation and offers a replicable methodological framework for similar urban fabrics and contexts. This article examines whether gated communities in Jordan contribute to discontinuity in urban areas and lead to social segregation.

In order to explore this hypothesis, it is imperative to differentiate between residential segregation and social segregation, on the one hand, and segregation and fragmentation, on the other hand. While residential segregation is the irregular or uneven distribution of residents within a space, social segregation refers to the lack of interaction between different social groups [2,3]. Segregation, in contrast, is related to the separation and division of social groups, whereas fragmentation is characterised by the physical disconnection of an area from its surroundings by barriers, changes in infrastructure, legislation, or other forms of discontinuity [3,4]. Given that social segregation reflects restricted social interaction and

interference between diverse social groups, this article aims to address two core questions: What are the socio-spatial impacts of gated communities on their surroundings? And can the applied investigation be replicated across other cities in the Middle East?

The argument on the social impact of gated communities, particularly regarding their potential to cause social segregation, is divided among scholars. One group argues that the physical designs of these developments encourage separation and segregation and limit access [5–7]. Another group counters this view, suggesting that gated communities may foster integration, particularly when developed in poorer areas, as they create job opportunities and reduce geographical segregation [1,8–10]. For instance, while an increase in property values surrounding gated communities may represent a positive economic impact, it can also lead to the displacement of existing residents, making these areas unaffordable. Consequently, further investigations are required to examine these economic implications, particularly in the newly developed gated communities on the outskirts of Amman. The replicability of the study's methodology, which integrates socio-spatial analysis with economic and social assessments, allows for cross-comparative studies to evaluate similar phenomena in other contexts. In addition to the design features of these developments and their economic impact, individual constraints such as income level, race, religious background, or education level may play a role in urban residential distribution and contribute to socio-spatial segregation [1]. Such geographical arrangements and residential distribution, when not dictated by choice, can result in socio-spatial segregation. Conversely, social separation of one social group stemming from the deliberate preferences of specific groups, such as residents of gated communities seeking seclusion and isolation, can be categorised as social group segregation. Another perspective on social segregation, as argued by Roitman, et al. [11], is related to the social practices of individuals, such as daily routines and intentional behaviours designed to satisfy personal preferences. These may include interactions such as working, socialising, consuming, or producing. Such practices can structure the developing patterns of socio-spatial segregation, as some practices may influence segregation more significantly than others.

Segregation can also stem from a lack of social interaction between neighbouring groups that live within spatial proximity. This may be due to perceived socio-economic or cultural differences or security concerns, which may lead to the establishment of physical and social barriers. For example, intended segregation occurs when gated community residents intentionally avoid interacting with their neighbours, perceiving them as security threats. In contrast, unintended segregation results from design features, such as high walls and security rooms, which may lead to a lack of social interaction [12].

By implementing space syntax analysis, this study offers a methodological approach that enables the assessment of the socio-spatial impacts of gated communities, which can be applied to similar urban contexts. Accordingly, this article seeks to examine the socio-spatial impacts of gated communities on their surroundings, employing space syntax analysis to assess levels of interaction and segregation. This analysis enables researchers and policymakers to determine whether these communities reinforce socio-spatial boundaries or promote potential integration across different regions.

2. Literature Review

The transformation of towns in the United States after World War II led to the emergence of new neighbourhood forms in the late 20th century, including gated communities. These communities developed in response to socio-economic and urban challenges, driven by rising crime rates and the desire for exclusivity and security. This trend extended beyond the U.S. to other places such as Europe, South Africa, and Latin America and also extends to the Middle East, including Jordan attracting people seeking security, socio-

economic isolation, lifestyle, and exclusivity. As a result, gated communities have become a global trend, raising essential questions about their impact on urban development and social influences [13–15].

In the U.S., Blakely and Snyder [16] classify gated communities into three main categories: lifestyle, prestige, and security zones. Lifestyle communities primarily focus on exclusivity and amenities catering to affluent residents, often reinforcing socio-spatial separation. Prestige communities serve elite people from society, symbolising social boundaries and increasing socio-economic disparities. Security zones develop as a response to the fear of crime, resulting in increased spatial and social isolation. Their findings suggest that gated communities contribute to fragmentation, social segregation, and the privatisation of public spaces, challenging traditional urban planning principles.

Internationally, scholars have investigated several issues pertaining to gated communities and their socio-spatial influences in different countries and contexts. In South Africa, Landman [17] highlights how gated communities disrupt patterns of social interaction, resource distribution, and urban growth, causing long-term challenges to urban sustainability. In Europe, Atkinson and Blandy [18] question the reasons for the growing number of gated communities, emphasising their role in exacerbating social segregation, disrupting social diversity, creating an imbalance in safety and security, and reducing services in poor areas. Similarly, in Latin America, scholars have investigated the positive and negative impacts associated with gated communities. While they may foster job creation and improvement of quality of life within the walls, they also privatise common spaces, encourage the use of private transportation instead of public, and lead to social disparities and segregation [19,20]. In Sydney, Australia, Quintal and Thompson [21] argue that gated communities reflect a positive desire for control and protection despite the fact that they may lead to segregation. Similarly, Kenna [22] examines Macquarie Links, one of Sydney's largest gated communities, suggesting that minor crimes, such as graffiti and littering, contribute to the demand for privately governed neighbourhoods. The author concludes that people prioritise restrictive contracts over security and calls for further research on such developments in Australia and their impact on urban life and social integration [22]. In Shenzhen, China, Wang, et al. [23] identify similar trends, suggesting that the privatisation of public spaces contributes to social fragmentation and inequality. Their study highlights that gating and privatisation limit access to essential services and facilities, leading to socio-economic disparities.

In the Arab World, specifically the Middle East and GCC (Gulf Corporation Council) countries, several scholars debate the reasons for their emergence and their socio-spatial impacts. For example, AlQahtany [14], Glasze [24], Salim [25], Elsheshtawy [26], Al Shawish [27], and others argue that their emergence is primarily related to socio-economic factors, concluding that several social and spatial implications of gated communities at both micro and macro levels persist. The way how real estate developers market these developments as elite places with distinctive environments implies isolation and separation. However, in the study area of this article, specifically in Amman, Jordan, limited research is conducted on the spread of this phenomenon since the subject is relatively new to the country [28]. For example, Al Omari and Al Omari [29] argue that the emergence of gated communities is primarily related to the rise of a new layer of middle and upper-middle in society seeking exclusivity and a luxury lifestyle. He suggests strategic planning policies are required in order to control their unregulated spread, as this may affect the distribution of natural resources. Similarly, Alkurdi [30] suggests that their development is associated with the desire for security, privacy, and modern living, concluding that the lack of public facilities and urban congestion has pushed people to select such options. His study recommends selecting vital locations that can enhance social interaction and avoid

separating the community fabric. In contrast, Al-Homoud and Al Aswad [31] suggest that people select this type of residential housing for regulations, lifestyle, and feasibility, concluding that gated communities in Jordan can encourage inequality opportunities between their people and their surrounding neighbours. In a recent study carried out by Abed, Mabdeh and Nassar [28], the authors suggest two types of gated communities are developed in Jordan: mini and mega-gated communities, concluding that both categories require regulatory frameworks to facilitate their integration with the surroundings. Finally, Hammad, et al. [32] discuss that the evolution of Amman's master plan over time, along with the social and economic transformations, has encouraged real estate developers to influence such types of housing options. They conclude that the urban planning policies of gated communities can be reevaluated by incorporating features from historical cities that reflected cohesion and unity.

Gated communities in Jordan demonstrate that such phenomena have spread out to different countries and contexts, reflecting similar challenges of urban sustainability, social fragmentation, and inequality despite their short-term solutions for security, privacy, and local inclusion. Such disparities align with the global trend seen in other parts of the world where gated communities may have social and spatial influences that can affect social interaction and privatisation of public spaces, leading to social inequalities.

3. Theoretical Proposition for Segregation and Separation

A community is defined by the relationship between people and their external connections, defining both existing and potential relationships [33]. The term "community" carries different meanings depending on whether it is viewed from the viewpoint of members or non-members, often implying shared experiences and cohesions, as the idea of sharing is assumed rather than being central. While "community" may suggest collective individuals sharing common cultural, historical, or other shared characteristics, a sense of community can be more than a spatial condition as it involves communication behaviours and attitudes at the neighbourhood level [34]. This sense of community emphasises involvement, commitment, and contribution and can be measured by elements such as feeling at home, satisfaction, shared values, belonging, and community attachment.

In the framework developed by McMillan and Chavis [34], they identify core elements to measure the sense of community: (a) membership, which reflects a feeling of affiliation and belonging; (b) influence, which relates to making a difference in a personal and a group scale in both ways; (c) reinforcement, which addresses the fulfilment of members being a part of that group; (d) emotional connection, associated with shared stories, histories, and time together. These elements collectively describe a sense of community where individuals feel connected, valued, and involved within a context of shared histories and values. However, while these elements create a strong sense of community, their manifestation requires more effort and time than simply grouping residents in a gated community. The idealised image of gated communities, often promoted by developers as a space of safety and exclusivity, does not spontaneously foster a strong sense of belonging or community interaction. This is evident in historical neighbourhoods, where community interactions traditionally emerged from deep societal bonds, such as shared histories, ethnicities, and culture, rather than being merely enforced by their physical layouts and architectural designs.

This challenge is exacerbated in the context of fragmentation in the Third World countries, particularly in the Middle East, including Jordan. Socio-political transformations, rapid urban growth, and inadequate urban and infrastructure planning helped in fragmenting the urban environments, as in the case of Amman. In this context, Balbo [35] explains that the conventional master planning processes are often too slow and based on

long-term forecasting, which is incompatible with the unpredictable growth rates in many Third World countries. Thus, planning techniques that demand technical qualifications, expertise, financial support, and continuous monitoring might not be available in these countries. For example, the city of Amman had 56 different plans between 1960 and 1990 to accommodate the mass and sudden population growth caused by socio-political changes. The influx of growth in the population led to a shortage in infrastructure, land provision, housing, and services, which have created the fragmented and unplanned cities that we see today [36]. This fragmentation extended beyond the physical manifestation to include social influences, with the spread of gated communities intensifying spatial separation. Balbo [35] explains that cities may become further fragmented with the rise of new urban forms such as gated communities, shopping centres, and business parks, which are forms of urban development that are isolated from the rest of the city. This type of isolation and fragmentation can limit interaction and reduce the sense of belonging and sharing. In Amman, for example, the design of gated communities with their walls and gates physically and spatially segregates their residents from the wider community, reinforcing disparities, limiting social interactions, and compromising the sense of belonging.

Amman's urban fabric will be analysed through the theoretical framework emphasising key elements such as membership and influence, as explained by McMillan and Chavis [34], in order to assess the socio-spatial impacts of gated communities. This will be examined by employing a space syntax analysis study to evaluate the spatial accessibility, navigability, and integration of these developments with the surrounding urban fabric.

In summary, conventional master planning methodologies, socio-political changes, and rapid population growth may aggravate fragmentation by creating new isolated zones with diverse levels of infrastructure, service provisions, and socio-economic status, such as gated communities. The case of Amman illustrates how socio-political changes and rapid population growth led to unplanned urbanisation and the need to address housing demands, creating new developments and configurations that are isolated urban forms. The theoretical framework aims to analyse the socio-spatial impacts of gated communities in Amman critically by linking the study to the findings and results extracted from the space syntax analysis.

4. Materials and Methods

This article employs space syntax theory to analyse the socio-spatial impact of gated communities on their surroundings, focusing on urban integration, accessibility, and potential segregation. Space syntax examines the influence of spatial relationships on social life, space, and society by quantifying spatial relationships between streets and buildings within the built environment [37,38]. This approach allows for a detailed assessment of how spatial configuration can influence human behaviour, socio-economic activities, and social interactions within an urban environment. Applying space syntax theory can add a social and spatial dimension to the analysis, examining how gated communities impact social cohesion, spatial inequality, and urban development.

In this theory, space is understood as the shared zone between physical layouts and social activities. Building arrangements and their relationship to the street network contribute to people's relationships and their socio-economic patterns [37,39]. For example, the linear arrangement of shops and passageways in a marketplace fosters visible interaction between retailers and customers, enhancing both social and economic engagement.

Thus, this study will employ space syntax to assess the socio-spatial impacts of gated communities by examining various aspects such as accessibility, social segregation, urban integration, perception, and experience. Accessibility will be evaluated by measuring the ease of movement between both communities (inside and outside). Social segregation will

be assessed by examining the physical barriers that separate them from their surroundings, while urban integration will be measured by examining the spatial integration and the physical connection of gated communities with the larger urban fabric.

4.1. Space Syntax Method and Axial Analyses

The built environment typically consists of public spaces enabling movement between different areas and private spaces linked to them, such as gardens and courtyards [37]. Urban public spaces are analysed using axial maps, which calculate the connectivity based on topological, geometric, and metric relationships. Space syntax provides metrics such as relative asymmetry (RA), real relative asymmetry (RRA), and choice values, which are used to evaluate spatial properties of urban layouts [37,40].

Spatial models are composed of a set or a group of axes that facilitate calculating the interconnection of all urban spaces topologically, geometrically, and metrically [41]. As explained by Vaughan [38], space syntax can be applied to explore the structure-function relationships within a city. This involves assessing the spatial integration of street axes, which can be achieved by measuring the number of directional changes required to reach other streets from a given axis. In spatial integration maps, integration is represented in black, indicating high levels of integration, and light grey for low integration. For example, in a small town with a main street identified as the main axis along with several side streets connected to it, the side streets directly connected to the main street exhibit high integration, while streets requiring multiple changes have lower integration. Such analyses are vital for understanding layouts that promote connectivity and movement within a city [42]. DepthMap 10 software is used for spatial analysis, which can perform advanced analysis, such as axial and isovist analysis. The software is an open-source tool used in space syntax research that is suitable for use in various urban environments worldwide. As such, this methodology is easily replicable in other regions to examine the socio-spatial impacts of urban developments. Space syntax also incorporates visibility analyses through isovist, which represents all visible elements from a specific location in the built environment [43]. As the observer moves and changes the location, the visible objects will change, creating new isovists that collectively map the area's spatial patterns [44]. This is particularly relevant in understanding how gated communities restrict or enhance visual and physical accessibility to their surroundings.

Furthermore, distance measurements within space syntax include topological distance, which refers to the lowest number of turns required to move from one space to another [45]. Angular distance, or geometric distance, is the least number of angular changes from one space to the other, while metric distance is the numeric distance in metres from each street to all other streets. Each of these distance metrics will generate various spatial patterns, which can provide distinct perceptions of spatial relationships. One of the key syntactic measures is integration, or mathematical closeness, which assesses the ease of access of each spatial element to all others within a given space or environment. For example, it measures how easy it is to travel from different intersections to the same point using a continuous and smooth route.

Whereas choice quantifies how many spatial elements are positioned on the shortest path of any pair of elements; in other words, if there are three possible routes between two different points, where two of these routes pass through a particular intersection, that section would be considered a higher choice value because it is situated on multiple shortest paths between different locations [39].

For this study, relative asymmetry (RA value) and real relative asymmetry (RRA) metrics were used to analyse gated communities in Jordan to identify the ease of access to each spatial element [46]. The RA metrics represent the level of integration of a specific

area; in other words, the higher the RA number, the more the area is integrated and the public, whereas the lower RA result means more private, segregated spaces. The relative asymmetry (RA) and real relative asymmetry (RRA) employed in this study are used in space syntax studies and can be replicated in different urban settings. These measurements can be calculated using the formulae provided, ensuring consistency and comparability across different case studies or geographical contexts.

Formula for measuring RA:

$$RA = 2(MD - 1)/(K - 2) \tag{1}$$

where MD represents the mean depth (average distance to reach a point from all others), and K is the total number of intersections in a space.

Real relative asymmetry (RRA) is used mainly in analysing building plans or spatial layouts.

Formula for measuring RRA:

$$RRA = RA/DK \tag{2}$$

where DK denotes a table for all the values of K spaces, which is represented by a diamond-shape [47].

4.2. Space Syntax Parameters

The selection of space syntax parameters in the study area is related to their role in analysing the spatial connections with the surrounding urban. The parameters include integration, both mean and step depth, and choice values. Integration is usually related to the easiness of access from other spaces, where high values indicate interconnectedness and low values suggest isolation [38]. On the other hand, step and mean depth are related to the number of steps required to reach a specific point or zone, indicating ease of navigation and accessibility. Whereas the choice value determines the alternate route options in movement, highlighting critical routes that facilitate movement [48]. High choice values indicate a settlement more accessible and easier to navigate, fostering interaction.

The comparative analysis of the selected parameters offers valuable insights into the spatial implications of gated communities in Jordan and their integration with the surrounding urban fabric. However, results may be limited when implementing these parameters since the measurement may not capture the socio-cultural influences, population growth, and socio-economic data [49–51].

4.3. Application to Gated Communities in Jordan

Space syntax analysis and metrics are applied to two gated communities in Jordan, namely, Al Andalucía and Greenland, to examine their impact on spatial division and social cohesion. The analysis included measuring and assessing accessibility, urban integration, and social segregation. The analysis is conducted using computer software such as Depthmap 10, using relative asymmetry (RA) and real relative asymmetry (RRA) to calculate accessibility, which is measured by evaluating the movement between gated communities and their surroundings. Urban integration is assessed through spatial integration indicators, which identify the connection of gated communities with the urban fabric. Finally, social segregation is examined by analysing the physical separation between gated communities and their neighbours. Figure 1 illustrates an integration map for the city of London, where the warm colours (red and yellow) indicate highly integrated spaces with easy access and high connectivity, while cool colours (blue and green) represent more segregated levels with lower integration. This methodology is not limited to gated communities in Jordan and can be applied to study other forms of urban segregation or

spatial integration, such as in informal settlements, mixed-use developments, or even historic city centres. The replicability of this approach makes it a valuable tool for urban planners, policymakers, and researchers interested in understanding and mitigating urban fragmentation and separation.
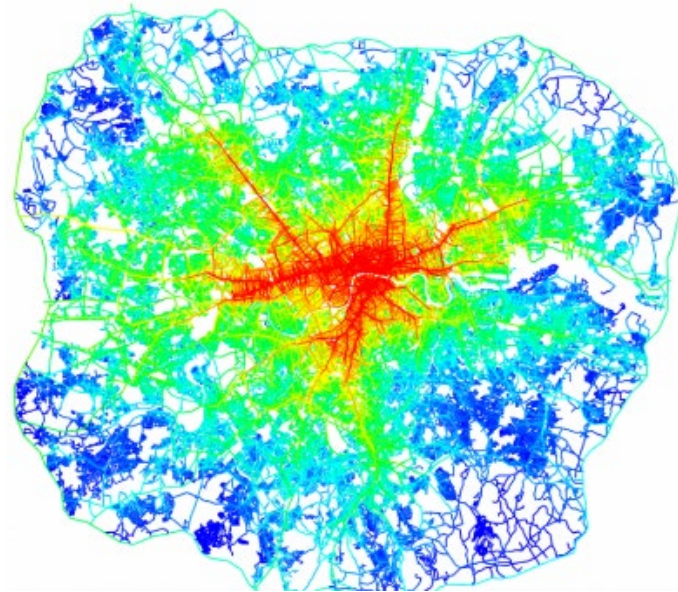

Figure 1. Integration pattern, map of London. Source: [37].

By implementing the space syntax metrics, this article aims to examine how the layout may influence spatial inequality and social cohesion within urban development. For example, the analysis of accessibility will verify the ease of access and movement between gated communities and their connectivity with the surrounding streets. The article aims to provide an empirical foundation for understanding the socio-spatial influences of gated communities in Jordan, aiming to foster integrated urban growth with their surroundings.

5. Analysis and Results

5.1. The Case Studies

The development of the first gated community in Amman—Al Andalucia—started in 2005, which can be attributed to the reflex of neoliberal changes witnessed in the neighbouring countries, as the primary funding came from the United Arab Emirates [31,52]. Post the global financial crisis, new urban transformations emerged due to the resurgence of Jordanian expatriates from the GCC countries favouring gated communities for their exclusivity and security [30,53]. Two case studies, Al Andalucía and Greenland, were selected for the space syntax analysis based on their contrasting urban context, location, development timeline, and socio-spatial features Figure 2. The selection of these cases allows for a comparative analysis to evaluate their spatial outcomes, which will help in understanding their interconnection with the surroundings. The selection of these cases allows for a comparative analysis to evaluate their spatial influence, which will help in understanding their interconnection with the surroundings. This comparative approach is vital as it provides insights into the urban changes in gated communities over time and their differing impacts on urban integration and segregation. The spatial outcomes of each community will be evaluated based on how they relate to their surrounding areas, with a particular focus on how the architectural and urban design choices contribute to either connectivity or isolation within the city.
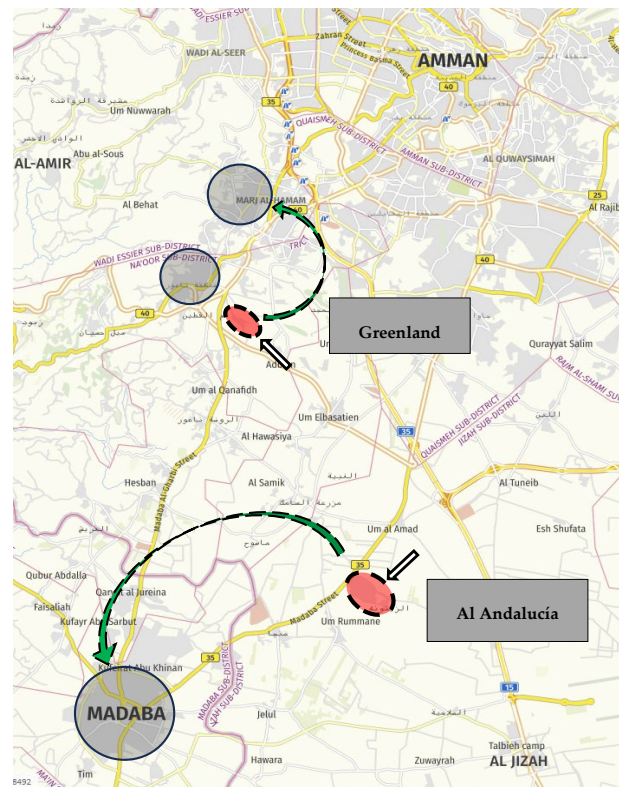
Figure 2. Location of both case studies. Source: [54].

Table 1 presents an overview of various gated communities that emerged in Amman, from early projects such as Al Andalucía to more recent developments and offers valuable insights reflecting the demand for exclusivity and security. Furthermore, the variation in the size of these developments reflects the targeted demographics, which ultimately may influence their spatial integration and influence. However, the preference for villas can be associated with socio-economic changes, such as increased wealth among Jordanian expatriates and their demand for more exclusive and larger residences.

Table 1. List of Gated Communities in Amman. Source: The Author.

Gated Community	Area (m²)	Number of Units	Units Type	Construction Date
Green Land *	400,000	147	Apartments	2008
Al Andalusia **	800,000	588	Villas	2005–2013
Saraya Dabouq	6000	10	Villas	2011
Panorama Villas Compound	3500	10	Apartments	2013
Mohd Odeh Compound	3860	8	Villas	2013
Green Valley Villas	4277	10	Villas	2014
Green Village	22,000	30	Villas	2016
Black Iris	13,550	18	Villas	2016
Saqr Compound	5094	11	Villas	2016
Mohd Odeh Compound	3860	8	Villas	2013
Panorama Compound	2850	8	Villas	2013
Al-Kursi Compound	2900	5	Villas	2016
Abdoun Complex	unknown	13	Apartment	2017
Victoria Villas	unknown	unknown	Villa	2023
Amman Gardens Compound	300,000	unknown	Villas	Concept
Mograbi Compound	6764	10	Villas	2024

* and ** represent the selected gated communities as case studies for this article.

5.2. Analysis

5.2.1. Al Andalucía

The space syntax analysis conducted on the case study aims to evaluate the integration, accessibility, and navigational ease, providing insights into its spatial organisation and potential implications for residents' daily lives. Figure 3 shows the integration (the measure of accessibility) of the gated community with its surroundings. The analysis reveals low accessibility patterns, with the most accessible zone being the entrance area, as encircled red. This configuration is likely to create traffic congestion and difficulty in pedestrian movement. It was also observed that the highest integration value was 0.73, while the lowest was 0.30. The values are colour-coded on a heat scale; the red colour and other warm colours show the highest value, while the blue colour and other cool colours show the lowest value. The average integration for the case study was observed to be 0.45, which means the system tends to be segregated as a whole. The residential zones on the far left and right sides tend to be the most segregated ones, thus making them hard to access, which may also serve as quiet zones and prove to be possible crime occurrences.

Figure 3. Measuring integration for Andalucía. Source: author, developed by depthMap 10.

Figure 4 shows step depth from the main entrance, indicating how many routes one must take to reach the furthest point of the community. The analysis shows that this community is difficult to access, as the average number of steps (routes) is 7.91. This means that one typically requires eight different routes to navigate the area. The highest step depth was observed to be 16 steps away from the main entrance, which means that to reach the end of the community, one needs to turn at least 16 times before reaching the destination. This type could make it challenging to navigate in case of an emergency.
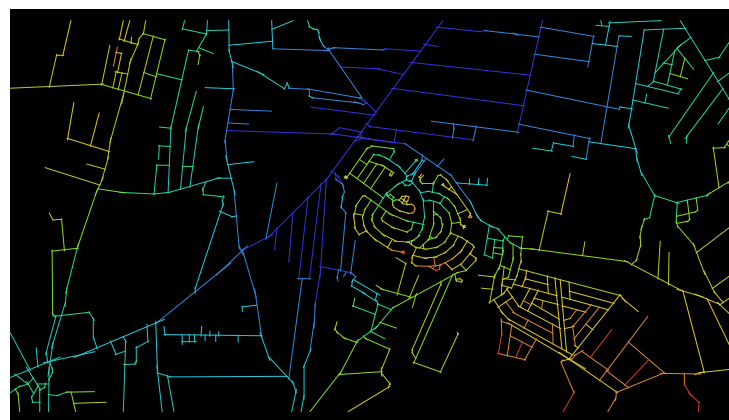

Figure 4. Measuring step depth for Andalucía. Source: author, developed by depthMap 10.

Figure 5 shows the mean depth of the community as a related concept of step depth. Mean depth shows the average number of turns one needs to take to navigate the space. The lowest mean depth was found to be 8.30, and the highest was 13.54, which is very high and thus makes this community hard to access in terms of movement.
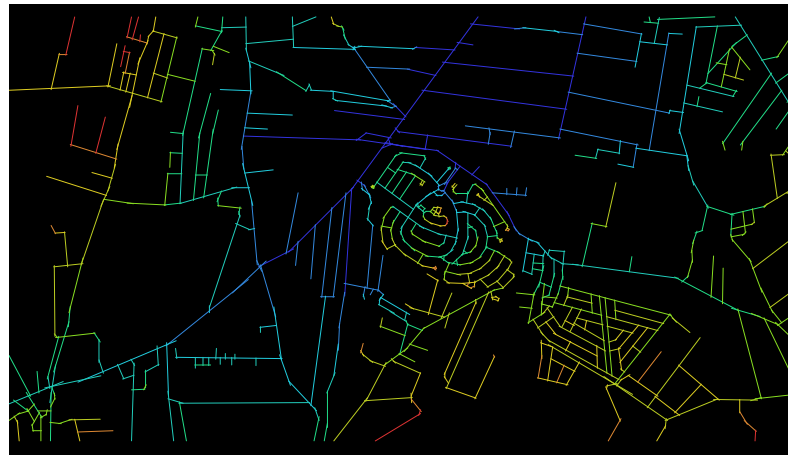

Figure 5. Measuring mean depth for Andalucía. Source: author, developed by depthMap 10.

Figure 6 shows the values of choice for this gated community. The highest value was observed on the red-coloured route and the lowest on the purple- or blue-coloured route. The choice value determines the alternate route options in movement, thus making a settlement more accessible and easier to navigate. Overall, this community shows the lowest choice values on most routes except for those shown in red, orange, or greenish colours.

Figure 6. Measuring choice values for Andalucía. Source: author, developed by depthMap 10.

In conclusion, the findings highlight lower integration and accessibility, with limited choice values and higher step depths, indicating potential challenges in navigation and connectivity. The findings highlight a spatial configuration that prioritises exclusivity and separation driven by the limited gate access and complicated internal street arrangements. These results are in line with McMillan and Chavis [34] theories of membership and connection related to the sense of community, as boundaries can strengthen the sense of belonging between internal residents and, at the same time, may reduce the interaction with the surrounding community. The social and economic background of Al Andalucía residents, along with their cultural norms favouring privacy, may also have a substantial role in accentuating separation and isolation.

5.2.2. Greenland

The spatial study carried out on the Greenland gated community represents a wide range of integration values that affect the accessibility and connectivity of the area. The community's spatial arrangement appears moderately integrated, with an average integration score of (0.26). Figure 7 shows that some areas exhibit low accessibility, with minimal integration readings of 0.10, while other areas indicate higher connectivity (0.44), suggesting potential social interaction. The entrance zone, indicated in red and orange, is the most accessible location with a maximum integration of 0.44, which is likely to experience traffic congestion and may hinder pedestrian movement. The average integration within the community is measured at 0.36; the community exhibits a thorough, accessible pattern, suggesting a spatial arrangement that is highly integrated. The zone, indicated in red and orange colour, is the most accessible location with a maximum integration of 0.37. Conversely, the residential neighbourhoods exhibit moderate accessibility, which may enhance accessibility but may contribute to a quieter environment.

Figure 7. Measuring integration for Greenland. Source: author, developed by depthMap 10.

Figure 8 presents the step depth from the main road of the community, which means the number of routes one needs to take to reach the end route of this community. It was observed that this community is easy to access, as the average number of steps (routes) one needs to reach is 7.91, which is 8, which means that one needs to take at least eight different routes to navigate this community. The values are colour-coded on the heat scale; the red colour and other warm colours show the highest value, while the blue colour and other cool colours show the lowest value. The highest step depth was observed to be 16 steps away from the main road, which means that in order to reach the end of the community, one needs to turn at least 16 times before reaching the destination. This type could make it challenging to navigate in case of emergency.

Figure 9 illustrates the mean depth of the community as a related concept of step depth, which shows the average number of turns one needs to take to traverse the space. The lowest mean depth was found to be 12.81, and the highest was 41.42, with an average value of 20.22, which is very high and thus makes this community hard to access in terms of movement.

Figure 10 shows the choice values, which determine the flexibility of movement within the community. The highest value was observed on the red-coloured route and the lowest on the purple- or blue-coloured route. The choice value determines the alternate route options in movement, thus making a settlement more accessible and easier to navigate. Overall, this community shows the lowest choice values on the majority of routes except for those shown in red, orange, or greenish coloured.

Figure 8. Measuring step depth for Greenland. Source: author, developed by depthMap 10.

Figure 9. Measuring mean depth for Greenland. Source: author, developed by depthMap 10.
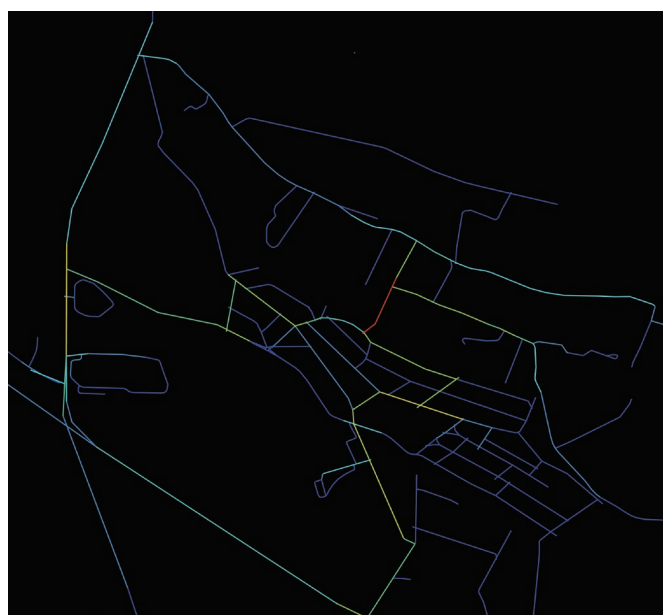

Figure 10. Measuring the choice values for Greenland. Source: author, developed by depthMap 10.

The spatial study of the Greenland gated community reflects a moderate integration score from the analysis, showing that the entrance area is accessible yet crowded. Although the developer aims for peaceful and calm settings, nonetheless, this may reduce visibility and connectivity, which may pose security risks to the development. The development incorporates a more connected street network, less rigid walls, reduced security gates, and closer proximity to service areas in comparison to Al Andalucía. The integration of exclusivity with functionality in Greenland may reflect a positive evolving approach for future gated communities since the development exerts less isolation and separation.

5.3. Similarities and Differences

The spatial analysis of Al Andalucía and Greenland developments reveals key differences in their integration and accessibility in relation to their socio-economic, social, and other key aspects, such as location, size, housing types, and residents' rationale for selecting such housing options. Table 2 presents a comparative analysis between the two selected gated communities, highlighting similarities and contrasts of both cases on macro and micro levels in order to illustrate how these developments have influenced their surroundings in the context of Jordan's gated communities. The locations of both developments significantly affect their accessibility, integration into the urban fabric and socio-economic implications. Al Andalucía, located away from the city of Amman, promotes exclusivity with challenges in the provision of daily services and amenities, making it more isolated compared to Greenland. Conversely, Greenland's proximity to the urban growth zone and its better integration with surrounding areas suggest a more inclusive development, fostering greater local interaction and better economic impact.

Table 2. Comparison between both case studies. Source: The Author.

Aspect	Al Andalucía	Greenland
Location	~20 km south of Amman, close to the airport	~12.6 km from Amman in Na'ur, closer to the urban growth zone
Developer	TAAMEER Jordan: International investor	Private Jordanian investor
Construction Timeline	Began in 2005, stopped in 2008, resumed in 2009, and was completed in 2013	Began in 2008
Land Use	Initially zoned as agricultural land	Formerly agricultural/forested land
Development Area	800,000 m^2 with 600 villas	400,000 m^2 with 500 units (villas, semi-villas, flats
Architectural Style	Modern-style villas with landscaped gardens, premium finishes, private family atmosphere	Modern villas with landscaped gardens, private pools, and diverse architectural styles due to customisation option
Security Features	Enclosed with a concrete wall, single entrance/exit with security guards and surveillance cameras	Enclosed with a wire fence, secured with a boom gate and a small security room, less physical isolation than Al Andalucía
Transportation Access	Main access via Airport Road, followed by a dedicated road creating an "exclusion experience" on entry	Access via Airport and Dead Sea Roads; shares road with surrounding properties, suggesting better community integration.
Surrounding Amenities	Limited services around the area; basic groceries and laundries are available. Residents rely on distant shopping, impacting the local economy	Basic services nearby; closer to cities Na'ur (3.8 km) and Marj Al Hamam (6.3 km), though still facing some access issues due to limited public transport options
Social Interaction	Central recreational area promotes social interaction	Shared open spaces foster regular resident interactions. Recreational area decentralised; smaller size may reduce interaction, but still accessible for residents

Table 2. *Cont.*

Aspect	Al Andalucía	Greenland
Economic Impact	Contributes economically to surrounding communities like Madaba through resident shopping due to the lack of nearby services	Encourages surrounding area development by stimulating construction and residential investment nearby; increases local economic activity, though dependent on nearby cities for daily needs

The layout configuration of Al Andalucía, with its centralised community centre, cul-de-sac-type roads with dead-ends, grand security gate, and rigid concrete wall surrounding the development, emphasises isolation and social exclusivity. The simplified security gate distributed internal streets, and the low-wire fence surrounding the development fostered partial integration, which may enhance community interaction with the surroundings.

6. Discussion

The discussion examines how the findings of the spatial analysis of the case studies can integrate best practices of urban design principles, such as accessibility, walkability, safety, and social interaction. These principles are contextualised within McMillan and Chavis [34] studies, identifying community core elements such as membership, influence, reinforcement, and emotional connection. This framework highlights how the design layout of gated communities can foster or discourage a sense of community and connection.

The spatial analysis of Al Andalucía, with an average integration reading of 0.45, demonstrates spatial challenges related to accessibility and community connectivity. The overall design layout, with its centralised recreational area, may encourage social inter-action and increase emotional connection. However, the low integration values and the physical barriers indicate limited spontaneous interactions and can isolate communities, as explained by Newman [55]. This finding aligns with Blakely and Snyder [16] review of gated community typologies, where exclusivity can be more important than connectivity, which reflects the broader trend of gated communities. In contrast, Greenland development has a lower integration reading of 0.36, which may indicate a slightly better-integrated community since the residential area is partially separated from the main entrance. The decentralised recreational area encourages unplanned interactions among residents, which enhances reinforcement by creating a spontaneous social exchange. This observation aligns with Balbo [35] observation that decentralisation in urban layouts can enhance social interaction compared to rigid and centralised designs. The contrasting design layout of both developments reflects the variance in the impact of social engagement and sense of belonging. The design approach of Greenland reflects more integration, which reflects an adaptive urban approach, as the developer may have responded to lessons learned from Al Andalucía. This aligns with the findings of Alkurdi [30] that the design of gated communities can balance exclusiveness with integration.

In terms of safety and security, both cases exhibit high-security measures by introducing fences, security rooms, and surveillance cameras, which aligns with the discussion introduced by Newman [55], as privacy in gated communities can limit observations and increase risk. The design layout of Al Andalucía may create low visible areas, which may increase security risks, whereas the layout of Greenland, with its wire fence, may reflect a sense of openness with the surroundings. This observation aligns with Hammad, et al. [56] analysis of gated communities in Amman, highlighting the balance between security and accessibility. Furthermore, both communities are located on the outskirts of Amman, which denotes that they rely heavily on the nearby infrastructure, which may strengthen their economic impact on the surrounding areas. However, the development

of gated communities on the outskirts of Amman may create isolated islands that physically and socially isolate their residents from the surrounding urban area, reinforcing social division [6]. Such spatial isolation resonates with Balbo [35] argument on urban planning in developing countries, where rapid urbanisation often leads to fragmentation and socio-economic disparities. Nonetheless, the location of the Greenland community suggests that since this project was developed after Al Andalucía, the developer may have learned lessons from other experiences, particularly in relation to the location selection and distance from Amman. This hypothesis may reflect an adaptable approach to urban design in relation to connectivity and accessibility yet maintaining exclusivity.

From a policy perspective, the study findings emphasise the need for urban planning strategies in Jordan that can integrate gated communities with the wider community. Recommendations may include providing shared public areas, fostering mixed-use zones, and connecting these developments with public transportation to enhance accessibility and reduce socio-spatial isolation. Studies from the Latin American context, where gated communities have privatised public spaces, suggest that integrating shared public areas can mitigate fragmentation [19,20]. Similarly, Australian studies emphasise the importance of connecting gated developments to their surrounding urban fabric through regulatory frameworks to reduce segregation [21,22].

Finally, gated communities in Jordan demonstrate the neoliberal shift towards seclusion, privatisation, and luxury. While Al Andalucía catered to affluent residents seeking seclusion and exclusivity, Greenland represents a more adaptive approach that balances luxury with accessibility and urban connectivity. Both case studies reflect the ultimate desire of residents and developers to create exclusive and secure areas while fostering challenges to inclusivity and connectivity. Exclude and seclude certain layers of society in an exclusive and safe environment. As argued by Balbo [35], gated communities exacerbate socio-economic disparities by restricting access to the surrounding neighbours. Policy actions that are extracted from historical urban characteristics, such as cohesive layouts and shared spaces, can create new gated communities that promote inclusivity and community integration while maintaining security and exclusivity [32].

7. Conclusions

The findings of the space syntax analysis conducted on Al Andalucía and Greenland developments reveal significant spatial and social impacts, particularly regarding accessibility and interaction. These findings highlight that gated communities, especially those built on the outskirts of the city, contribute to social and physical isolation and reinforce fragmentation. While the long-term effects of such developments require further time until they can be thoroughly examined, early findings of the space syntax analysis of Al Andalucía and Greenland indicate spatial and social implications. Therefore, planners and authorities should prioritise sustainable development by promoting organic, integrated townscape growth to ensure sustainable development and positive flourishing of the surrounding areas.

Based on the study findings of the space syntax analysis, the following design strategies are proposed for the future development of gated communities, particularly those developed on the outskirts of Amman:

- Long-term master planning: Gated communities should adopt phased developments that initially focus on internal social cohesion, followed by gradual integration as the surrounding areas mature. The space syntax findings suggest that providing pedestrian accessibility, such as walkways and green areas, can enhance the development integration and transition in future phases.
- Adaptability of layouts: The internal designs and layouts should be adaptable and liveable in order to create diverse forms of enclosures. Since the community is de-

veloped on the outskirts of the city, the initial phase may require focusing on safety, security, and internal social integration. The space syntax results suggest that higher levels of spatial integration within the community encourage stronger social ties.

- Phased integration strategy: A phasing strategy approach can help in the transition from enclosed communities to semi-opened developments that encourage communication with the surroundings, which will enhance overall community connectivity and integration. The space syntax analysis demonstrates that layouts with higher choice values and fewer step depths indicate stronger connections between internal residents.

This proactive approach ensures that the gated communities in Jordan have the potential to evolve in response to the growth of the surrounding areas, fostering a more integrated and cohesive urban fabric. It is suggested that authorities and municipalities are encouraged to enforce a design framework aligned with this phasing strategy, ensuring a smooth transition and future integration of gated communities so they will not stand as isolated islands within the urban sprawl.

Furthermore, the findings address the study questions by demonstrating that gated communities in Jordan significantly impact their surroundings by creating socio-spatial boundaries, reducing integration, and fostering social segregation. Additionally, the space syntax analysis, along with the design recommendations, offers a replicable framework for evaluating similar phenomena in other cities in the Middle East. While the study provides valuable insights, certain limitations should be acknowledged. The space syntax analysis was carried out on two case studies within a specific timeframe, limiting its generalisability. Further studies could explore additional case studies in Jordan to expand the analysis further for a holistic understanding of their influence on the surroundings. Regarding the time limitation, such analysis requires long-term investigation and monitoring of the area to assess the integration or separation of gated communities over time. Examining the role of policy and urban planning strategies in Jordan with regard to the design and integration of gated communities can provide additional perceptions of their growth.

Overall, the study contributes to the growing literature on urban segregation by assessing the social and spatial impacts of gated communities in Jordan through space syntax analysis. Additionally, the study offers a replicable framework for understanding similar urban contexts while addressing the socio-spatial challenges represented by gated communities.

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