

The Role of Public Space Quality on the Formation of the Real Estate Value

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Abstract

The quality of Public Space as part of the real estate value is, apparently, obvious. Still, on this issue, the cause-effect relationship is not straightforward. Public Space intrinsically presents a complexity of aspects that require a careful, analytical approach. Such an approach will enable to systematize its characteristics so as to understand its origin, its performance and its effects. The concept of real estate value also encompasses several theories. This concept should be defined and the factors involved in its formation should be determined.

In this perspective, the study of the importance of Public Space along the course of History, from Antiquity to modern days, is basic to unravel the implications that Public Space has on the economy of the city. In fact, Public Space is continuously adapting to the novel urban realities, like new values and consumption patterns. Also, the qualities, demands and benefits of Public Space require a detailed study to elucidate the importance of its role in the contemporary city. Finally, the understanding of the market behaviour, and especially the behaviour of the transaction of real estate properties, together with the study of the location, a factor that determines the real estate value, is fundamental to attain the aim of this work – to understand the effect of the quality of Public Space on the formation of the real estate value.

With this purpose, the quality of three spaces in Freguesia do Areeiro (Areeiro's Borough), Lisbon, Portugal, has been evaluated so as to attempt a relationship between their various dimensions – *Inclusiveness, Meaningful Activities, Comfort, Safety, Pleasurability* – and the price of the apartments there located. Conclusions could then be drawn regarding the influence of some of the particularities of the space on the valorisation of the real estate.

It was possible to demonstrate that the real estate value is affected by specific parameters of the Public Space. The study showed that *Social Dimension* (MORO, 2011), *Inclusiveness* and *Meaningful Activities* (METHA, 2014) are not the major characteristics that influence the real estate value. In fact, according to the study here performed, the space properties related to the *Image/Identity* (ALVES, 2003), *Prestige* (GONÇALVES, 2009), *Comfort and Image* (PPS, 2014) and *Pleasurability* (METHA, 2014) concepts are those that predominantly determine the formation of the real estate value.

Keywords: *Method of Evaluation, Quality, Public Space, Real Estate Value*

1. Introduction

Throughout history, and despite its formal and functional evolution, the characteristics of Public Space have been the target of profound thinking. Their importance and their contributions to the City are recognized, numbered and revealed by many researchers from different areas. Shortly, it can be said that public space is an important component of urban space, because it supports the diversity of experiences of the city.

Considering urban quality as an indicator of development, and the real estate market as part of the City economy, cause-

effect relationships between the public space and the real estate value can be anticipated.

The property value has undeniable importance in the economy of the City. It is thus desirable to investigate how this issue is related to the quality of the surrounding public space.

This work uses the reassessment of reflections from various authors regarding public space and the real estate value themes. Effort has also been invested in carrying out a survey of recent papers with new elements capable of making significant contributions to the understanding of the topic.

2. Public Space

The role of urban public space, a subject widely discussed in urban planning and in various areas of social sciences, brings with it a set of questions that lead to thorough consideration. Although the concept of "public space" has emerged for the first time in the seventies of the last century within a historical-cultural context where social issues gained a new importance, a reflection by themes that carry its meaning has been present over many centuries. (GONÇALVES, 2006)

Brandão *et al.* (2002) believe that good design of public space is one that meets the expectations and needs of users (providing suitability to be recognized, appreciated and enjoyable), as well as being sustainable, efficient, consistent, flexible and serve their purpose. The authors believe that quality should be the aim of all those involved in the creation of public space processes. The final product should be attractive to users, visually stimulating, easy to use (and maintain) and should also be well integrated in the real site. This need for public space to present a certain structural flexibility is important in that it allows spaces to adapt to future opportunities and expectations without much mobilization of financial resources.

3. Real Estate Value

Derycle (cit. in CARVALHO, 2005) considers that there are relevant conditions specified in the pricing of urban land taking into account three categories of factors: micro-location, macro-location and general.

The micro-location allows explaining the difference between the price of a share and the average price of the area, and consists of various factors that are related to the intrinsic characteristics of the property and its immediate surroundings. This factor can be subdivided into three categories:

- 1) Associated with the cost of real estate (such as the characteristics of the soil and subsoil, the size, shape, topography, slope and insertion of the land parcel at the local urban fabric);
- 2) Associated with the characteristics of the final product (such as comfort exposure, views, visibility, facilities, equipment and services in the immediate environment, adaptation to the requirements of the relevant current and projected proportion of demand);
- 3) Risk associated with the investment (such as property size, age, condition, physical and functional obsolescence, specificity and the maintenance of the building image).

On the other hand, the macro-location category accounts for the difference between the average price and the average price zone of the city and groups the factors that give expression to the characteristics of the area, incorporating the elements of urban policy. It may also be subdivided into three categories involving factors:

- 1) Related to the intrinsic characteristics of the area (such as natural environmental quality, availability of parking and community facilities, capacity and general state of infrastructure, density);
- 2) Associated with accessibility (in public or individual) transport to the poles of interest from urban life;
- 3) Associated with building rights (permitted densities and urban rules applicable to the transformation of the built property).

Finally, the factors referred to as "general" refer to the various circumstantial variables with regard to the investment framework:

- 1) Size and growth rate of the city;
- 2) Efficiency of urban administration;
- 3) Urban Policy;
- 4) Local context;
- 5) Tax and national credit policies.

4. Case Study

4.1. Selection of the Area of Study

To set-up the case study, it was crucial to carry out a research on the areas of the city of Lisbon that would allow the understanding of the way in which the quality of its public space interferes with the formation of the real estate value. The choice fell upon the study of different but contiguous spaces in 'Freguesia do Areeiro' (Areeiro Borough) in Lisbon: Alameda Dom Afonso Henriques, Bairro dos Actores and Avenida Guerra Junqueiro.

A preference was given to contiguous spaces in the same borough in order to cancel the effect of factors related to macro-location (DERYCLE cit. in CARVALHO (2005)) – an important factor in the formation of the real estate value – and to ensure that all the buildings have similar characteristics. The variable of the macro-location is constant throughout all the analysed spaces, i.e. the intrinsic characteristics of the area (such as the environmental quality, the distances to downtown and to the poles of interest of urban life) are identical for all the spaces. Also, the construction year, the type and quality of the used materials, as well as the kind of typologies of the housing units do not suffer great variations across the area of study. Thus, in the analysed area, the objective was to cancel the variation of the aspects that may influence the formation of the real estate value, with the exception of the micro-location factors (Derycle, (1981) cit. in Carvalho (2005)) – more specifically the quality of the public space of the immediate surroundings.

On the other hand, the fact that there is a significant formal and experiential diversity between the aforementioned different public spaces represented an important factor for the selection. Even though all the spaces are connected, it is apparent that all of them have differentiating aspects. Thus, in a first approach, it is clear that Alameda Dom Afonso Henriques offers a wide range of characteristics and uses, indicating that it is an inclusive space for various activities and types of behaviour.

Bairro dos Actores shows a substantial absence of noise pollution and a feeling of safety regarding the traffic, if compared to other analysed spaces. Finally, Avenida Guerra Junqueiro shows a different reality, in formal terms, regarding the width of the sidewalks, with various esplanades and a diversified and expressive provision of trade and services.

Lastly, in order to choose the area of study, the generalised perception that indicates a significant difference between the market values (price per square meter) of the housing units of Alameda Dom Afonso Henriques, compared to those in Bairro dos Actores, was taken into account.



Figure 1. Images from Rua Carlos Mardel



Figure 2. Images from Alameda Dom Afonso Henriques



Figure 3. Images from Avenida Guerra Junqueiro

4.2. Survey of the Sales Value of Housing Units

4.2.1. Methodology

Initially, in order to begin this stage of the Survey of the Sales Value, it was decided to look for the values required by the owners of all housing units for sale in Bairro dos Actores, Alameda Dom Afonso Henriques and Avenida Guerra Junqueiro, regardless of their location, typology or state of preservation. This collection of information was carried out by going to the places in question, thus identifying the selling boards of real estate agencies or of private ads. A research was developed in parallel through the databases available online, on property sale sites, namely the sites of the main real estate

agencies in Lisbon (REMAX and ERA), as well as on extended sale platforms (OLX and SAPO).

Even though this information collection method is the closest possible to the source – the owner of the property – and even though the data are all from the same time period, this process shows some weaknesses. In the one hand, the information collected through the real estate agents' boards on the spot allows one to know what the exact location of the buildings is, their price and floor area. On the other hand, the information about the buildings for sale on online platforms is fairly complete (price, typology, floor area, preservation state), but its exact location (street or house number) is seldom disclosed. This way, in both cases, real purchase situations were simulated, contacting the real estate agents or the very owners, in order to know the selling price and floor area or the full address of the buildings.

After a first analysis of the collected data, it was decided that the research should be focused on a more restricted area, so as to guarantee more useful results to the next step of this paper's methodological process – the evaluation of the quality of the public street space, marketplaces or gardens. Like so, there was a need to narrow the research at Bairro dos Actores to only one street, making it represent the prevailing values in the whole neighbourhood, thus enabling the evaluation of the public space. It was decided to limit the survey to the housing units located on Rua Carlos Mardel due to it being the street with a larger number of data. The average value of the buildings per m² on Rua Carlos Mardel (1501 €/m²) does not significantly differ from that of the remaining streets in Bairro dos Actores (1472 €/m²), where the data suggest a linear proportionality between the selling price of the buildings and their floor area (Figure 4).

Subsequently, it was decided that the research should focus on "used" buildings alone, leaving out of the survey all renovated housing units. This decision was based on the fact that this area presents a small number of renovated buildings with a wide range of different features, causing a large standard deviation on the calculated average.

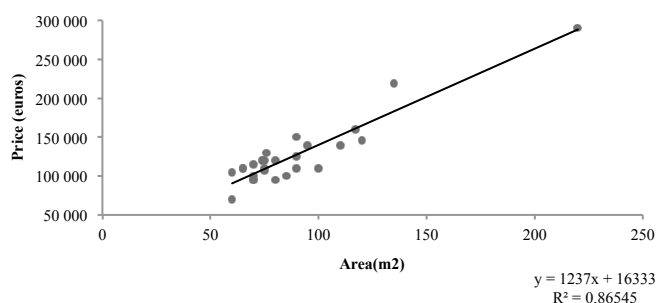


Figure 4. Linear regression of the Sales Value at Bairro dos Actores.

4.2.2. Results

After the survey of the values required by the owners, the data were grouped into three areas - Rua Carlos Mardel, Alameda D. Afonso Henriques and Avenida Guerra Junqueiro – and the average value (in euros) of the price per m² (Tables 1, 2 and 3 and Figure 5) was calculated.

Table 1. Data collection of price apartments in Rua Carlos Mardel

Date	Space	Tip	Area (m ²)	Price (€)	Price/m ²
07/07/2014	Rua Carlos Mardel	T3	75	110 000	1467
07/07/2014	Rua Carlos Mardel	T3	100	110 000	1100
14/07/2014	Rua Carlos Mardel,	T3	75	120 000	1600
18/07/2014	Rua Carlos Mardel,	T3	76	130 000	1711
07/07/2014	Rua Carlos Mardel	T4	135	219 500	1626
			Average		1501

Table 2. Data collection of price apartments in Alameda D. Afonso Henriques

Date	Space	Tip	Area (m ²)	Price (€)	Price/m ²
18/07/2014	Alameda	T1	65,5	150 000	2290
07/07/2014	Alameda	T2	115	225 000	1957
07/07/2014	Alameda	T3	122	265 000	2172
07/07/2014	Alameda	T3	112	210 000	1875
15/07/2014	Alameda	T3	122	250 000	2049
07/07/2014	Alameda	T4	160	200 000	1250
10/07/2014	Alameda	T4	108	160 000	1481
22/07/2014	Alameda	T4	117	160 000	1368
22/07/2014	Alameda	T4	299	513 000	1716
07/07/2014	Alameda	T5	205	480 000	2341
07/07/2014	Alameda	T6	200	350 000	1750
			Average		1841

Table 3. Data collection of price apartments in Av. Guerra Junqueiro

Date	Space	Tip	Area (m ²)	Price (€)	Price/m ²
08/07/2014	Guerra Junqueiro	T3	160	385 000	2406
15/07/2014	Guerra Junqueiro	T3	150	320 000	2133
15/07/2014	Guerra Junqueiro	T4	170	300 000	1765
16/07/2014	Guerra Junqueiro	T5	175	345 000	1971
16/07/2014	Guerra Junqueiro	T5	175	299 500	1711
16/07/2014	Guerra Junqueiro	T3	175	385 000	2200
16/07/2014	Guerra Junqueiro	T5	175	320 000	1829
			Average		2002

**Figure 5.** Area of Study

4.3. Public Space Evaluation

4.3.1. Methodology

In order to approach the Evaluation of the Quality of the Public Space of the area of study, the methodology considered to be more appropriate and complete for this type of evaluation was selected. Vikas Metha's (2014) methodology, published on the Journal of Urban Design – "Evaluating Public Space" –, was used, since it adapts well to the qualitative and quantitative evaluation to be performed, enabling a wide assessment of the public space. This methodology allows the punctuation of various sub-criteria associated to five different criteria – the five dimensions of Public Space: *Inclusiveness, Meaningful Activities, Comfort, Safety* and *Pleasurability* – and, subsequently, allows an analysis with the aim of deciphering how these criteria behave according to the various alternatives – the three evaluated public spaces – linking them to the formation of the real estate value.

The methodology developed by Metha (2014) is considered to be a Multiple-criteria Analysis model. The models of this category provide technical support to the decision through the comparison of the alternatives, without necessarily being linked to monetary values. A commonly used type of Multiple-criteria Analysis, be it in the public sector, or in the private, is the Multi Criteria Decision Analysis (MCDA) (Keeney, 1992).

The methodology involves 45 sub-criteria, the aim of which is to analyse behaviours and perceptions caused by the space. Thirty-two sub-criteria are observed and punctuated by the team of experts, and the remaining thirteen are punctuated by the users of the space. A weight (k) is associated to each sub-criterion.

The additive hierarchical model is a composition of simple additive models, leading to a hierarchical criterion structure, and represented through the following model (Mateus, *et al.* 2008):

$$V_i(a) = \sum_{j=1}^n k_j \cdot v_j(a), \quad \sum_{j=1}^n k_j = 1 \quad \text{and} \quad 0 < k_j < 1, \forall_j$$

Where:

- $V_i(a)$ Partial value of alternative a on criterion i ;
- j Each sub-criterion under criterion i ;
- n Number of sub-criteria under criterion i ;
- $v_j(a)$ Local value of alternative a under sub-criterion j , in a scale 0 to 3;
- k_j Weight of sub-criterion j .

Once the partial values for each alternative have been determined, the overall value of each alternative is at last calculated. Using the aforementioned additive model, the general equation is (Mateus, *et al.* 2008):

$$V(a) = \sum_{j=1}^n k_j \cdot v_j(a), \quad \sum_{j=1}^n k_j = 1 \quad \text{and} \quad 0 < k_j < 1, \forall_j$$

Where:

- $V(a)$ Overall value of the alternative a ;
 j Each criterion under the alternative a ;
 n Number of criteria under the alternative a ;
 $v_j(a)$ Local or partial value of alternative a under criterion j ;
 k_j Weight of criterion j .

A team of experts, composed by six final year students, observed and evaluated the three spaces according to Metha's methodology (2014), taking into account the range of activities and behaviors of the users. An observation schedule was set: 10h00, 18h00 and 22h00 - six study periods arranged in two days (a weekday and a Saturday). The team was divided into three pairs; each pair evaluated all of the three spaces in the two days at the same time. At the end the average was calculated from the evaluation of each pair, and hence the final values found for each variable and consequently for the five dimensions of each of the three spaces.

4.2.2. Results

Table 4. Results of the public space index for the three spaces in Areiro, Lisbon

	W*	Rua Carlos Mardel	Al. D. Afonso Henriques	Av. Guerra Junqueiro
Inclusiveness				
1. Presence of people of diverse ages	0,04	1,33	0,053	2,83 0,113 2,17 0,087
2. Presence of people of different genders	0,04	2,33	0,093	3,00 0,120 2,50 0,100
3. Presence of people of diverse classes	0,04	1,33	0,053	2,50 0,100 1,50 0,060
4. Presence of people of diverse races	0,04	1,33	0,053	3,00 0,120 1,67 0,067
5. Presence of people with diverse physical abilities	0,04	0,83	0,033	2,17 0,087 1,50 0,060
6. Control of entrance to public space: presence of lockable gates, fences, etc.	0,10	3,00	0,300	2,83 0,283 3,00 0,300
7. Range of activities and behaviours	0,10	1,17	0,117	3,00 0,300 1,50 0,150
8. Opening hours of public space	0,10	3,00	0,300	3,00 0,300 3,00 0,300
9. Presence of posted signs to exclude certain people or behaviours	0,10	3,00	0,300	2,83 0,283 3,00 0,300
10. Presence of surveillance cameras, security guards, guides, ushers, etc. intimidating and privacy is infringed	0,10	3,00	0,300	2,67 0,267 1,67 0,167

upon

11. Perceived openness and accessibility	0,20	2,00	0,400	2,83 0,567 1,67 0,333
12. Perceived ability to conduct and participate in activities and events in space	0,10	2,83	0,283	2,67 0,267 2,67 0,267
Sub-total	1,00	2,270	2,807	2,190
Inclusiveness (0 to 100)		76	94	73
Meaningful Activities				
13. Presence of community-gathering third places	0,20	1,67	0,333	2,83 0,567 2,17 0,433
14. Range of activities and behaviours	0,10	1,17	0,117	3,00 0,300 2,00 0,200
15. Space flexibility to suit user needs	0,10	1,00	0,100	3,00 0,300 1,33 0,133
16. Availability of food within or at the edges of the space	0,20	1,17	0,233	2,50 0,500 3,00 0,600
17. Variety of businesses and other uses at the edges of the space	0,10	1,33	0,133	1,50 0,150 2,67 0,267
18. Perceived suitability of space layout and design to activities and behaviour	0,20	1,17	0,233	2,50 0,500 2,33 0,467
19. Perceived usefulness of businesses and other uses	0,10	2,50	0,250	1,67 0,167 2,33 0,233
Sub-total	1,00	1,400	2,483	2,333
Meaningful Activities (0 a 100)		47	83	78
Comfort				
20. Places to sit without paying for goods and services	0,20	0,50	0,100	3,00 0,600 1,00 0,200
21. Seating provided by businesses	0,10	1,33	0,133	2,33 0,233 2,83 0,283
22. Other furniture and artifacts in the space	0,10	0,67	0,067	2,83 0,283 1,83 0,183
23. Climatic comfort of the space—shade and shelter	0,20	1,00	0,200	1,17 0,233 2,33 0,467
24. Design elements discouraging use of space	0,10	2,50	0,250	2,67 0,267 2,00 0,200
25. Perceived physical condition and maintenance appropriate for the space	0,20	1,83	0,367	2,33 0,467 2,83 0,567
26. Perceived nuisance noise from traffic or otherwise	0,10	1,83	0,183	1,00 0,100 1,50 0,150
Sub-total	1,00	1,300	2,183	2,050
Comfort (0 to 100)		43	73	68
Safety				
27. Visual and physical connection and openness to adjacent street/s or spaces	0,10	1,33	0,133	3,00 0,300 2,50 0,250
28. Physical condition and maintenance	0,10	2,00	0,200	2,50 0,250 2,50 0,250

appropriate for the space							
29. Lighting quality in space after dark	0,10	1,17	0,117	2,00	0,200	2,17	0,217
30. Perceived safety from presence of surveillance cameras, security guards, guides, ushers, etc. providing safety	0,10	0,50	0,050	1,17	0,117	2,00	0,200
31. Perceived safety from crime during daytime	0,20	2,50	0,500	2,33	0,467	2,67	0,533
32. Perceived safety from crime after dark	0,20	1,83	0,367	2,33	0,467	2,17	0,433
33. Perceived safety from traffic	0,20	2,17	0,433	1,83	0,367	2,33	0,467
Sub-total	1,00	1,800		2,167		2,350	
Security (0 to 100)		60		72		78	

Pleasurability

(For street)

34. Presence of memorable architectural or landscape features (imageability)	0,10	1,33	0,133			2,33	0,233
35. Sense of enclosure	0,10	2,50	0,250			2,83	0,283
36. Permeability of building facades on the streetfront	0,10	1,00	0,100			3,00	0,300
37. Personalization of the buildings on the streetfront	0,10	0,67	0,067			3,00	0,300
38. Articulation and variety in architectural features of building facades on the streetfront	0,10	2,17	0,217			2,67	0,267
39. Density of elements on side- walk/street providing sensory complexity	0,10	0,67	0,067			2,83	0,283
40. Variety of elements on sidewalk/street providing sensory complexity	0,10	1,00	0,100			2,00	0,200
41. Perceived attractiveness of space	0,20	1,33	0,267			2,67	0,533
42. Perceived interestingness of space	0,10	0,50	0,050			2,67	0,267
Sub-total	1,00	1,250				2,667	

Pleasurability

(For attached plaza, square, park)

34. Presence of memorable architectural or landscape features (imageability)	0,07			2,67	0,187		
35. Sense of enclosure	0,07			1,50	0,105		
36. Variety of subspaces	0,07			2,50	0,175		
37. Density of elements in space providing sensory complexity	0,07			2,17	0,152		
38. Variety of elements in space providing sensory complexity	0,07			2,67	0,187		

39. Design elements providing focal points	0,07			2,50	0,175		
40. Visual and physical connection and openness to adjacent street/s or spaces	0,07			3,00	0,210		
41. Permeability of building facades on the streetfront	0,07			1,33	0,093		
42. Personalization of the buildings on the streetfront	0,07			1,50	0,105		
43. Articulation and variety in architectural features of building facades on the streetfront	0,07			2,17	0,152		
44. Perceived attractiveness of space	0,20			2,33	0,467		
45. Perceived interestingness of space	0,10			2,67	0,267		
Sub-total	1,00			2,273			
Pleasurability (0 a 100)		42		76		89	
Total (weighting of each variable – 0.2)		1,604		2,385		2,318	
Global Evaluation (0 to 100)		53		79		77	

* Assigned weighting to variable

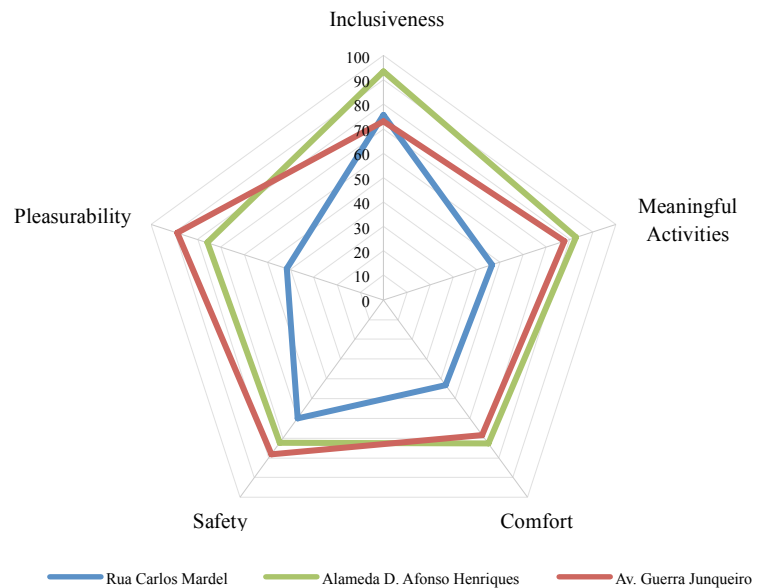


Figure 6. A comparative visual display of the results of the public space evaluation for three spaces in Areeiro district, Lisbon

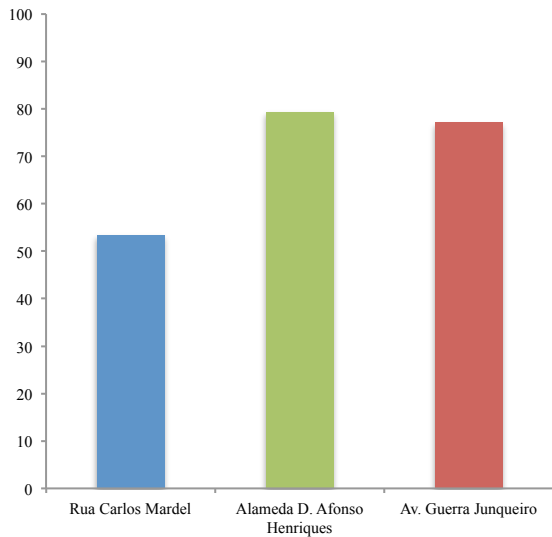


Figure 7. A comparative visual display of the global evaluation

Table 5. Characteristics of the participants in the study

	Rua Carlos Mardel		Al. D. Af. Henriques		Av. Guerra Junqueiro		
	Count	%	Count	%	Count	%	
Total	19		30		22		
Age	18-24	3	15,79	4	13,33	3	13,64
	25-34	5	26,32	5	16,67	5	22,73
	35-44	4	21,05	6	20,00	3	13,64
	45-54	1	5,26	4	13,33	6	27,27
	55-64	5	26,32	3	10,00	2	9,09
	65-74	1	5,26	4	13,33	3	13,64
	75 and above	0	0,00	2	6,67	0	0,00
	Unans.	0	0,00	2	6,67	0	0,00
Gender	Male	7	36,84	14	46,66	9	40,91
	Female	12	63,16	16	53,33	13	59,09
	Unans.	0	0,00	0	0,00	0	0,00
Race	Cauca.	16	84,21	15	50,00	18	81,82
	African	1	5,26	7	23,33	4	18,18
	Asian	2	10,53	4	13,33	0	0,00
	Indian	0	0,00	2	6,67	0	0,00
	Other	0	0,00	2	6,67	0	0,00
Live/work	Live	6	31,58	18	60,00	10	45,45
	Work	8	42,11	5	16,67	6	27,27
	Live/Work	5	26,32	3	10,00	3	13,64
	Visit	0	0,00	3	10,00	3	13,64
	Unans.	0	0,00	1	3,33	0	0,00

4.4. Data Analysis

The results of the "survey of sales value of housing units" showed a significant difference between average prices/m² of the three areas analysed. The average price of the property square meter in Rua Carlos Mardel is 1501 € / m², € 340 less than the average price of property for sale in Alameda D. Afonso Henriques - € 1841 / m². In Av. Guerra Junqueiro an average sales value of € 2002 / m² was found, resulting in an increase as compared to Rua Carlos Mardel and Alameda D. Afonso Henriques of 501 € / m² and € 161 / m², respectively. Although the differences in the average price of the square meter refer to buildings in poor conditions ("used"), similar differences were observed in "refurbished" properties.

Thus, this strongly suggests that the micro-location (DERYCLE, 1981 cit. in Carvalho, 2005) is an important factor in the formation of the value of real property.

Overall, in terms of the results of the "evaluation of public space", the alternative Rua Carlos Mardel has a deficit in quality compared to both Alameda D. Afonso Henriques and Av. Guerra Junqueiro public spaces. In a scale of 0 to 100, the sum of the criteria according to Metha's methodology (2014) gives 53 points to Rua Carlos Mardel, 77 points to Av. Guerra Junqueiro and 79 points to Alameda D. Afonso Henriques. From the preliminary analysis of the results obtained, it can thus be concluded that the formation of the real estate value is not directly related to the quality of public space as a whole (Figure 8).

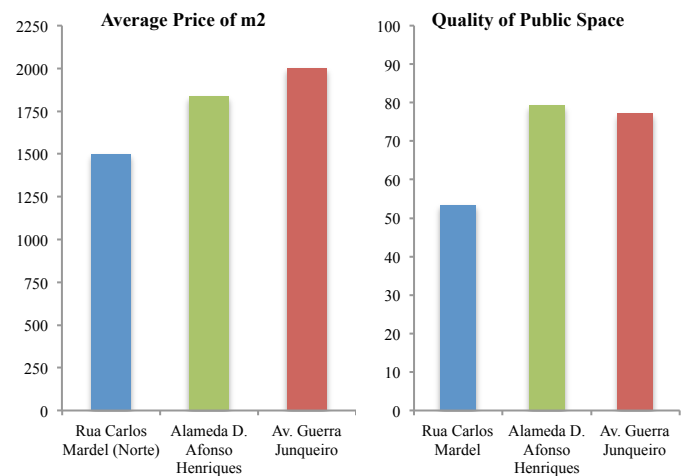


Figure 8. Comparison between the Average Value of the Price per square meter and the Quality of Public Space

However, by performing an analysis for each criterion of the "assessment of public space", it appears that the criteria corresponding to the five dimensions of public space have different results depending on the assessed area (Figure 9). In fact, regarding *inclusiveness* the alternative Alameda D. Afonso Henriques has a very high quotation (94) compared to the other spaces. The result of the function applied to the sub-criteria *presence of people of different ages, presence of people of different races, range of activities and behaviours and perceived openness and accessibility* was crucial to elect Alameda D. Afonso Henriques as the space with the highest capacity of inclusion. *Meaningful Activities* and *Comfort*

quotations of Rua Carlos Mardel (47 and 43 respectively) contrasted with the other alternatives. The sub-criteria *presence of community-gathering third places* and *variety of businesses and other uses at the edges of the space* in the dimension *Meaningful Activities*, as well as *places to sit without paying for goods and services* and *climatic comfort of the space - shade and shelter* in the dimension *Comfort*, played an important role in the calculation of the final result of these dimensions.

On the other hand, the *Safety* criterion had no significant variation among the assessed areas. Rua Carlos Mardel, Alameda D. Afonso Henriques and Av. Guerra Junqueiro obtained 60, 72 and 78 points, respectively. For these criteria, the sub-criteria with the highest weighting - *perceived safety from crime during daytime* and *perceived safety from crime after dark* - were significantly scored equally on the three alternatives. Finally, on the criterion *Pleasurability* there were significant differences due to the characteristics of the analyzed areas. With quotation 42, Rua Carlos Mardel appears to be the least *pleasurable* space due to the sub-criteria *variety of elements on sidewalk/street providing sensory complexity* and *perceived interestingness of space*. Alameda D. Afonso Henriques, quoted at 76, comes with higher level than Rua Carlos Mardel and lower than Av. Guerra Junqueiro. The later has a higher score (89) due to the *permeability of building façades on the streetfront*, *personalization of the buildings on the streetfront*, *variety of elements in the space providing sensory complexity* and *perceived attractiveness of space*.

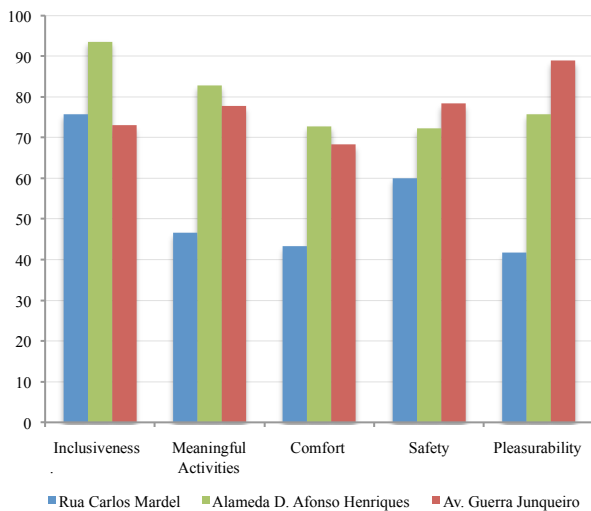


Figure 9. Comparison between each criterion evaluation

4.4. Sensitivity Analysis

Sensitivity Analysis allows studying the effect of fluctuating the weighting of different criteria - the five dimensions of public space - in order to identify those that are the most crucial in determining the real estate value. The analysis performed above concluded that the overall evaluation of the different alternatives (in accordance with the weighting coefficient defined by Mehta (2014)) does not agree with the average price per m² of the respective alternatives.

To this end, the weight of one of the criteria was allowed to fluctuate, while the weights of the remaining criteria were adjusted to a constant value so that the total sum would be 1 (Figures 10 and 11).

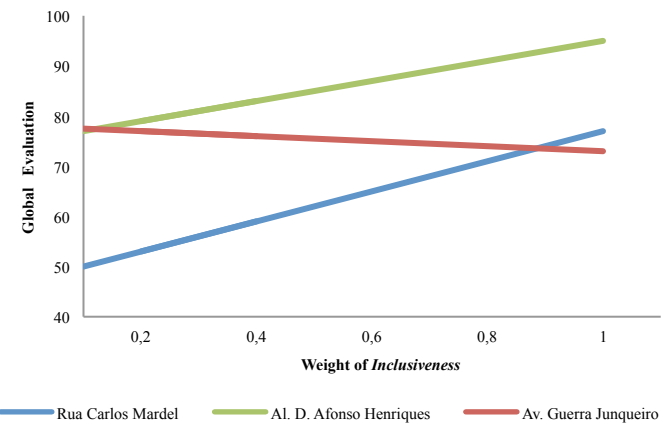


Figure 10. Scenario number 1 – Weight fluctuation of *Inclusiveness*

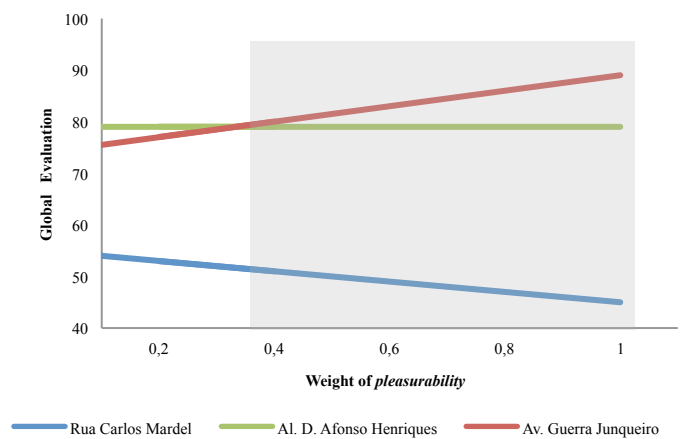


Figure 11. Scenario number 5 – Weight fluctuation of *Pleasurability*

The sensitivity analysis performed allows us to understand which are the critical criteria and which are those whose weighting is not in agreement with the quality of public space while forming the real estate value.

Firstly, it was concluded that the *Inclusiveness* criterion is not significant in the formation of the real estate value. In fact, by taking equal weightings for all criteria (dashed line in Figures 10-11), the Alameda Dom Afonso Henriques alternative stands out from the rest as being the alternative with the highest overall value, thus contradicting the results obtained in the *Survey of Values Sale*, where Av. Guerra Junqueiro has the highest value of the square metre. This discrepancy is amplified in *scenario number 1* (Figure 10) when varying the weighting of this criterion. On the other hand, in *scenario number 5*, with the fluctuation of the weighting of the criterion *Pleasurability*, the overall assessment of the three alternatives is the one that goes out to meet the expected results, where the three alternatives are ordered in the same way, both in assessing the quality of public space (shaded in Figure 11), as with regard to the average selling price per unit area. Thus, it is concluded that the *Pleasurability* criterion is the one that has greater relevance in the formation of real estate value.

5. Conclusions and Future work

The idea that the quality of the urban public space is related to the formation of the real estate value may be somewhat generalised. By dissecting the Public Space in different dimensions, and by establishing objective relations between their characteristics and the real estate value, this paper has sought to look into their relationship and concluded that is not straightforward.

The Study Case has allowed drawing important conclusions regarding the behaviour of the constituting dimensions of the public space in the formation of the real estate ownership value. Through a multicriterion analysis and a corresponding sensibility analysis, it was possible to show that the real estate ownership value is influenced by specific parameters/criteria regarding the quality of the public space. The use of this type of methodology has been considered fundamental, as in analysing different alternatives due to criteria (and sub-criteria) and their respective risk weights.

This way, it has been concluded that *Sociability* (PPS, 2012), *Social Dimension* (MORO, 2011), *Inclusiveness* or *Meaningful Activities* (METHA, 2014) are not the characteristics that influenced the real estate ownership value the most. According to the performed work, the space characteristics linked to *Attractivity* (BRANDÃO *et al.*, 2002), *Image/Identity* (ALVES, 2003), *Image* (PPS, 2014) or *Pleasurability* (METHA, 2014) are those which predominantly interfere in the formation of this value.

With reference to *Pleasurability*, the attractiveness of the space, the density and variety of elements which promote sensorial complexity, and, moreover, the presence of buildings or referential landscapes, result, from this study case, as being the variables mostly responsible for the composition of the basic concept. In this sense, a space is configured as agreeable and pleasant, should there be good references in it – when the space is “imageable” (LYNCH, 1960), i.e. when there is a high space quality and a sensorial complexity in it. The most referential spaces are those where the combination of various factors – shape, colour, structure, order – build up a palpable idea of the place. Thus, in order to provide the spaces with a high feeling of pleasantness, it is suggested that, during the process of the creation of the city, architects and urban planners take into consideration the wide range of subspaces (without losing the sense of environment), the permeability between buildings’ façades and the street and the integration of esthetic elements. All these features promote important space references, contributing to the diversity and intensity of sensorial stimulations.

Various empirical studies (GREY *et al.*, 1970; CIOLEK, 1978; JOARDAR AND NEILL, 1978; WHYTE DEPOORTER, 2004; METHA, 2007, cit. in METHA, 2014) have shown that the variety and intensity of sensorial stimulations, namely “diversity of people and activities, aspect of the buildings, personalization of the façade to the level of the street, street signs, trees and the density and the wide range of the shape, texture and colour of bushes and plants” (METHA, 2014), are a very positive contribution for keeping users in the public space. In short, the studies have concluded that the preferred public spaces offer a high level of sensorial stimulation,

making the space more attractive, increasing the perception of its interest and, consequently, the time that users spend there.

Even though inclusiveness is a consensual component in the formation of Public Space quality both for architects and urban planners, the average citizen, as a participatory agent for the real estate market representing demand, values the associated spaces to an image of prestige and with a high perception of attractiveness.

City Branding is a concept that creates a promoting strategy and provides the cities with an image, a symbol or a cultural meaning, increasing its synergies and constituting a value-adding element. Substantially, it perfects pleasantness as a means of bettering the *image* and, consequently, it increases the real estate value. Urban space branding is considered, on one hand, as a means of reaching competitive advantages, incrementing investment and tourism, and, on the other, allowing to build stronger communities by reinforcing the local identity (PEREIRA, 2013). Thus, it can be concluded that the “city brand” or the “neighbourhood brand” must be treated as a multidimensional entity, with functional and emotional elements which, conjugated with an *image*, generate a set of associations to the place.

Finally, as a continuation of this assignment, a study which deepens and defines the morphological characteristics of the space associated to the formation of the real estate ownership value, providing the architects and urban planners with useful tools for designing the city – so as to make it more attractive, by enhancing its economic value – is suggested.

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