Contents available at: www.repository.unwira.ac.id
ARTEKS
JURNAL TEKNIK ARSITEKTUR
https://journal.unwira.ac.id/index.php/ARTEKS

Research paper doi: 10.30822/arteks.v7i3.1235

Analysis of the relationship between the gated community Citraland Surabaya's spatial configuration and social segregation

Salmina Wati Ginting[1*], Vincentius Totok Noerwasito[2], Eko Budi Santoso[2]

[1] *Department of Architecture, Universitas Sumatera Utara*
Jl. Dr. Mansyur Kampus USU Padang Bulan, Medan, Indonesia 20155
[2] *Department of Architecture, Institut Teknologi Sepuluh Nopember, Indonesia*

ARTICLE INFO

Article history:
Received July 16, 2021
Received in revised form Nov. 22, 2021
Accepted October 18, 2022
Available online December 31, 2022

Keywords:
Configuration
Gated community
Segregation
Space syntax
Spatial

***Corresponding author**: Salmina Wati Ginting
Department of Architecture, Universitas Sumatera Utara, Indonesia
Email: salmina.wati@usu.ac.id
ORCID: https://orcid.org/0000-0002-5527-3538

ABSTRACT

Previous studies have shown that gated community development encourages social segregation, which occurs due to the ability of the design elements to separate from their environment. An example is the plurality of the entrance element, the provision of portals to roads, and the inaccessibility of open spaces such as parks to the public. Therefore, this study discusses the relationship between the spatial configuration of a gated community and social segregation by analyzing spatial elements, such as boundaries, roads, and public spaces. The relationship is described quantitatively with the integration value (R), both on local (R3) and global (Rn) scales, generated by the DepthmapX application from Space Syntax. One of the gated communities in Surabaya, Indonesia, Citraland, was chosen as a case study. The results showed that the higher the integration value, the lower the level of segregation and vice versa. Furthermore, it proves that the primary circulation path has the highest integration value and is the main axis influencing segregation. The number of entrances does not affect segregation as opposed to its relationship to the main axis. The number of public spaces also does not affect segregation, as opposed to the relationship between the location of public spaces and the main axis. The level of segregation of gated communities is very likely to differ on a local scale (R3) and a global scale (Rn). Citraland has proven to be integrative on a local scale but segregative on a global scale.

Introduction

Spatial configuration or design is the physical structure of space and its relationships (Peponis 1997). It also shows the spatial elements' relations and how they are arranged and designed to accommodate specific activities (Bill Hillier and Hanson 1984; B Hillier and Vaughan 2007; Bill Hillier 2015). According to Bill Hillier and Hanson (1984), the "organization of architectural space" is believed to encourage different behaviors, activities, or diverse social lives. For example, the configuration of roads throughout the city, straight ones, bends, and intersections affect drivers' route choices. Similarly, people do not arbitrarily choose to visit city parks, restaurants, and even specific places where meetings are held. Different spatial configurations affect varying social lives from the least scale, for example, the simple tents of the Bedouin tribe in the Sahara Padang, to modern and smart cities in developed countries. Bill Hillier and Hanson (1984, 8) stated that "*…the differences in the organization of architectural and urban space relate to and influence social life*".

Generally, a spatial configuration is divided into two, namely closed and open. Clear perimeter boundaries characterize closed configurations, sometimes massive such as non-transparent walls or fences. Entry is only limited to one individual at a time. An open configuration provides multiple access points with a hollow border character.

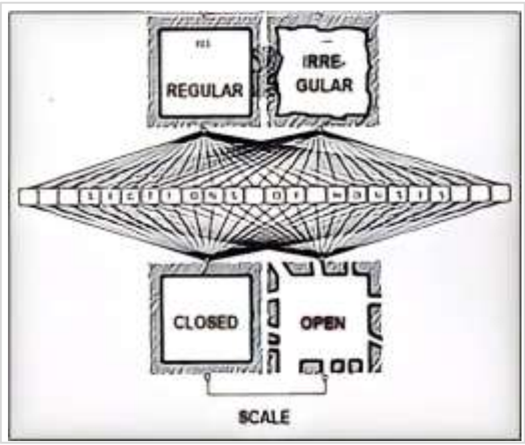

Figure 1. Schematic of the basic principles of closed and open spatial configuration
Source: (Krier 1993)

Haas and Westlund (2017) reported several fundamental principles of the "Open" City. This is referred to as the antithesis of the closed city concept. The three basic principles are 1) ambiguous edges in the form of permeable and porous boundaries, 2) incomplete forms such as the space's ability to 'dialogue,' adapt and be open to various designs according to the user's needs, and 3) unresolved narrative where space is designed with surprises to avoid boredom and a 'that is all experience.

Regarding the issue of social segregation, it is encouraged by closed configurations and reduced by the open type. In this context, it is defined as some form of physical separation that results in the absence of social interaction. Legeby (2010) stated that segregation is a type of construction that involves social hierarchies. It emerges from a socially distanced life which is manifested physically.

The spatial design is a closed configuration at the residential scale, especially those with certain security features built by private developers, often referred to as gated communities or 'fenced residents. This is understandable given the background that gated communities are generally built for security reasons, namely to protect themselves and their property from external disturbances. Pompe et al. (1998), one of the pioneers of gated community study, stated that the three main reasons people choose to live in such areas are security, lifestyle, and prestige. In addition, (S. M. Low 2001; 2008; Glück and Low 2017; Caldeira 2001; Roitman and Recio 2020; Roitman and Scopes 2012; Roitman 2017; Le Goix 2005; Atkinson and Blandy 2006), to name but a few of the numerous studies, also conclude that such communities tend to encourage segregation. Leisch (2002), who researched gated communities near Jakarta, Indonesia, stated that security is the main reason people reside in such areas.

Although several preliminary studies reported that gated communities tend to encourage segregation. However, only a few studies have stated that spatial elements influence segregation. Alkurdi (2015), Caldeira (2001), Glebbeek and Koonings (2016), and Roitman and Scopes (2012) stated that boundary elements, namely fences and walls around gated communities, encourage segregation. Haas and Westlund (2017) reported that centralized public spaces and non-porous boundaries encourage segregation. Regarding boundaries and entrances, Ellin (1997) further stated that a porous and permeable boundary is characterized by the number of entrances to a gated community. Vaughan (2005) reported that such areas are usually located away from main roads.

Furthermore, Oliveira (2016) stated that residential layouts in the form of cul-de-sacs and loops with doors backing the main road encourage segregation compared to the grid and linear types. In line with this, Jacobs (1992), and Duany, Plater-Zyberk, and Speck (2017), reported that it tends to be more segregative than grid or linear types. Jacobs (1992) stated that designing roads with multiple intersections makes cities appear livelier and more interactive and can be used to monitor one another.

Figure 2. Grid-shaped road (left), fragmented grid (middle) and cul-de-sac (right)
Source: (Southworth and Ben-Joseph 2003)

The aforementioned literature study shows that several elements affect spatial configuration and social segregation. These include entrances, boundaries, public spaces, and road layouts. Furthermore, previous studies also stated that closed configurations encourage segregation more than the open type. This research failed to explain the relationship between spatial configuration and social segregation measurably or quantitatively. For example, which elements affect segregation most among entrances, boundaries, and public spaces? How huge is the impact in terms of numbers?

This study discusses the relationship between the spatial configuration of gated communities and social segregation. The spatial analysis uses three variables: entrances, boundaries, and public spaces (Putra 2021). The entrance is discussed in terms of number, accessibility, and boundaries are analyzed with respect to permeability. At the same time, public space is illustrated in terms of accessibility and the accompanying private or public character. Segregation terminology is discussed concerning the integration value of the DepthmapX Space Syntax application. The higher the road or space integration value, the lower the level of segregation. One gated community in Surabaya, Indonesia, Citraland was selected as the case study.

Citraland Surabaya is one of the largest gated communities occupying an area of approximately 2000 hectares in West Surabaya. This residential region has the tagline "The Singapore of Surabaya." This is because its sculptural and vegetation designs and lifestyles are similar to Singapore's. The existence of simple villages and settlements with low density around Citraland is the main reason for selecting this gated community as a case study. The present analysis aids in determining whether the development of Citraland causes segregation in these villages, considering that this gated community targets the upper-middle-class market. This area is divided into seven zones for easy investigation, as shown in figure 2.

Figure 3. Gated community Citraland Surabaya

Method

This study is focused on understanding space, how it is designed, organized, and configured, as well as its relations with specific activities and its impact on social life. The spatial configuration of gated communities is related to and affects social segregation. Incidentally, three of its elements, including entrances, boundaries, and public spaces, were analyzed using the Space Syntax application, specifically DepthmapX 0.8. Some information obtained from this application's operation is the level of integration and segregation of roads or areas. These are depicted by the value of integration (R) and the color of the road.

A high integration value is indicated by a 'warm' line color, namely yellow or red. Meanwhile, a low integration value is depicted by a 'cool' line color, namely green or blue. The high integration value indicates that the road is well known, the most crowded, and the most frequently used. Theoretically, it has the highest economic value (Bill Hillier 2007; B Hillier and Vaughan 2007). Roads with a high integration value also exhibit integrative rather than segregative characters (B Hillier and Vaughan 2007).

Besides being able to explain segregation quantitatively in the form of numbers, DepthmapX can also illustrate it on both local and global scales. The segregation value on a local scale (indicated by the R3) simply means that the general public recognizes the area within walking distance or a radius of 400 meters. For example, if some persons walk on CitraLand within a radius of 400 meters, they can recognize the entire area. This implies that the area is quite integrated (not separated) on a local scale. Despite being indicated by an R3 value above average, the region also shows a 'warm' color, namely reddish-yellow.

Separation on a global scale (indicated by the Rn value) means that the area is unknown to the general public. Low integration values are depicted by 'cold' colors i.e. bluish-green.

Furthermore, field observations were carried out based on the characteristics of the spatial elements, such as entrances, boundaries, and public spaces, as well as the configuration of the three elements. The analysis at this stage resulted in identifying the spatial configuration of the gated community, both segregative and integrative.

In the present research, DepthmapX was run twice. The first stage was on the Citraland map (graphic map in Dxf format). Here this community is drawn according to the road and space configuration obtained from the conversion of Google Earth maps. The DepthmapX application generates an axial map that displays data on the integration value (R) of all road segments on both global (Rn) and local scales (R3). The integration value and the path color describe which roads are segregative and integrative. To ensure the analysis is accurately executed, in addition to the integration values of R3 and Rn, the intelligence value (R2) is also displayed. R2 is obtained by comparing the integration value of Rn on the X-axis and the connection on the Y-axis. The maximum R2 value is 1.0, which indicates it has a strong connection on the global scale (Rn). A high R2 value correlates with a greater degree of integration and a low level of segregation on a global scale.

The second stage is a spatial experiment related to changing the accessibility and permeability of boundary elements, roads, and public spaces. It was carried out as follows.

a. The barrier permeability is changed by closing and opening specific entrances.
b. Road accessibility was changed by building fences or portals in several locations. For instance, in CitraLand, the fences or portals were erected at 54 points, according to the results of field observations.
c. The accessibility to public spaces is changed by cutting off its entrance or moving it to another area or location.

Theoretically, this spatial experiment is bound to change the integration value (R). The analysis of the integration value before and after the test illustrates which spatial elements primarily influence it and also affect the segregation level. There are two integration values in Space Syntax, namely local and global scales denoted by R3 and Rn, respectively. Therefore, the analysis of changes in the value of integration, in addition to explaining which spatial elements have the most influence, also explains their impact on both local and global scales. The study methodology is schematically shown in figure 4.

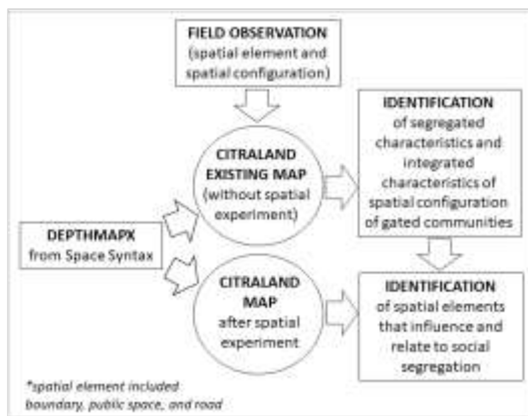

Figure 4. Schematic of study methodology

Result and discussion

DepthmapX 0.8 application at gated community Citraland Surabaya

The application of the DepthmapX software on the Citraland map is shown in figure 5. It is evident that the grid-shaped and loop or cul-de-sac roads have warm (red and yellow) and cold colors (blue and green), respectively. Warm colors show a higher integration value than cool ones.

Figure 5. Axial map of local integration Rn

Figure 6. Axial map of local integration of R3. Areas with high integration value are marked with a white dotted line

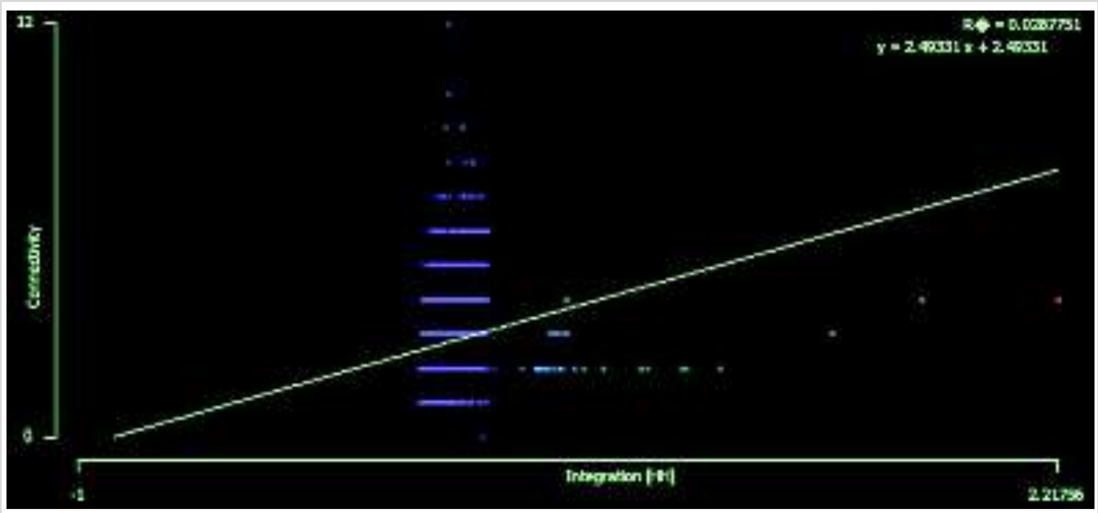

Figure 7. Intelligence value R2=0.02877

Areas with high integration values are a small part of Zones 1, 4, 5, 6, and 7. Meanwhile, most Zones 1, 2, and 3 have low integration values. This difference explains that grid-shaped roads that intersect with many others tend to be more integrative than cul-de-sac and loop-shaped ones.

The values of local (R3) and global integration (Rn) of Citraland are shown in table 1. The average value of R3 is slightly greater than that of Rn, meaning that Citraland is well known on a walking scale of approximately 300 to 400 meters from the outermost boundary than globally.

Table 1. Information or object categories

No	Attribute	Minimum	Average	Maximum
1	Rn integration	0.19117	0.23162	1.21756
2	R3 Integration	0.58170	1.20597	2.75279
3	Intelligibility R^2	0.028775		

The analysis results are as follows from the axial map and other data obtained from running the DepthmapX application.

1. The average local integration value (R3) is 1.20597. It is greater than the global integration value (Rn) of 0.23162. This indicates that Citraland is well known on a local scale with a radius of 300 to 400m from the outermost point than globally. It is in line with the low intelligence value of 0.028775. It implies that the CitraLand residential area and the city road network's spatial structure are less integrated and, therefore, unknown. For the record, the CitraLand residential area is located in the westernmost region of Surabaya City, which at the time of its construction in the 90s, was an agricultural land managed by the community and low-density village.
2. Telaga Utama and Citra Raya Lakarsantri, designed as the main roads connecting the northern-southern sides, proved to have the highest integration value. Telaga Utama managed to become the most integrated road with all others in the entire CitraLand residential area on a local scale but not globally.

Observations of land use in Citraland show that Zone 1 is filled with several functions, including a golf course, waterpark, Ciputra University (UC) and UC Walk campuses, Kozko commercial area, and residential clusters. The golf course is private and not accessible to the public. Residential clusters are built in a grid formation. Zone 1 has three entrances, one of which is Citra Raya Lakarsantri. It is the main entrance, specially designed with a sculpture, four lanes of roads, and a 'roundabout' measuring 80 meters, including a park. One of the entrances to this zone emanates from a narrow village alley connected to Waterpark Boulevard and the UC campus. The houses in this alley were converted to hostels for some UC students. This zone's western and eastern sides are bounded by a massive wall and a road, respectively.

Figure 8. Entrance from the *kampung* alley in zone 1

Zones 2 and 3 are dominated by golf courses and a small number of residential clusters. There is only one entrance in zone 3, namely the village alley (Gang IVG), while 2 has none from outside Citraland. There are no massive boundaries in the two zones, except for 3 in the south, which borders Lakarsantri Village. Apart from the private golf courses, these two zones have no other public spaces.

Zone 4 is described as a 'middle' or 'transition zone. It mediates zones 1, 2, and 3 in the west with the main function of a golf course and 5, 6, and 7 in the east and north, which are dominated by high-density residential areas. There is no planned public space in this zone, but an area in the southern part of the remaining undeveloped plots is usually busy with sports activities, especially on weekends. The entire zone has a permeable boundary, including the main Telaga Utama road, which limits it to the east.

Zones 5 and 6 are dominated by residential clusters and supporting commercial functions. These two are the most densely populated zones in all of Citraland. The entrance to Zone 5 is located on the northern side, namely Lontar. It is equipped with a flying bird statue alongside the public space and commercial area in the form of a G Walk. Interestingly, the placement of the G Walk at the entrance certainly portrays its inclusive and public character, which services the people of this community. The only public space available is Merlion Park in Zone 6, but it is not accessible to the public. The park is fenced off and has no parking space or entrance. Within this area, there is a residential cluster therefore, access to the park is completely closed except for the residents.

Figure 9. Cluster-shaped cul-de-sac with fence/portal inside Merlion Park complex

Residential clusters in Zones 5 and 6 are not built in separate blocks from the main road but are erected alongside it linearly. This concept is unusual because the residents in fenced communities generally want security and privacy and are therefore placed separately. The plots on the left and right of the main road are for commercial functions such as shops and offices. Citraland is a gated community that does not apply the general design concept.

Figure 10. Occupancy on the side of the Balerina Raya road in zone 6, no portal/fence, not in a separate cluster

Zone 7 is located on the northernmost side of Citraland in the form of low-density residential clusters and public spaces. It has the most entrances, approximately four, directly adjacent to the villages in the north of Citraland. The public spaces provided are Fresh Market, the North Junction shopping complex, and a green park with a tennis court called Citraland Square Park.

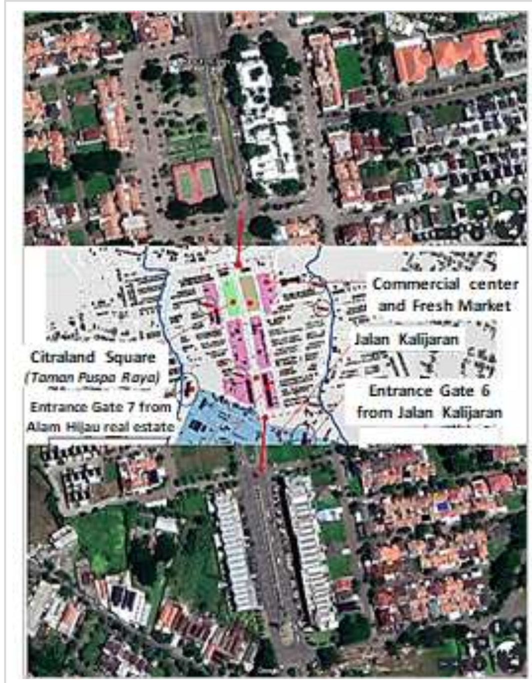

Figure 11. Zone 7 public space includes Citraland Square Park and Fresh Market (top) and North Junction shopping complex (bottom).

The results of field observations related to the three spatial elements, such as entrances, boundaries, and public spaces are shown in table 2 as follows:

Table 2. Characteristics of spatial elements, the value of integration, and level of segregation

Zone/function	Layout	NoE	NoPS	Maximum-minimum integration value	Segregation rate
1/Residential and golf course	Grid and C&L	3	4 Waterpark, UC Campus, UC Walk	1.95652 0.33333	Low integration (high segregation)
2/Golf course	C&L	0	0	1.98057 0.33333	Low integration (high segregation)
3/ Golf course	C&L	1	0	1.749517 0.33333	Low integration (high segregation)
4/Low density residential	Grid	0	1 Plot 'left over'	2.61736 0.33333	Medium integration (medium segregation)
5/High-density residential and commercial	Grid	1	1 G- Walk	2.51734 0.53374	High integration (low segregation)
6/High-density residential & commercial	Grid	1	2 G-Walk, Merlion Park	2.62384 0.79233	High integration (low segregation)
7/Low density residential and r. public	Grid	4	2 Citraland Square Park, market	2.752792 0.69981	High integration (low segregation)

Note: NoE = number of entrances; NoPS = number of public spaces; C&L Cul-de-sac and Loop

Table 2 shows that spatial planning affects segregation, while the number of entrances and public spaces has an insignificant effect. Zone 6 has more public spaces than entrances (2:1). Meanwhile, Zone 7 has more entrances than public spaces (4:2), although both have low levels of segregation.

There is an assumption that the greater the number of entrances and public spaces, the lesser the level of segregation. This tends to occur because the movement of people and vehicles to and from the gated community is usually crowded. However, table 2 shows that the two spatial variables do not affect the level of segregation. Based on this, spatial experiments were carried out, such as changing the accessibility of entrances and public spaces without altering the number.

DepthmapX 0.8 app with spatial experiments

In the field observations carried out from 2018 to 2020, it was reported that Citraland had three main entrances, namely Lontar, Citra Raya Lakarsantri, and the Emerald Mansion. Furthermore, there are seven other entrances from neighboring villages. None of the ten entrances are equipped with security features. All are accessible to the public without inspection.

Figure 12. Location of 10 entrance gates to Citraland

Furthermore, 54 roads are equipped with security features. These are in the form of mechanical portals or iron fences guarded by security officers. These were not installed at the 10 main entrances that were initially identified. It was installed at the residential cluster entrance, some of which are separated from the main road up to 76 meters, such as the Esplanade cluster in front of the UC Campus. These were also equipped with mechanical portals and guard posts, ensuring that activities performed in clusters were not visible from the main public road, as shown in figure 13.

Figure 13. Portal/fence at the entrance to the Esplanade Park zone 1 cluster

Spatial experiments were carried out as follows 1) changing the boundary permeability by closing specific entrances and opening others, 2) changing road accessibility by permanently installing 54 fences or portals throughout Citraland, and 3) changing the accessibility of public spaces by closing certain roads and opening others.

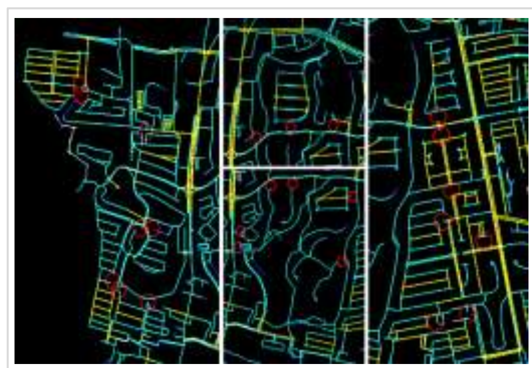

Figure 14. Spatial experiment of road elements, namely the termination of the accessibility of fenced/portaled roads

The aim is to ascertain if the value of integration (R) changes with the spatial experiment.

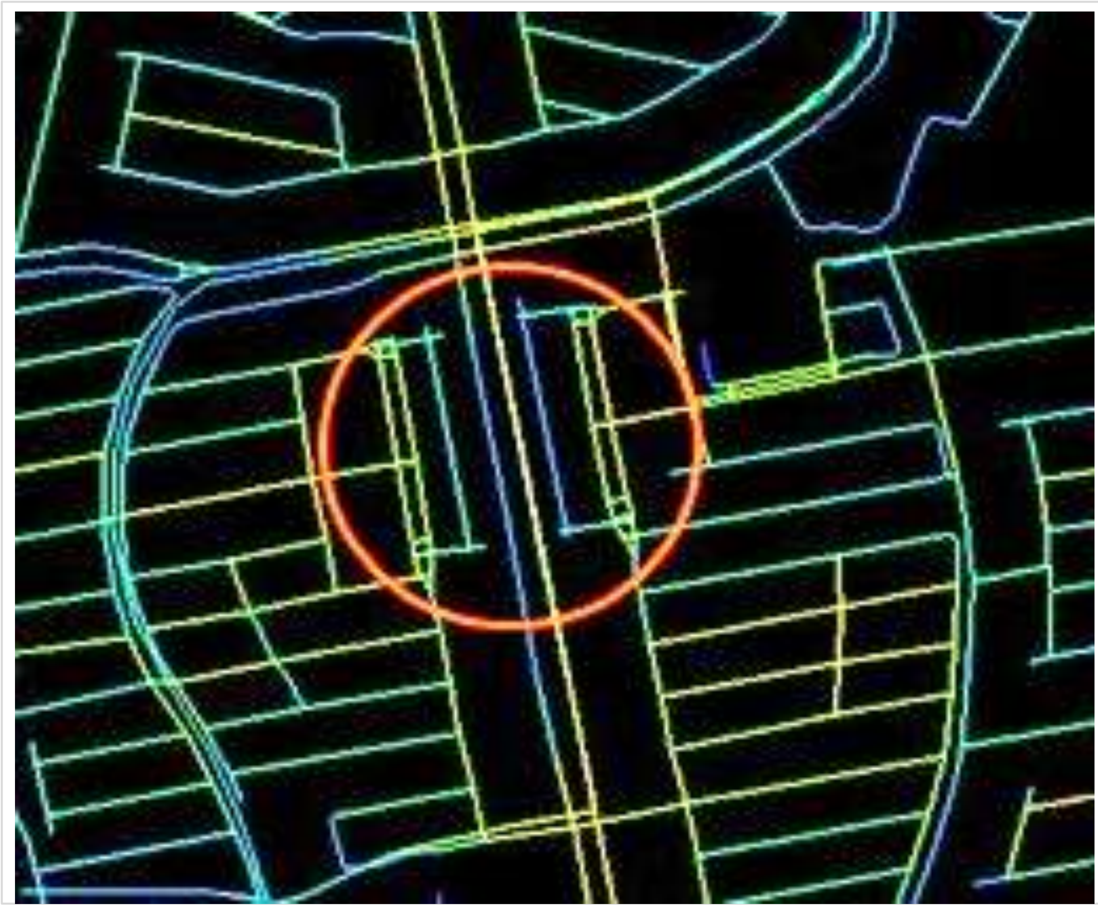

Figure 15. Access to the public space of Citraland Square Park from Telaga Utama has been cut off/eliminated. The park is only accessible from other roads on the east and west sides of the park

The application of DepthmapX on the Citraland map in terms of changing the boundary permeability and road and public space accessibilities is proven to affect the integration values of Rn and R3, as shown in table 3.

Table 3. Average integration value before and after a spatial experiment

No	Average value	Existing Value	Spatial experiment		
			Boundary (1)	Road (2)	Public space (3)
1	Rn integration	0.23162	0.2299	0.2278	0.2154
2	R3 Integration	1.20597	1.2003	1.1998	1.2190
3	Intellij-biliti R^2	0.02877	0.2808	0.2821	0.2732

Spatial experiment:
(1) Closing the entrance of Lontar and opening 2 (two) other doors
(2) Cut-off access to 54 roads in the cluster
(3) Termination of access to public spaces from the main road, namely Telaga Utama

Table 3 shows that the global scale integration value of Rn (city scale) tends to decrease when the three spatial elements are changed. The most significant decrease occurred in changing the accessibility of public spaces from 0.23162 to 0.2154. With respect to the local scale integration value of R3, it was proven to be reduced by the spatial boundary and road experiment. Although, the spatial experiment of public space has been proven to increase the value of R3. Therefore, the increase in the value of R3 needs to be investigated again in zone 7 only using more detailed and in-depth analysis.

In-depth analysis zone 7

Spatial experiments were carried out on a smaller unit, such as Zone 7, to get more detailed and accurate results. It was selected because this region has complete spatial elements. This zone has several public spaces and applies a permeable boundary in the form of 4 (doors) entrances. It consists of a combination of fenced or portaled roads accessible to the public. Telaga Utama, which is the main axis, also crosses this zone.

Figure 16. Zone 7

As was previously carried out on all Citraland maps (zones 1 to 7), DepthmapX from space syntax was also applied to AutoCAD.dxf zone 7 maps, as shown in the following image. This figure shows an axial map of the local and global integration of R3 (left) and Rn (right), respectively. The integration value of R3 is higher than that of the global denoted by Rn, as shown in table 4.

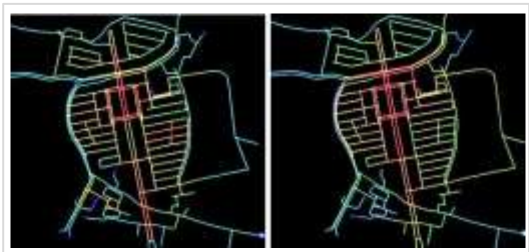

Figure 17. Axial map of R3 local integration zone 7 (left) and global integration Rn (right)

Table 4. Global integration (Rn), local integration (R3), and zone 7 intelligence values

No	Attribute	Minimum	Average	Maximum
1	Rn integration	0.1862	0.3850	0.5670
2	R3 Integration	0.3333	1.2070	2.2762
3	Intelligibility	$R^2 = 0.44231$		

Furthermore, a similar spatial experiment was carried out, i.e. changing the permeability and accessibility of boundaries, roads, and public spaces. In the previous experiment, fences or portals were activated on 54 roads. Then in zone 7, 9 roads were closed, as shown in figure 18. The boundary experiment involves closing the entrance to the zone except for Telaga Utama, as shown in figure 19. The public space experiment is shown in figure 20. The global and local integration values of Rn and R3 are shown in table 5.

Figure 18. Accessibility termination of 9 zone 7 roads

Figure 19. Experimental boundary in the form of closing the entrance to the zone except for Telaga Utama

Figure 20. Axial map of local integration in experiments 4,5 and 6

Table 5. Effects and interrelationships of spatial elements with the level of segregation in zone 7

No	Attribute	Existing value	Spatial experiment					
			Bounds	Public space				Road
			(1)	(2)	(3)	(4)	(5)	(6)
1	Rn	0.3850	0.35991	0.35540	0.38149	0.37134	0.37181	0.3489
2	R3	1.2070	1.22173	1.17601	1.22543	1.21914	1.21552	1.2204
3	R^2	0.44231	0.27205	0.24318	0.36626	0.31151	0.32116	0.3617

Spatial experiment
(1) 8 entrances to the zone removed (1 road from Telaga Utama remains)
(2) Access to public spaces through Telaga Utama is eliminated
(3) Transfer of public space to another location that is still connected to Telaga Utama (public space in the middle of the zone)
(4) Transfer of public space to the north (public space at the edge of the zone)
(5) Relocation of public space to the south (public space at the edge of the zone)
(6) Activate 9 portals or fences to the cluster (9 accesses removed)

Table 5 shows that all experiments tend to reduce the average global integration value Rn. The most significant decrease occurred in an experiment (6) involving activating nine portals or cluster fences. It simply means that there are 9 roads leading to the cluster removed. Among these were four roads that are directly connected to the Telaga Utama. The smallest decrease was discovered in experiment (3), where the public space moved to another location connected to the main axis.

Meanwhile, five of the six experiments tended to increase the average local integration value of R3. The highest increase occurred in experiment (3), moving public space to another location still connected to the main axis. In this case, the average local integration value of R3 increased from 1.20695 to 1.22543. The decrease in the average value of local R3 integration from 1.20695 to 1.17601 occurred in experiment (2), where access to public spaces through Telaga Utama was eliminated. This occurred because Telaga Utama is Citraland's main axis with the highest integration value of both local R3 and global Rn.

All experiments carried out tend to reduce the value of intelligence. The most significant decrease from 0.44553 to 0.24318 occurred in an experiment (2) access to public spaces through Telaga Utama was removed.

Conclusion

The primary circulation path that serves as the main axis with the highest integration value is related and also affects segregation. The number of entrances does not affect segregation. This study proves that it is influenced by the position of the entrance on the main axis. Meanwhile, entrances that are adjacent to or connected to the main axis tend to reduce the level of segregation.

Road fences tend to decrease the value of integration, thereby increasing segregation. The number of public spaces does not affect the level of segregation. It is also not affected by the position of the public space at the edge or middle of a gated community. The present study proves that the factor that influences segregation is the position of public space on the main axis. The closer or more connected it is to the main axis, the higher the integration value and the smaller the segregation.

Spatial configuration affects segregation on the local R3 and global scales Rn. Citraland's spatial configuration tends to be integrative and segregative on local and global scales.

References

Alkurdi, Nabeel. 2015. 'Gated Communities (GCs): A Physical Pattern of Social Segregation'. *The Anthropologist* 19 (1): 229–37. https://doi.org/10.1080/09720073.2015.11891657.

Atkinson, Rowland, and Sarah Blandy, eds. 2006. *Gated Communities: International Perspectives*. 1st ed. United Kingdom: Routledge.

Caldeira, Teresa P. R. 2001. *City of Walls Crime, Segregation, and Citizenship in São Paulo*. 1st ed. California: University of California Press.

Duany, Andres, Elizabeth Plater-Zyberk, and Jeff Speck. 2017. 'The Charter of the New Urbanism'. In *The City: Critical Essays in Human Geography*, 577–82. United Kingdom: Taylor & Francis.

Ellin, Nan, ed. 1997. *Architecture of Fear*. Hudson, New York: Princeton Architectural Press.

Glebbeek, Marie-Louise, and Kees Koonings. 2016. 'Between Morro and Asfalto . Violence, Insecurity and Socio-Spatial Segregation in Latin American Cities'. *Habitat International* 54 (May): 3–9. https://doi.org/10.1016/j.habitatint.2015.08.012.

Glück, Zoltán, and Setha Low. 2017. 'A Sociospatial Framework for the Anthropology of Security'. *Anthropological Theory* 17 (3): 281–96. https://doi.org/10.1177/1463499617729229.

Goix, Renaud Le. 2005. 'Gated Communities: Sprawl and Social Segregation in Southern California'. *Housing Studies* 20 (2): 323–43. https://doi.org/10.1080/026730303042000331808.

Haas, Tigran, and Hans Westlund, eds. 2017. *In The Post-Urban World Emergent Transformation of Cities and Regions in the Innovative Global Economy*. 1st ed. United Kingdom: Routledge.

Hillier, B, and L Vaughan. 2007. 'The City as One Thing'. *Progress in Planning 67*, pp 205-230. http://discovery.ucl.ac.uk/3272/.

Hillier, Bill. 2007. *Space Is the Machine*. London: Space Syntax.

———. 2015. *Space Is the Machine: A Configurational Theory of Architecture*. London, United Kingdom: Space Syntax. https://discovery.ucl.ac.uk/id/eprint/3881/1/SITM.pdf.

Hillier, Bill, and Julienne Hanson. 1984. *The Social Logic of Space*. Cambridge: Cambridge University Press.

Jacobs, Jane. 1992. *The Death and Life of Great American Cities*. United States: Vintage.

Krier, Rob. 1993. *Rob Krier: Architecture and Urban Design*. 1st ed. United States: Wiley.

Legeby, Ann. 2010. 'From Housing Segregation to Integration in Public Space: A Space Syntax Approach Applied on the City of Södertälje'. *The Journal of Space Syntax* 1 (1): 92–107.

Leisch, Harald. 2002. 'Gated Communities in Indonesia'. *Cities* 19 (5): 341–50. https://doi.org/10.1016/S0264-2751(02)00042-2.

Low, Setha. 2008. 'The Gated Community as Heterotopia'. In *Heterotopia and the City*. United Kingdom: Routledge.

Low, Setha M. 2001. 'The Edge and the Center: Gated Communities and the Discourse of Urban Fear': *American Anthropologist* 103

(1): 45–58. https://doi.org/10.1525/aa.2001.103.1.45.

Oliveira, Vítor. 2016. *Urban Morphology: An Introduction to the Study of the Physical Form of Cities*. United States: Springer.

Peponis, John. 1997. 'Geometries of Architectural Description: Shape and Spatial Configuration'. In *1st International Space Syntax Symposium*, 31.31-31.37. London. https://www.academia.edu/2891572/Peponis_J_1997_Geometries_of_architectural_description_shape_and_spatial_configuration_in_1st_International_Space_Syntax_Symposium_London_pp_31_31_31_37.

Pompe, Jeffrey J., James R. Rinehart, Edward J. Blakely, and Mary Gail Snyder. 1998. 'Fortress America: Gated Communities in the United States'. *Southern Economic Journal* 65 (1): 192. https://doi.org/10.2307/1061366.

Putra, Gierlang Bhakti. 2021. 'Space Syntax Analysis of Urban Housing Transformation in Indonesia'. *ARTEKS : Jurnal Teknik Arsitektur* 6 (3): 415–24. https://doi.org/10.30822/arteks.v6i3.944.

Roitman, Sonia. 2017. 'Splintering (Sub) Urbanism and Social Differences: Gated Communities as the Driver for Suburban Change in Chacras de Coria (Mendoza, Argentina)'. *Revista INVI* 32 (90): 159–82. https://doi.org/10.4067/S0718-83582017000200159.

Roitman, Sonia, and Redento B. Recio. 2020. 'Understanding Indonesia's Gated Communities and Their Relationship with Inequality'. *Housing Studies* 35 (5): 795–819. https://doi.org/10.1080/02673037.2019.1636002.

Roitman, Sonia, and Jonathan Scopes. 2012. 'Discussion: Gated Communities: Definitions, Causes and Consequences'. *Proceedings of the Institution of Civil Engineers - Urban Design and Planning* 165 (3): 189–189. https://doi.org/10.1680/udap.11.00026.

Southworth, Michael, and Eran Ben-Joseph. 2003. *Streets and the Shaping of Towns and Cities*. United States: Island Press.

Vaughan, Laura. 2005. 'The Relationship between Physical Segregation and Social Marginalisation in the Urban Environment'. *World Architecture* 185 (185): 88–96.

Author(s) contribution

Salmina Wati Ginting contributed to the research concepts preparation, methodologies, investigations, data analysis, visualization, articles drafting and revisions.

Vincentius Totok Noerwasito contribute to the research concepts preparation and literature reviews, data analysis, of article drafts preparation and validation.

Eko Budi Santoso contribute to methodology, supervision, and validation.