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Evaluation of the Spatial Quality of Apartments from Different Price Categories Using the Visibility Graph Analysis: A Case of Tirana, Albania

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Abstract

During the last decade, there has been massive growth in the construction of large residential complexes and apartment blocks in Tirana. Urban density is increasing due to the fact that traditional low-story villas are demolished, and the space of the former private gardens is used for the new construction with high built ratio. The public areas which are adequate for such dense cities are not provided and therefore residents have a tendency to spend more time indoors. This research aims to evaluate the spatial qualities of the newly constructed 3+1 apartments using the Space Syntax visibility graph analysis (VGA). VGA allows to compare the overall exposure of the room, to estimate its level of privacy and control and to check if it is suitable for the assigned function. Analysis is performed for the apartments of different price levels in order to find the influence of price to the design quality and residential comfort. The results show that the degree of separation of the public and private domains corresponds to an increase in the price of the apartment. The visual exposure of the hall is higher in comparison with the living room, which facilitates the movement towards the individual rooms without interaction with the other family members.

Keywords: Space Syntax analysis (SSA), visibility graph analysis (VGA), privacy, connectivity, housing design

1.0 INTRODUCTION

Tirana as the capital city of Albania is one of the most attractive places for investment. For the next twenty years the city center is planned to be completely transformed and densified (Aliaj et al., 2003). Large residential complexes occupy the former gardens of traditional Albanian villas. At the same time the city infrastructure has not changed, the street network remains the same as it was a hundred years ago. Narrow streets are converted to urban canyons when 12-15 floor-high residential buildings are positioned often at a distance of less than 20 meters between each other. The ground floors of those buildings usually have a public function, such as offices, shops, and cafeterias. In most cases, owners expand their businesses on public sidewalks and squares and even construct without permission tents, fences, or covered terraces, reducing the space available to pedestrians (Pojani, 2010). The informal construction occurred after the change of the political system brought chaotic and uncontrolled development, which affected mainly the green areas and public spaces (Felstehausen, 1999). The city gets privatized, and the newly established open spaces are designed as commercial areas, being addressed to the visitors as consumers (Shameti, 2019). The access to such spaces gets restricted and the users may feel uncomfortable since they expected to pay and have no alternative. As the growing city in 2019 Tirana attracted 60% of all the investments in the field of construction (Göler & Doka, 2020). All development activities resulted in the fact that the urban density of Tirana is one of the highest among European capitals (Dumani et al., 2018). At the same time, in 2018, green areas are reduced to 15% in some administrative units if the city and the total amount of land with artificial surface land and built-up land reached 73% (Teqja et al., 2020). There is a lack of urban infrastructure, such as parks, public areas, sports areas and playgrounds, the sidewalks and streets are narrow, full of obstacles. The environmental quality of the city is decreasing followed by the high noise and air pollution levels, urban heat effect, traffic problems, uncomfortable and dangerous paths for pedestrians and reduction of open areas which are really free to stay.

The increasing amount of construction, the density of the city, and the level of prices in the housing market directly affect the level of prices in the housing market. Government policies on housing also push this bubble effect (Koprencka et al., 2018). Average housing prices are very high compared to family income. The apartment's price is usually 3 times higher than the construction costs (Shosha et al., 2021). During the last 3 years, the cheapest apartment price in the city outskirts has risen from 500 to 750 €/m^2 while the most expensive residence in the newly built skyscraper in the city center can cost 3000-4000 €/m2. Despite the huge price difference, the spatial qualities

of Albanian apartments are very similar. The Standard of Housing Design establishes the minimal dimensions of the rooms, classifies the apartments, and provides the list of spaces within each typology, lists the furniture which is suitable for every residential space (Gjermeni, 2017). However, the circulation space and the way the rooms are connected are not included. The apartments constructed during the post-communist period are large, and the living room area is exaggerated, while the overall efficiency of use is low (Yunitsyna, 2019). Developers aim to construct dwellings with the maximum area and density, and the recommendations of the space standards are often not taken into account. The design of the apartment layout is not rational, and the rooms can have a complex shape with niches and annexes. There is no common approach towards location of the public and private zones in the apartments or the provision of corridors in order to increase the privacy of the bedrooms.

This study is based on the evaluation of the spatial layout of the three-bedroom apartments, which belong to the contemporary residential complexes of Tirana, Albania. Samples were taken from low-, mid- and high-cost housing estates. The objective of research is to perform the visibility analysis of apartment plans and to evaluate the relationship between apartment design, the use of space and its privacy. The results allow us to understand the relationship between the quality of the apartment layout design and its price. In addition, the discussion focusses on the interior design features that facilitate the balance between public and private domains in the apartment.

2.0 LITERATURE REVIEW

2.1 Space Syntax Analysis (SSA)

Space Syntax is widely used as a method for evaluating social and spatial relations in architecture and urban design. This analysis can also be performed at the level of a single building or its part. In 1984, the founders of Space Syntax, Bill Hillier and Julienne Hanson proposed a theory which allows us to evaluate in a quantitative way the patterns of interconnected spaces and based on the results to estimate their social and cultural importance. Julienne Hanson continued the research by investigating the link between the spatial arrangements of dwelling interiors and patterns of behavior and social position of the owners (Hanson, 1998). The traditional design and shape are the products of mutual influence of the culture and environment. The social and cultural function of the building is defined by its physical forms and the way its spaces are interconnected (Hillier, 1996). SSA is a concept that is used to describe the qualitative experience of spatial perception by examining the quantitative properties of spatial structure of cities and buildings (Yamu et al., 2021). It is used to examine the built environment and reveal the morphological properties of built structures by converting building plans into graphs (Osman & Suliman, 1994). The SSA of the apartment allows to convert its layout as hierarchical graph and to calculate the main metrics, such as integration, control value, mean and total depth for each room.

Nowadays, the design of housing units is widely influenced by international architecture, and contemporary apartments are organized in a similar way. The size of the rooms is defined by the minimal space standards. There is a common tendency to join the activities of cooking, dining and living in one big room and to decrease the areas of the more private rooms. Apartments with highly specialized rooms and one large space for daytime activities are less appreciated by residents (Manum, 2009). Bafna and Chambers (2014) argue that the configuration of spaces and the way spaces are connected have a greater effect on the behavior of inhabitants than on the dimensions and areas of the rooms. Apartment layout with segregated spaces divided according to the level of privacy can be found in traditional and modern Muslim houses. The Space Syntax analysis of Iranian modern dwelling conducted by Milani and Eynifar (2019) shows that it does not have the spatial arrangement prescribed by cultural norms, and most private and public spaces are often located close to each other without any buffer space in between. Ergün et al. (2022) find the similar approach in the social apartment blocks in Turkey, where the privacy is achieved by locking the doors. Another study from Turkey shows the increase in the integration of the living room, together with its merge with the living room and kitchen, which results to a further interference of the guest in family life (Şalgamcıoğlu & Ünlü, 2013). The SSA of the large Brazilian apartments conducted by Cunha and Trigueiro (2005) demonstrates a similar shift in the modern layout design. The guests have immediate access to the living room, while the hall, or reception space, is minimized, the bedrooms have less privacy, and the bathrooms may be used at the same time by the guests and family members. The general privacy of these dwellings is achieved by controlled access to the apartment block and by reducing the number of units per floor. The spaces in the modern Iraqi house are arranged linearly, and the dwelling itself has a higher level of integration, which makes the rooms more accessible and less private (Mustafa et al., 2010). The guests can stay close to the most intimate spaces of the house and interfere with the private life of the family members (Alitajer & Nojoumi, 2016). Despite the strong influence of the globalist modern design and architecture, Choi et al. (2014) note the influence of the local culture in Asian apartments. In Arabic culture the tradition of hospitality affects the layout of the modern dwelling. Room for guests may take up one third of the total area of the house but at the same time it is isolated from the other more private spaces (Al Mohannadi et al., 2019). Barkat et al. (2020) state that the hallway is an important space that provides a gradual transition from the exterior into the interior spaces. The most important rooms are directly connected to it, providing the specific relationship between visitors and inhabitants. The corridor that leads to the intimate zones regulates the relationship between the residents. Tomah et al. (2016) advice to provide the several zones inside of the apartment. The introduction of dual and triple zones helps to achieve a higher level of privacy and prevents social interaction between family members. Alkhazmi and Esin (2017) show the importance of visual privacy and define it as one of the key factors for housing design.

2.2 Visibility Graph Analysis (VGA)

Visibility graph analysis (VGA) is a method that allows researchers to evaluate the visibility and permeability of space from the position of the user. In VGA, the square grid overlaps with the evaluated space, and the isovists (Benedikt, 1979) are constructed from the center of each grid cell. The graph shows all the spaces that are exposed or hidden, which makes it possible to evaluate the movement of the

observer and to define more attractive spaces. Turner et al. (2001) used VGA for finding the most intervisible locations, which have a greater potential to be used by a group of people. The connectivity metric is a result of merging the Space Syntax Theory (Hillier & Hanson, 1984) with the Isovist Theory (Benedikt, 1979), which characterizes the visual relationship between the spaces (Lee & Ha, 2015). In SSA, connectivity and isovist area are the most commonly used metrics (Koutsolampros et al., 2019). Connectivity refers to the number of grid cells visible from the specific point. Being calculated for large open spaces, connectivity is calculated on the relation between the isovist area and the grid size. In the case of the apartment, the applied grid is relatively small, which allows one to assess the importance of the minor details, such as the walls forming the room perimeter and other visual obstacles, such as columns. For large scale urban analysis, isovist area can be limited by defining the visibility distance, but there is no need to limit this parameter during the evaluation of the apartment since the internal distances are small. The VGA is overlayed with the existing apartment plan, making it easy to distinguish segregated and integrated spaces just by color, to evaluate the intelligibility or predictability of space (Lee, 2020). Behbahani et al. (2014) argue that connectivity values calculated for different apartments are comparable to each other in the case where the same grid and the same visibility distance are applied. The connectivity value characterizes the room visibility, which is directly related to the level of visual control. Hight visibility corresponds with the high visual control, high exposure of space and low privacy, while low visibility is typical for the hidden spaces, which are more private and remote from the main dwelling spaces. VGA allows to estimate not only the visual privacy, but also the audio privacy, olfactory privacy, and circulation and psychological privacy (Nadoomi et al., 2022). The development of visual barriers protecting the intimate areas of the house is a result of cultural interference. Evaluation of visibility of each room allows one to match its openness, protection level, and controllability with its social and functional use.

3.0 METHODOLOGY

There has been an increase in residential construction in Tirana during the last decade. Room area, apartment, the number of the construction year number, neighborhood location of the neighborhood, and infrastructure are the main factors that affect its price (Thanasi (Boçe), 2016). Figure 1 shows the exterior views of the 14 housing complexes, which are grouped depending on the cost of the m^2 into the three price categories:

- Low-cost housing with a price up to 1000 €/m^2 (Mangalem housing complex, Iris Residence, and Alba Residence)
- Mid-cost housing with prices between 1000 and 1500 €/m^2 (Fiori di Bosco Residence, Klan Residence, Housing Complex on Xhanfize Keko Street, Ursa Magnet 2 and Residential Building on Zef Jubani Street)
- High-cost apartment housing with the price above 1500 €/m^2 (Park Life Residence, Palazzo Viridario, Lake View Residence, Lake apartments, Tirana Garden Building and Park Gate apartments)

Figure 1 Selected buildings grouped by the price category (from various online sources)

For this research, 36 apartments belonging to the 3+1 typology were selected which consist of 3 bedrooms, Living+Dining+Kitchen room, corridors, halls, and bathrooms. Non-habitable spaces can be arranged in different ways; therefore, the spatial arrangement, apartment size, configuration, and design principles vary for different cases. The research starts with the collection of the available open data available, such as the name and location of the housing complex, its photographs and renderings, building plans, and the apartment prices. The information was received through communication with developers and real estate agents. Some of the data are available for open view on the websites promoting the projects. The floor plans of each building were analyzed in order to find different variations of

the 3+1 apartments. At this stage, the designs with unique spatial arrangement were selected and the solutions with very minor differences, as well as the mirrored plans, were omitted. Each of the apartments was encoded according to the price category (low, medium and high price); number of bedrooms (3 bedrooms in each apartment), and the number in the list. In order to achieve uniformity in graphical representation, the apartment plans were redrawn in AutoCAD. Figure 2 shows the plans of the selected apartments with the indication of the main habitable spaces, which are Living+Dining+Kitchen, Master Bedroom, Bedrooms, WC, and the entrance location.

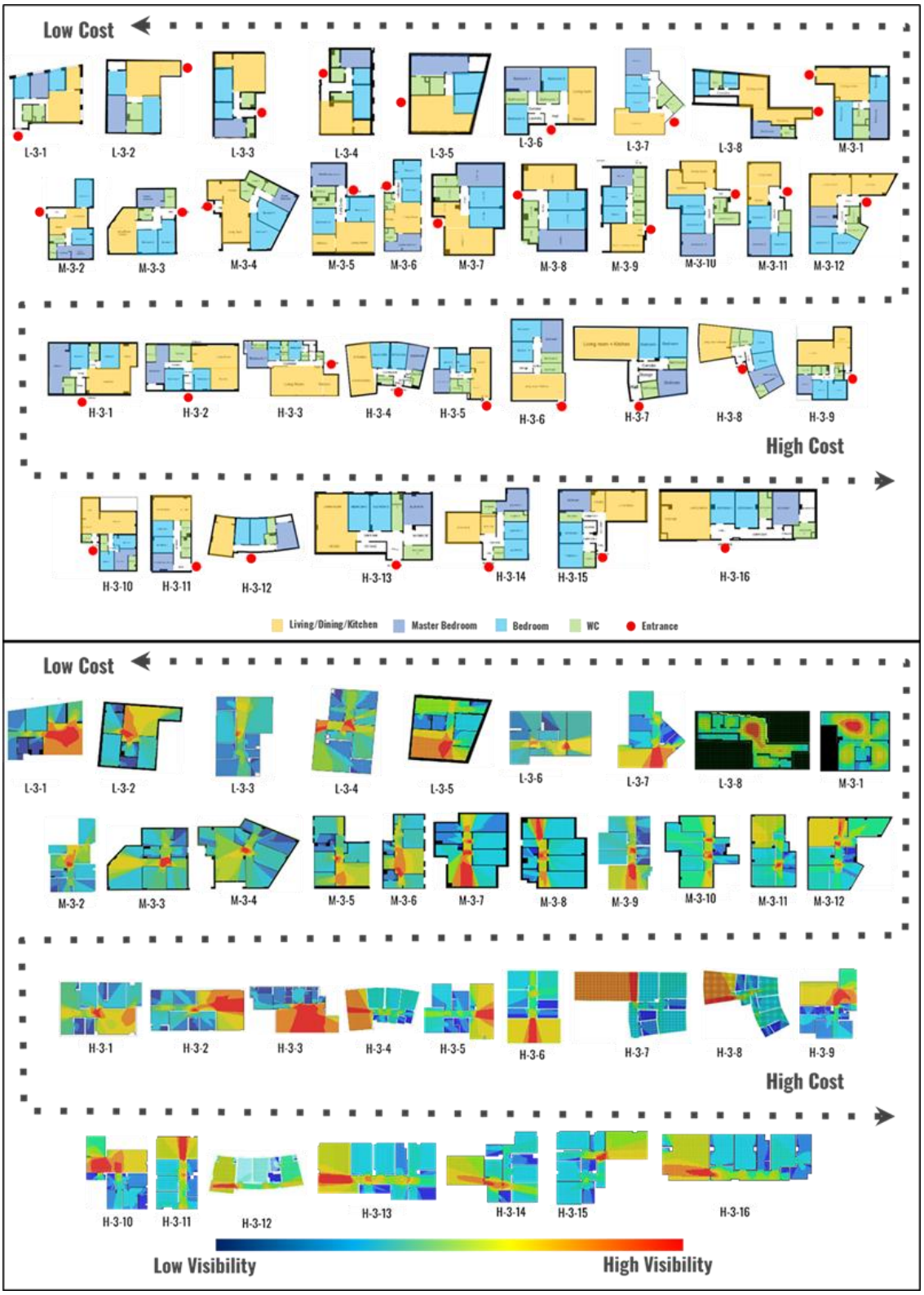

Figure 2 Functional analysis (above) and VGA (below) of the sample plans

Plans were imported into the DepthmapX program in order to obtain the VGA diagrams, and DepthmapX is a research tool originally developed by Alasdair Turner (see Turner, 2004) to perform urban and building spatial analysis. Currently, it is free software which allows one to calculate the visibility relations and provides quantitative data such as connectivity value and the graphical representation of it in the apartment plan. For all the apartments the 10 cm grid was selected in order to subdivide the internal spaces. The VGA graphs (Figure 2) show the result of the calculation of the visibility of each of the cell centers. Each cell is colored according to the level of visibility; therefore, the spaces with the higher exposure (red to yellow) and the hidden spaces (blue) can be found. Furthermore, the minimum, average and maximal connectivity values were extracted from the apartment metrics.

The next step of the analysis is to compare the level of visibility with the function of space, to estimate its level of privacy and potential comfort of use. The shape of the rooms, the position of the doors, the interconnection with the other spaces, the entrance position in relation to the house and other design factors are examined as affecting the level of privacy. The quality of the design solutions is examined based on the categorization of the apartments by price.

4.0 SPACE SYNTAX ANALYSIS OF THE CASE STUDIES

4.1 Connectivity

Connectivity is a local measure which is related with the amount of space which is visible from the specific point (Klarqvist, 1993). For the analysis it was assumed that the doors are open, therefore it is possible to observe one space from another. Sutkaitytė (2020) associates visual connection to the entrance with the higher level of social control. Rooms with greater connectivity are more suitable for social interaction (Koutsolampros et al., 2019) and family gatherings, while spaces with low connectivity are more intimate. Table 1 shows the minimum, average, and maximal connectivity for the case studies extracted from DepthmapX.

Table 1 Minimal, average and maximal connectivity of the apartments

№	Apartment Code	Price, €/m²	Connectivity			№	Apartment Code	Price, €/m²	Connectivity		
			Min.	Avg.	Max.				Min.	Avg.	Max.
1	L-3-1	750	273	2248	4415	**19**	M-3-11	1 500	342	1569	3032
2	L-3-2	750	225	1762	3572	**20**	M-3-12	1 500	231	1604	3079
3	L-3-3	790	124	1570	3419	**21**	H-3-1	1 600	966	7113	14303
4	L-3-4	790	166	1589	3321	**22**	H-3-2	1 600	330	4205	7999
5	L-3-5	800	26	2148	4031	**23**	H-3-3	1 600	52	2587	4517
6	L-3-6	900	298	2169	4871	**24**	H-3-4	1 600	220	2937	6291
7	L-3-7	900	868	4694	8856	**25**	H-3-5	1 700	375	2167	4239
8	L-3-8	900	50	1731	3106	**26**	H-3-6	1 750	494	2449	4705
9	M-3-1	1 000	125	1086	1960	**27**	H-3-7	1 900	350	4520	8350
10	M-3-2	1 050	470	2512	5533	**28**	H-3-8	2 000	523	5715	6291
11	M-3-3	1 000	399	2364	4137	**29**	H-3-9	2 000	115	3671	7843
12	M-3-4	1 050	229	2984	6487	**30**	H-3-10	2 000	154	3440	6939
13	M-3-5	1000-1200	8	2647	5792	**31**	H-3-11	2 000	228	1779	3598
14	M-3-6	1000-1200	24	2470	5117	**32**	H-3-12	2 000	262	2689	5459
15	M-3-7	1 200	187	2164	3855	**33**	H-3-13	2 100	431	2047	4254
16	M-3-8	1 250	171	1654	3160	**34**	H-3-14	2 100	287	1879	4058
17	M-3-9	1 300	76	623	1260	**35**	H-3-15	2 100	332	1964	4535
18	M-3-10	1 500	80	1504	3338	**36**	H-3-16	2 200	164	2163	4842

Connectivity can be used as an indirect indicator of the design quality, which is affected by the size of the apartment and the complexity of the plan design. High average connectivity is typical for apartments with large total area, large rooms, and simple plans with rational spatial divisions. Low average connectivity indicates smaller apartments with larger number of rooms, segregated spaces, and intricate interior designs. Maximal connectivity characterizes the amount of space that can be observed from a specific point in the apartment and, therefore, the level of visual control. Usually, this point can be found in the largest room, which is dedicated to the family and guests' meetings.

Figure 3 shows the distribution of connectivity for apartments depending on the prices. The highest value is registered for the high-cost apartments, while the lowest group is the mid-cost apartments. In the case of the high-cost group, the level of connectivity can be explained due to the fact that the total area of these apartments is bigger than the others. All habitable rooms are bigger which means that there are more grid cells which are visible from the specific point. Low-cost apartments have a specific spatial configuration which aims to reduce the service space, such as corridors and halls. In this case, the doors of the bedrooms can be opened directly to the living room. The common features of the mid-cost apartments are the long corridors and medium-sized living rooms which lowers the connectivity in comparison with the high-cost group.

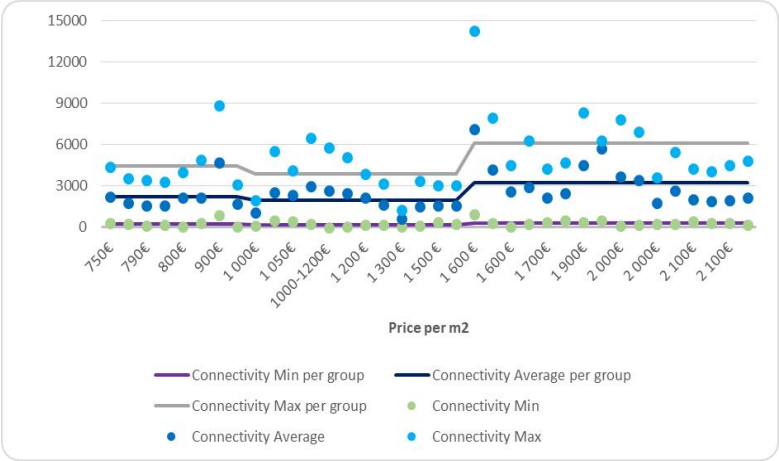

Figure 3 Connectivity values for the apartments

4.2 Visibility Graphs Analysis (VGA)

Based on the VGA of apartments (Figure 2), visibility level of each space is calculated. All spaces in the apartment were classified as Living+Dining+Kitchen (L/D/K), Master Bedroom (MB), First and Second Bedrooms (B1 and B2), Bathrooms (WC1, WC2 and WC3), Corridor (C) and Hall (H). For different case studies, the number of bathrooms may vary from 1 to 3 and some other spaces, such as storage or laundry may be added. Entrance hall is not present in all cases since the exterior door can be opened directly into the living room. Similarly, the hallway may not be present because the bedrooms can also be accessed through the living room. The level of visibility of all spaces is given in Table 2.

Table 2 Visibility of rooms and spaces

№	Apartment Code	Visibility Min	Visibility Med	Visibility Max	№	Apartment Code	Visibility Min	Visibility Med	Visibility Max
1	L-3-1	H, MB, B1, WC1, WC2	C, B2	L/D/K	**19**	M-3-11	MB, B1, WC1	H, B2	L/D/K, C
2	L-3-2	MB, B1, WC1, WC2	H, B2	L/D/K, C	**20**	M-3-12	MB, B1, B2, WC1, WC2	K	L/D/K, C, H
3	L-3-3	H, B1, B2, WC1, WC2	L/D/K, MB	C	**21**	H-3-1	H, B1, B2, WC1, WC2, WC3	MB	L/D/K, C
4	L-3-4	WC1, WC2	L/D/K, MB, B1, B2, WC1	C, H	**22**	H-3-2	H, B1, B2, WC1, WC2	MB	L/D/K, C
5	L-3-5	B1, WC1, WC2	C, MB, B2	L/D/K, H	**23**	H-3-3	MB, B1, B2, WC1, WC2, WC3	K	L/D/K
6	L-3-6	MB, B1, WC1, WC2, WC3	L/D/K, B2	C, H	**24**	H-3-4	MB, B1, B2, WC1, WC2, WC3	K	L/D/K
7	L-3-7	MB, B1, B2, WC2	C, WC1	L/D/K	**25**	H-3-5	B1, B2, WC1, WC2, WC3	MB, C	L/D/K
8	L-3-8	B1, B2, WC1, WC2	MB, C	L/D/K, H	**26**	H-3-6	H, B2, WC1, WC2	MB, B1	L/D/K, C
9	M-3-1	MB, B2, WC2, WC3	H, B1, WC1	L/D/K, C	**27**	H-3-7	H, MB, B1, B2, WC1, WC2, WC3	C	L/D/K
10	M-3-2	H, MB, B1, WC1, WC2	C, B2	L/D/K	**28**	H-3-8	MB, B1, B2, WC1, WC2, WC3	C, H	L/D/K
11	M-3-3	H, WC1, WC2	L/D/K, MB, B1, B2	C	**29**	H-3-9	MB, B1, B2, WC1, WC2, WC3	C, H	L/D/K
12	M-3-4	H, MB, B2, WC1, WC2	L/D/K, B1	C	**30**	H-3-10	MB, B1, B2, WC1, WC2, WC3	C, H	L/D/K
13	M-3-5	B2, WC1, WC2	MB, B1	L/D/K, H	**31**	H-3-11	MB, B1, B2, WC1, WC2, WC3	C, H	L/D/K
14	M-3-6	B2, WC1, WC2	MB, B1	L/D/K, H	**32**	H-3-12	MB, B1, B2, WC1, WC2	H	L/D/K, C
15	M-3-7	H, B1, B2, WC1, WC2	MB	L/D/K, C	**33**	H-3-13	B1, B2, WC1, WC2	C, MB	L/D/K
16	M-3-8	H, B1, B2, WC1, WC2	MB	L/D/K, C	**34**	H-3-14	H, B1, B2, WC1, WC2, WC3	C, MB	L/D/K
17	M-3-9	H, B1, B2, WC1, WC2	MB	L/D/K, C	**35**	H-3-15	H, MB, B1, B2, WC1, WC2, WC3	C	L/D/K
18	M-3-10	H, B2, WC1, WC2, WC3	L/D/K, MB, B1	C	**36**	H-3-16	MB, B1, B2, WC1, WC2, WC3	C, H	L/D/K

In the second step of visibility analysis, the level of visibility of rooms was calculated for the four price groups. The diagrams presented at Figure 4 show the percentage of each type of space according to visibility.

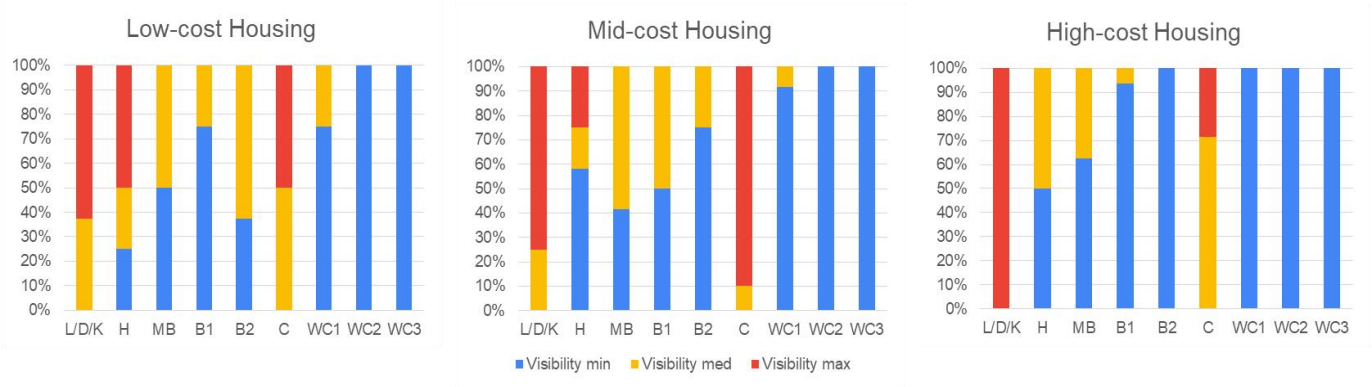

Figure 4 Visibility of spaces for the apartments from three price categories

Based on the VGA parameters, Living+Dining+Kitchen and corridor have the highest visibility levels among the other rooms. It is the largest space in the apartment, and it is designated for all the collective daily activities of family members and guests. The high level of visibility is associated with the ability of the inhabitants to control the apartment (Güney, 2007); therefore, it is appropriate for most public rooms. In case M-3-12, kitchen can be considered as separate room, and in cases H-3-1, H-3-9 and H-3-10, it is designed as an annex room which is attached to the living area. In other cases, Living+Dining+Kitchen room take a clear rectangular shape.

High level of exposure of the corridor can be explained by the fact that it connects the living room with all the bedrooms, bathrooms and sometimes the hall. The corridor has the highest level of space control and is the place where members of the family may briefly interact during movement to the other spaces. At the same time corridors isolate the intimate areas where inhabitants may perform individual activities without being disturbed which results to the social segregation (Edgü & Ünlü, 2003). The corridors of high-cost apartments are longer, which can also be explained by the increased size of the rooms. There is a duality in the location of the hall: in half of the cases, it is the hidden space attached to the main corridor and the other option is to connect it all directly with the living room. In 6 cases, there is no space that is dedicated as a buffer element between the apartment and the outside space.

The master bedroom appears to be less private than the other bedrooms. Often it is located at the end of the long corridor, and it can be observed even from the living room. It is noticed the decrease of exposure of all the three bedrooms with the growth of the apartment price. In high-cost apartments, there is a clear functional zoning, and the intimate area, which includes bedrooms and bathrooms, is separated by a corridor from the more public spaces of the apartment. This comes along with the suggestion of Tomah et al. (2016), for which it is crucial to separate the private and public domains of the house. A researcher from Jordan noticed that the square shape of the bedroom and the presence of a small corridor are associated with higher control (see Al-Homoud, 2009). In the low- and medium-price categories, one or two bedrooms can be accessed directly from the living room. The shape of the secondary bedrooms is mostly rectangular, while the master bedroom can have an L-shaped shape since the master bathroom can be accessed from it via the small hallway. The privacy of bathrooms is of a similarly high level for all cases. There is a specific separation of the function of the bathroom for high-priced apartments when the guest bathroom is accessed from the hallway, the family bathroom from the corridor, and the master bathroom from the master bedroom.

5.0 DISCUSSION

The VGA of the 3+1 apartments demonstrates that there is a relation between the apartment price, its general visibility, and the visibility of the separate rooms. In general, the division of the public and private zones is correlating with the visibility and therefore the privacy and level of control. The rooms and spaces are organized hierarchically by size, while the circulation inside the apartment is more complex. The corridor as a transition element makes the main contribution to the spatial arrangement, the complexity of the design, the connectivity, and the functional zoning of the apartment. Yildiz et al. (2018) note in the modern housing units the shift of the publicity from the gathering space towards the transition spaces which decreases the social interaction inside of the family. Based on the evaluation of the apartment plans there can be found 4 main types of corridors (Figure 5) depending on their shape and length:

- No corridors or small square-like corridors
- Medium corridors
- L-shape or Z-shape corridors
- Long corridors

Mustafa et. al (2010) define the ability to orient inside of to dwelling and the have the rooms accessible as signs of its spatial efficiency. In case H-3-13, a long corridor makes private rooms more distant from the family room and increases the independence of use. Besides the length it is important to provide the visual obstacles which can protect the interior of the intimate spaces. The location of the doors opposing each other decreases privacy. At the same time, the shape of the master bedroom with an additional small hallway that collects the doors to the bathroom and the wardrobe protects the space from additional exposure. Positioning the entrance hall at the end of

the corridor far from the living room means that visitors will disturb the intimacy of the bedroom zone of the visitors. The L-shaped corridor of apartment H-3-14 helps increase the privacy of the rooms. Only the area next to the living room and hall is exposed while two rooms are completely hidden behind the corner. When the corridor becomes smaller, it is not possible to open all the entrances. In sample M-3-7 the door of the second bedroom faces the kitchen, hall and the living room which reduces its privacy. M-3-4 is an extreme case where the corridor is too small and due to its location in the center of the apartment attached to the living room it becomes the space with the highest visibility level. All the bedrooms' openings are facing each other and also can be observed from the living room.

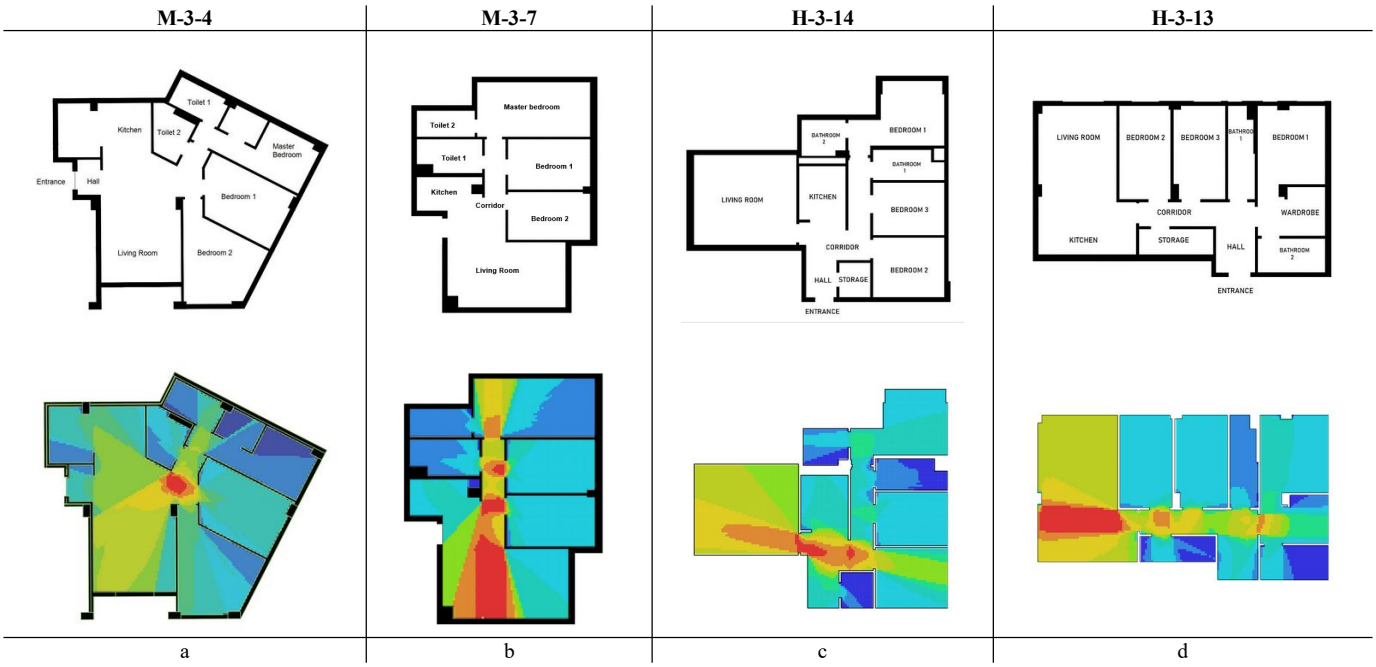

Figure 5 Sample apartments with small (a), medium (b), L-shape (c) and long (d) corridors

The living room in all the apartments is the largest and the most exposed space which has direct relation to its cultural meaning as a place for family gathering and guest meeting. However, in the traditional house, these two spaces are separated. Malazi et al. (2020) define kitchen as semi-public space which should have good access to the served area. Allocation of the separate space for the kitchen in some samples from all price categories comes along with the Islamic tradition, but it is not a requirement in modern Albanian house. The separate kitchen often is a dark room, which is not intended to be used for dining. Güney (2007) gives an example of the flexible apartment layout which can be achieved by the use of doors of different sizes. Separation of the hall and formal meeting room, or dining and living zone by the large double and triple doors can help in organization of the transition of guests from the hall to the gathering area, or to the dining area, with the further isolation of those spaces for the needs of the other family members.

The design of contemporary Albanian housing is based on the tendencies that were established during the post-communism period. Albanians prefer to have larger rooms, but at the same time they are not aware of the meaning of hallways and corridors in terms of maintaining privacy and residential comfort (Hasa & Yunitsyna, 2021). This results in the provision of the large Living+Dining+Kitchen rooms, which can be used at the same time for accessing the bedrooms. This solution recalls the spatial structure of the 19th century Ottoman house, where the central 'sofa' room was used at the same time as a living and circulation space, however Toker and Toker (2003) demonstrated the shift towards the segregation of the living room and the bedroom zone in the modern Turkish house. The use of the living room for circulation conflicts with the traditional Albanian dwelling design, where bedrooms were segregated and accessed through the private corridor, or stair, therefore the visitors could never interfere with the intimate zone of the house (Vrusho & Yunitsyna, 2016). The structure of the dwellings is rather a result of the complex economic situation and the high dwelling cost, than of the cultural approach.

6.0 CONCLUSION

In this paper, Space Syntax visibility graphs are used as a tool to evaluate the spatial properties of 36 3+1 apartments from housing complexes built during the last 10 years in Tirana. In VGA, the price of the influence of the apartment on its overall connectivity level and on the general exposure of the rooms can be observed. Apartments in the higher price category have the highest connectivity and a clearer separation of public and private spaces depending on the activities carried out. The living and dining rooms are larger than the others, and the intimate rooms are grouped into a zone that is accessed through a long corridor. The kitchen can be organized as separate or adjusted to the living room space, increasing the level of privacy. The bathrooms are dedicated for different users, such as guests, family members or couples and arranged at different depth levels from the hall.

With the decrease in price, the evident drawbacks of the design solutions are observed which decrease the privacy of the intimate rooms. The bedrooms can be accessed directly from the living room, which means that they are exposed to family members and guests. The guest bathroom can be missing or can be positioned in the depth of the intimate zone of the apartment. The corridor often receives the highest connectivity value, which shifts the focus of the space dedicated for social interaction from the living room. Spatial solutions of the 3+1 apartments with the higher price correspond with the social and cultural demands towards Albanian housing. Private and public zones form two cores of the residence that can function autonomously. The living and dining room allows the daily activities of the family and invite guests. The hallway with a guest bathroom is close to it. The kitchen is placed with the lover exposure, but it is directly connected to the dining room. Bedrooms and private bathrooms are separated and located in a remote part of the dwelling. On the other hand, there are cases where poor arrangement of the spaces results in its exposure and interference of the private and public domains. The real estate market in Albania has a higher demand for the small apartments due to the low income level of the population. 3+1 apartments are less affordable and can be considered luxury units; therefore, developers offer qualitative design solutions that can compete on the market and most of the cases demonstrate similar principles of spatial arrangement that form this specific plan typology.

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