Assessing Quality of Life through Physical Parameters of Urban Space

Júlia M. Lourenço

1. Introduction

This paper introduces quantitative and qualitative indicators to evaluate the quality of urban life and design. Furthermore, it discusses their validity and contribution to urban planning needs.

As cities keep growing in size, it becomes more and more important that urban expansion takes place in a controlled and planned way, so that cities can satisfy the needs of its population. This becomes particularly relevant in a world where half of the global population is already living in urban areas. Urban planning is the set of tools through which interventions, in the context of urban design, attempt to create urban spaces that contribute to the quality of life of its citizens. This can be defined as the relationship of inhabitants with the different elements that constitute urban space. Urban design determines, directly, the physical components of urban space, and indirectly, its socio-economic, political and cultural elements, influencing the relationship between the urban environment and its components. Unplanned growth leads to environmental degradation, traffic jams, urban sprawl, pollution, low access to basic services and infrastructure, loss of identity, disintegration of communities, pockets of poverty, etc. Also more and more, within a network of global cities, they compete to attract investment and qualified human resources. Thus, urban quality of life has become a main topic of strategic city planning.

2. Literature Review

The 'urban quality of life' theory originated within the sustainability framework. The concept is defined as the perceptions, feelings and experiences of individuals within the space in which they live. By adding to the social, economic and environmental components of sustainability cultural and personal factors affecting quality of life, Wish (1986) proposed the following basic factors of urban quality of life: economic vitality, feeling of place, cultural activities, good quality housing stock, easy access to services like health, sports, education, shopping, child-care, social organisations, need of forming a sustainable environment, security and privacy. The concept was further developed by several scholars during the 1990s (Brown et al., 1993; Felce and Perry, 1995; Cummings, 1998; Parfect and Power, 1998) with several others implementing operational approaches to the subject (Findlay et al., 1998, Rogerson et al., 1989; Savageau and Loftus, 1997). Cummings (1999) defined quality of life in both an objective and a subjective manner, defined by seven important characteristics: welfare, health, productivity, privacy, security, population, and emotional welfare. Objectively, Cummings' objective criteria relate to culture while the subjective ones are covered by perceptions. Kamp et al. (2003), emphasise that urban quality of life is associated with several components, such as personal and communal development, health, security, physical environment, and natural resources (Fig. 1).

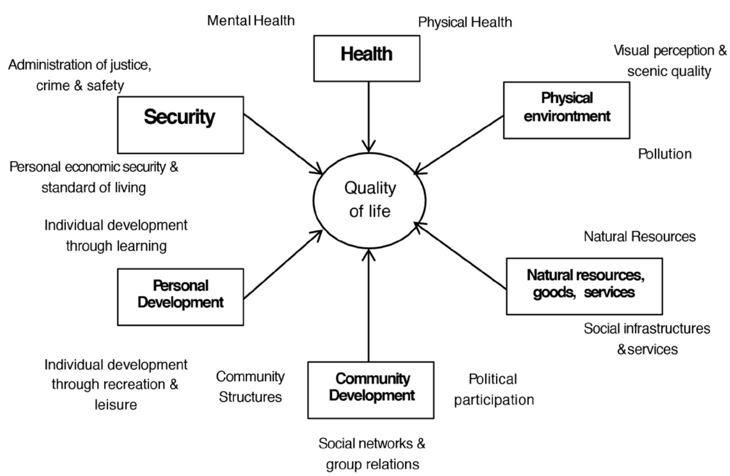

Figure 1 - Quality of life components (Kamp et al., 2003)

McRea et al. (2006) studied the strength of the link between subjective and objective indicators of urban quality life. Knowing that subjective and objective indicators of urban quality of life are rarely related to each other, they tried to link them by using Geographical Information Systems (GIS) to locate respondents to the B2003 Survey of Quality of Life in South East Queensland and to gather objective indicators about their urban environment within the region with regard to services, facilities and overcrowding. Structural Equation Modelling (SEM), showed that the strength of the relationship between these objective and subjective indicators can be weak, and suggests care should be taken when making inferences about improvements in subjective urban quality of life, as more in-depth research is needed to link those indicators.

These last approaches led to the study of Portuguese urban quality of life. Some important points drawn from the previous studies are: (i) quality of life in cities can be described by dimension; (ii) dimensions are associated with particular aspects of living in an urban context; (iii) quality of life dimensions can be described by indicators, which can be objective or subjective; (iv) dimensions and indicators can be combined through the attribution of different levels of importance (weights) based on a subjective judgment. This theoretical and applied framework permits different combinations of dimensions and associated weightings to lead to different definitions, more or less personal, that can be customised to the interests, motivations and preferences of a social group, a company, an institution or a single citizen.

3. A model for Assessing Urban Quality of Life in Portuguese Cities

In 1998, a brief research study about quality of life in the eighteen major Portuguese cities was performed by a research team in the Department of Civil Engineering at the University of Minho. This study aimed at responding to the degradation of quality of life in urban areas and to contribute to broader goals of attaining global sustainability.

The methodology followed in this study, including the quality of life evaluation model, is based on the following seven steps:

1. Identification of the dimensions to be considered. Initially, studies on quality of life in cities were consulted, as well as national newspapers, in order to understand the nature of the problems and the motivations of the urban population, which resulted in an extensive list of potential dimensions to be considered. Secondly, a telephone survey of a sample of 50 people was undertaken, resulting in a final set of nine dimensions: climate, commerce & services, crime, unemployment, housing, mobility, architectural heritage, purchasing power, and pollution.

2. Definition of weightings for the dimensions. A sample of 150 people, distributed over the country, was surveyed by phone in order to establish the set of weights representing the relative importance of the dimensions.

3. Creation of indicators that describe each dimension. The selection of indicators resulted from the judgement of the research team, taking into account the relevance of the variables included and, also, the availability of data.

4. Definition of the scoring scale for the indicators. In order to make indicators comparable, a normalised score for each city and indicator was developed. Given by the difference between the value of the indicator for the city and the mean of the 18 cities considered, divided by the standard deviation of the 18 cities. Denoting the value of the indicator for a city by the mean of the values of the 18 cities by $\mu[I]$, and the respective standard deviation by $\sigma[I]$, the score for the indicator is given by:

$$Score_i = a_i \frac{I - \mu[I]}{\sigma[I]}$$

Where a_i is a variable that assumes the value +1, when higher values of the indicator *i* contribute positively to the quality of life, and the value -1, when higher values of the indicator contribute negatively to the quality of life.

5. Definition of weightings for the indicators. The attribution of indicator weightings within each dimension resulted from the judgment of the research team, as presented in the next section. It should be stressed that the subjective attribution of weightings does not affect the generality of the model, as the weighting set can be adjusted according to the nature of the study.

6. Definition of the aggregation equation for the indicators. For each dimension and each city, the score is given by the weighted average of the indicator scores:

$$Score_d = \frac{\sum_i Score_i \times \omega_i}{\sum_i \omega_i}$$

, where ω_i is weighting of indicator

7. Definition of the aggregation equation for the dimensions. For each city, the score is given by the weighted average of the dimension scores:

$$Score = \frac{\sum_d Score_d \times \omega_d}{\sum_d \omega_d}$$

, where ω_d is weighting of indicator d.

The complete set of dimensions, indicators and weightings as resulted from the national survey and the research team's options (Mendes, 1999) is presented in table 1.

Table 1 - Dimensions, indicators and weightings

CLIMATE			0.087
Winter climate index Summer climate index Rainfall index		0.33 0.33 0.33	
COMMERCE & SERVICES			0.117
Banks		0.143	
Bank branches per 10.000 hab.	1.000		
Commerce		0.143	
Retail shops Retail shops per 10.000 hab. Hypermarkets Hypermarkets per 10.000 hab.	0.200 0.200 0.300 0.300		
Sport facilities		0.143	
Indoor sports arena per 10.000 hab. Outdoor sports field per 10.000 hab. Indoor swimming pools per 10.000 hab. Outdoor swimming pool per 10.000 hab. Athletics tracks per 10.000 hab.	0.200 0.200 0.200 0.200 0.200		

University and Polytechnic		0.143	
University graduation courses University *numeri clausi* Polytechnic graduation courses Polytechnic *numeri clausi*	0.400 0.400 0.100 0.100		
Museums		0.143	
Number of museums	1.000		
Health		0.143	
Hospitals per 100.000 hab. Hospital beds per 100.000 hab. Number of physicians per 10.000 hab. Number of pharmacies per 10.000 hab.	0.150 0.600 0.200 0.050		
Social Assistance		0.143	

Number of youth-activity facilities per 10.000 hab.	0.050		
Capacity of youth-activity facilities per 10.000 hab.	0.200		
Number of elderliness-activity facilities per 10.000 hab.	0.050		
Capacity of elderliness-activity facilities per 10.000 hab.	0.200		
Number of kindergartens per 10.000 hab.	0.050		
Capacity of kindergartens per 10.000 hab.	0.200		
Number of houses for aged people per 10.000 hab.	0.050		
Capacity of houses for aged people per 10.000 hab.	0.200		

The application of the evaluation models, together with the particular weightings set presented in the previous section, resulted in a ranking of cities. Table 2 presents the ranking and scoring for each city and each quality of life dimension.

Rank	Cities	Clim. *Score e*	Com. Serv *Score*	Crime *Score e*	Unempl *Score*	Housing *Score*	Mobil *Score e*	Patrimon *Score*	Purchase *Score*	Pollut *Score*	FINAL *SCORE*
1	Lisboa	0.9	1.54	0.24	0.39	-2.69	-0.91	3.26	3.31	-1.86	0.38
2	Guarda	-0.18	-0.08	0.88	0.75	0.91	0.05	-0.58	-0.51	0.76	0.26
3	Coimbra	-0.07	0.58	0.80	0.66	-0.62	0.55	0.41	0.06	-0.36	0.23
4	Bragança	-0.64	-0.10	1.15	0.22	1.23	-0.31	-0.37	-0.54	0.41	0.16
5	Castelo Branco	-0.09	-0.02	1.20	0.03	1.00	0.27	-0.65	-0.49	-0.15	0.15
6	Santarém	-0.07	-0.41	0.54	0.50	0.44	-0.09	0.04	-0.50	0.48	0.12
7	Aveiro	0.39	0.18	-1.04	1.05	0.20	0.13	-0.61	0.02	0.16	0.05
8	Viana do Castelo	-0.05	-0.60	0.13	0.72	0.40	0.12	-0.20	-0.67	0.38	0.04
9	Évora	-0.09	0.01	0.10	0.00	-0.66	-0.27	1.28	-0.23	0.32	0.04
10	Leiria	0.39	-0.51	-0.69	1.29	0.56	0.23	-0.65	-0.33	-0.01	0.03
11	Faro	0.93	-0.01	-1.36	0.31	-0.12	0.42	-0.58	0.32	-0.17	-0.06

Ran k	Cities	Clim . *Score e*	Com. S erv *Score*	Crim e *Score e*	Unem pl *Score*	Housi ng *Score*	Mob il *Score e*	Patrim on *Score*	Purcha se *Score*	Pollut *Score*	FINAL *SCORE*
12	Porto	-0.05	0.97	-0.03	-0.58	-1.66	-0.19	0.52	1.76	-1.08	-0.07
13	Braga	-0.51	-0.16	-1.06	0.41	0.37	-0.04	0.15	-0.20	-0.18	-0.13
14	Vila Real	-0.64	-0.24	0.29	-0.48	0.37	0.04	-0.47	-0.65	0.25	-0.15
15	Viseu	-0.51	-0.51	-0.60	-0.03	0.45	0.24	-0.40	-0.48	0.29	-0.15
16	Beja	-0.09	-0.13	1.03	-1.21	-0.64	-0.22	-0.41	-0.41	0.44	-0.18
17	Setúbal	0.93	-0.37	-1.90	-1.08	0.16	0.18	-0.31	0.08	-0.13	-0.32
18	Portalegre	-0.53	-0.13	0.32	-2.96	0.30	-0.19	-0.41	-0.54	0.46	-0.41

The results obtained in the first phase can also be observed in Figure 2. As can be seen, eight cities are below the average score and ten are above it. Lisbon leads the ranking, while Portalegre occupies the lowest position of the studied cities. This classification still holds until the 6th town if the survey is focused on comments by 65 lecturers of the University of Minho. Regardless of the survey respondents, the differences in the rank-order are very small. Contrary to this situation, in a recent study carried out by ISCTE and a newspaper, there were drastic shifts in the rank order of some of the cities which are listed in both of the two sets of quality of life evaluation, namely Braga and Bragança (shifting places of 3 and 13). Portalegre is nevertheless the last in both systems.

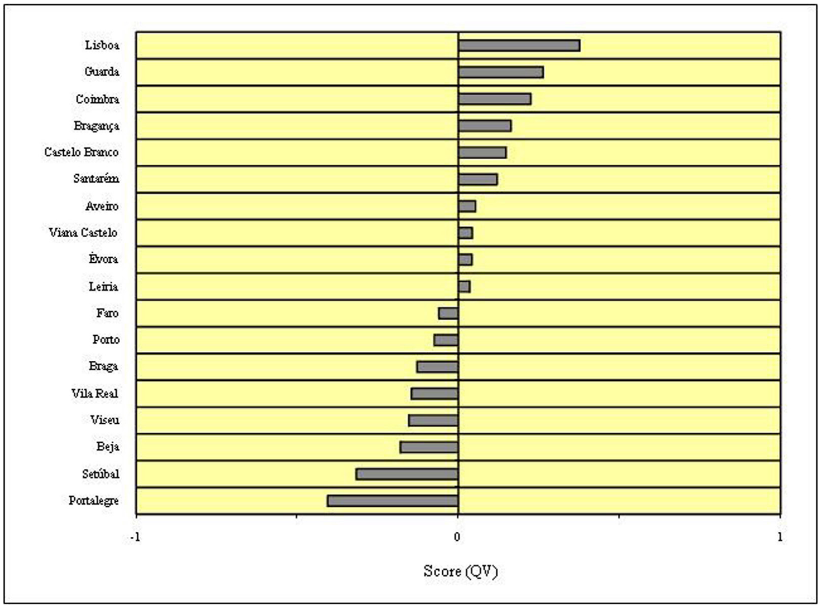

Figure 2- Quality of Life: ranking and scoring (national poll weights)

While the evaluation model developed at the University of Minho for the scoring of the indicators describes nine dimensions, namely climate, shopping and services, crime, unemployment, housing, mobility, built heritage, purchasing power, and pollution, the model of another Portuguese higher education institution (ISCTE - University Institute of Lisbon) misses important dimensions such as built heritage, air and noise pollution. Apart from this, there is no set of weightings as all the indicators are given the same weight and added arithmetically.

4. GIS Mapping

To complete this model, a GIS approach was used to compile and analyse both the quality of life scoring and urban pollution in order to get the GIS Mapping to perform a spatial analysis (Figures 3 and 4).

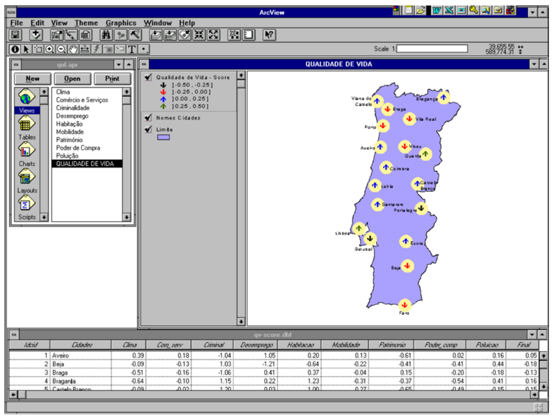

Figure 3 - Quality of life scoring: GIS mapping

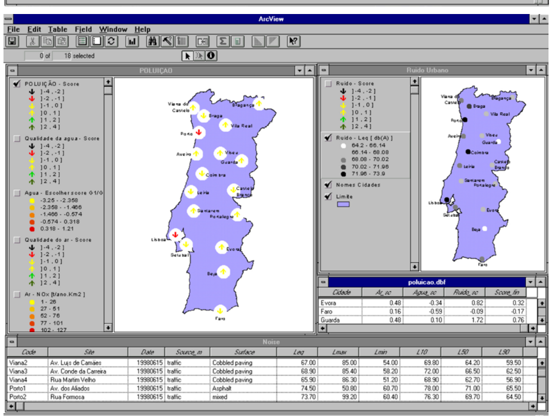

Figure 4 - Urban pollution: GIS mapping

The GIS approaches have already been developed by several researchers such as Gomes and Lins (2002), studying quality of urban life in Rio de Janeiro using the Geographical Information Systems (GIS) integrated with Multi-Criteria Decision Analysis (MCDA) to aid spatial decisions. One of the main advantages is the ability of GIS methods to clarify the decision making process and provide structure to a non-structured decision process; even so, further research should be developed. Apparicio et al., (2007) reported that using several spatial databases in GIS helped his study identify various combinations of advantages and disadvantages, within the urban living environment in which Montreal's public housing buildings have been located, according to three dimensions: the social environment, the physical environment, and the accessibility of services and facilities.

5. Critical Analysis of the Model

The application of the developed models, together with the particular weightings adopted, resulted in a city ranking, with Lisbon in the first place, as the most attractive city in terms of quality of life, and Portalegre in the last place, as the least attractive town. Leiria is the average city, as its score is close to zero. This classification seems to find justification in several practices that have been tested among European cities, where Lisbon and Évora are given as examples of good practice (Deelstra, 2000). The evaluation process was meant to be as sound as possible, therefore subjective options were based on a national poll and compared with a more specific survey directed at professionals with a higher level of education. It is argued that it is not possible to cut across the different systems under analysis and so each analysis is valid as long as it is kept as a closed system, where the scores are taken in relative terms. Likewise, cross-comparison analyses are not easy to establish between different systems of comparison or different countries.

6. Missing Updated Indicators for Sustainable Communities?

It has been argued before that the urban quality of life concept emerged from the sustainability framework. Therefore increasing the scope of the study to encompass broader sustainability concerns can deepen the understanding of the core subject of urban quality of life indicators, as well as showcase some of its limitations.

The drive to reach sustainability is stronger than ever, both cost efficiency and increased levels of quality of life depend on self-sustained, self-reliant communities. Technologically, there are multiple ways of reaching the intended mark and, inevitably, the number and nature of indicators is equally diverse, inevitably overlapping fields of research, introducing more complex models and raising important issues to the fore, previously relegated to the background. Classic indicators of Quality of Life or more precisely Quality of Urban Life, grew to encompass an ever expanding field of communication based utilities. The ability of communities to encourage and stimulate innovation and businesses that foster integration of all members of the community, and which manage to interact successfully with their members is equally important as attracting new people, fostering its growth and influencing other communities with possibly far reaching consequences. A successful community will spread its values and positive trends to a broader audience than simply its members. Potentially, they can add momentum to other communities to strive for maintaining and critically working toward a model of constant improvement.

Low-Carbon Cities and Sustainable Cities indicators can be diverse. The first deals principally with carbon foot-printing of urban environments, the second with the long term sustainability of cities as a whole. The exact indicators chosen to describe and quantify the carbon foot-printing and sustainability can vary depending on several factors, including strategies used to reach the ultimate goals of carbon neutrality and sustainability.

As a reference, Table 3 shows some of the most recent indicators in use by various groups taken from a small sample of Sustainable Cities' Indicators in use as of January 2012 grouped according to different categories.

Table 3 - Sample of Sustainable City indicators

Category	Indicator	Description
Environment	Water consumption[7]	Average total daily flow of water per person
	Green Space/Tree Planting[8]	Area predominantly vegetated or planted (forests, parks, gardens, etc.)
	Visual Polution	Number of cases of graffiti removal per year
	Waste Management/ Diversion	% of waste recycled, composted, etc.
	Ozone	Average annual ozone levels
	GHG emission reduction	Current % of GHG emission reduction achieved in reference to the base year defined in target
	Biodiversity/ Urban biodiversity monitoring program	Numbers of species of animals and plants/ Existence of a comprehensive urban biodiversity monitoring program in the city
	Water quality/Tap water and surface water quality	Existence of a water source protection program
	Household spending on shelter	% household expenditure allocated to shelter
Economic	Unemployment rate	Unemployment rate, all, seasonally adjusted
	Education	% of population who does not have a high school or higher diploma and % of the population who does
	Voter participation	Rate of participation in the most recent municipal election
	City Councill	Representation of gender and visible minorities on city council

7 Corporate Knights, Company for Clean Capitalism, Canada, http://www.corporateknights.ca [Accessed January 2012].

8 Jozsa, A., Brown, D., 2005.

Governance	Emission reduction target	Municipal GHG emission reduction target for the municipality as a whole
	Density	Number of people per square km of the city area
	Green transportation use/Cycling accessibility	Number of people in the city using a "green" mode of transportation to work: public transit, walking, biking, carpooling, etc.; number of km of cycling paths
	Congestion	Number of parking spaces
	Local food production and access	Number of year-round and seasonal farmer's markets operation in a city and the area allocated by the city to community gardens
Infrastructure	Green buildings	Residential or commercial retrofit programs for buildings (existence / support)
	Renewable energy	Incentives for renewable energy production and consumption (existence / support); annual consumption (%) of renewavle energy compared to other sources
Social	Life satisfaction	% of people who describe themselves as "satisfied" or "very satisfied" with their life
	Crime rate	Rated of homicides and hate crimes occurring in a city
	Health and access to care	Number of people in a city who are obese and number of people who report having access to a regular medical doctor
	Cultural events	Number of major cultural events/festivals held in an outdoor or community space, with a cultural focus, with an accessible cost (region dependent)
	Hazards and Natural Disasters	Number of natural disasters (ice storms, flooding)

Although the goal of reducing carbon emissions in cities is relatively straightforward to understand, the techniques and methodologies implemented have produced ever more complex indexes, which take into account the carbon balance, proper planning, the continuous improvement of any given city toward the carbon neutrality goal. All have become important factors to compare the performance of different urban centres. As an example, Table 4 is a small excerpt of indicators developed for use in Chinese cities (Price, L. et al., 2011).

Table 4 - Excerpt of indicators developed for use in Chinese cities, Prince et al.,
project supported by the China Sustainable Energy Program of the Energy Foundation (through the U. S. Department of Energy)

Category	Indicators	Description
Macro Indicators	Energy consumption	Final energy used for a given year divided by GDP
	CO_2 Emissions	CO_2/GDP
	Primary energy use	Primary energy consumption per capita
	Consumption-based carbon emissions	End-use carbon emissions
Municipal level	Electric power	CO_2 Emissions per power produced
	Residential	Residential final energy per capita
	Transportation	Transportation final energy per capita

The work and effort put into the indicators makes an important contribution towards the goal of lowering carbon emissions and developing sustainable cities and are of paramount importance. The numerous methodologies being developed help keep the sustainability discussion diverse and multilateral, with multiple participating countries most of which have their own concurrent models. This feature underlines the global commitment to the sustainability and impact of urban environments.

The examples shown in both tables are, of course, only a fraction of such indicators currently being used to gauge sustainability and the carbon foot-print of cities. Most indicator tables however are heavily influenced by factors such as the country of origin, the researchers involved (architects, engineers, environmental analysts, alternative energy experts, urban planners, etc.), the purpose of the underlying study, etc. Without going into the scope of the problem of integrated interdisciplinary research in this field (a subject discussed by other authors, such as Shmelev, S., and Shmeleva, I., 2009), it is still clear that the filtering of the subject through multiple disciplines, multiple cultural backgrounds and disparate national priorities, will produce varied indicators. Despite the multiplicity of indicators already produced, some researchers are taking different approaches altogether, such is the case of Intelligent Cities.

Even before Finland introduced broadband as a fundamental constitutional right[10], it was stated that broadband was having the potential to become the new globalising and people-empowering force of the twenty first century. This statement is supported by recent political and social events in 2011 where several movements were almost completely organised by using social media. Indicators like the penetration of broadband, innovation, digital inclusion and advocacy, have become a reasonable means of measuring the success of a city.

Funded by Canada, the Intelligent Community think tank defines a

[10] http://www.bbc.co.uk/news/10461048 [accessed: January 2012]

number of indicators based on key competitive factors in what is known as the “Broadband Economy”. These indicators are broadband connectivity, knowledge workforce, innovation, digital inclusion, marketing and advocacy. The first, equates the access to broadband a necessity as essential to business and the economy as clean water and energy. The ability of a community to expand its positive impact to other communities is vital for the propagation of good practices. The caveat is that the potential dilution of the cultural heritage of local communities, and spreading less positive technologies and practices, even non-intentionally, must not be understated.

The indicators reward municipal support for high-tech start-up companies, tech job creation, and appropriate implementation of technologically sustainable solutions which create jobs or save taxpayer money.

The question remains whether these new indicators are really charting new paths to quality of life and lasting prosperity for the citizens. For the time being, most models, independently of variation, are moving towards increasingly organic patterns following technological advances but not ignoring societal or human needs.

7. Indicators for Urban Design

Turning away from technocratic city development models to serving more human-centric priorities has long been defended by many urban planners. Below is a classical model by Jacobs and Appleyard of the theoretical elements forming the base of urban development planning models.

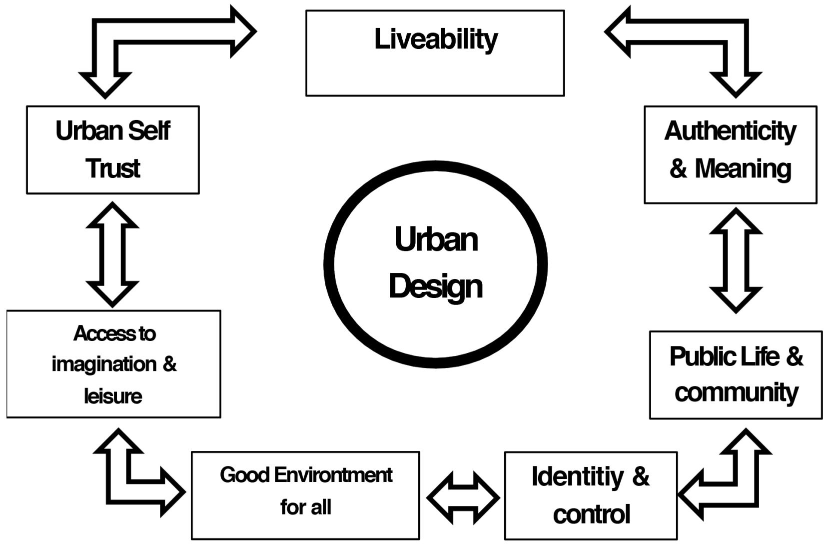

Figure 5 - Schematic diagram of the principles of urban design theorists, including the views of Jacobs and Appleyard.

Jacobs and Appleyard opposed the cost effective, grey skyscraper block tendencies which pervaded the decades of 1970s and 1980s, defending a set of characteristics which they considered to be vital for positive urban living (Jacobs and Appleyard, 1987: 171-174). Their manifesto against high density public and private development projects is now fully supported by current trends prioritising a high quality of life standard. The practice of continuous renewal of cities also leads to a loss of heritage as the places and buildings of a city which have become living material memories, thus bearing meaning and value in themselves as elements of place.

A series of qualitative and quantitative indicators may be used to characterise urban space and evaluate urban design.

A qualitative assessment may evaluate the urban structure, the street system, the existence of facilities and open spaces, or the diversity of land uses, for example.

The urban space may have an open or closed structure. Open can be axial or organic. Grid structures can be regular or irregular. The grid is often used for flat land while organic grids are the more sustainable choice for sloping areas. However, most often cities show a mix of both. Only cities planned from zero such as Brasilia, or extensively planned cities such as Barcelona, may be closer to pure categories. It is important to emphasise that urban design must be adapted to the territory. San Francisco may serve as an example of an urban regular grid structure badly adapted to its topographic environment. Urban structure (see Table 5) may determine car dependency and therefore pollution; conversely, it can make urban spaces more liveable, support public transport, facilitate population access to services and leisure, make cities safer, promote more efficient cities, etc.

Table 5 – Urban Structure Indicators

Urban Structure	
Axial	~
Organic	
Irregular Grid	
Regular Grid	~

Urban space is characterised by its street pattern (see Table 6) which is one of its major characteristics. Street patterns structure the city, serve as a support for infrastructure and condition accessibility. It can be non-linear, discontinuous, diagonal, organic, orthogonal. Cul de sac which is common in suburban developments and is an example that limits accessibility.

For example arterial streets may integrate or divide, traffic may be distributed more evenly, over-concentration in city centres may be avoided by the promotion of alternative uses; in neighbourhoods it may be appropriate to upgrade unsafe parts and enhance historic areas.

Table 6 – Street Pattern Indicators

Street Pattern	
Non-linear	
Discontinuous (cul-de sac)	v
Diagonal	
Organic	
Orthogonal	

Additionally, urban space is valued through the existence of, and the location of public facilities, public spaces, green areas and focal points (see Table 7). Numerous studies are defending the positive contribution of public amenities to the overall comfort of neighbourhoods and their inhabitants, as well as generating higher real estate values.

Table 7 – Spatial Enhancement Indicators

Saptial Enhancement	Total surface area	Location within neighbourhood
Public Equipment	B	B
Public Spaces	B	B
Green Areas	B	B
Focal Points of Interest		
Natural		
Artificial		

Finally, another set of indicators helps characterise the design of urban space (see Table 8). Urban space may be framed or non-framed, articulated or non-articulated, cohesive or without cohesion, varied or monotonous, and may possess self-identity or not.

Table 8 – Spatial Analysis Indicators

Spatial Analysis	
Framed (typologies/building heights)	V
Non-Framed	
Articulated (street network)	
Non-articulated/ Segregated	
With cohesion (pedestrian connections with surrounding space)	V
Without cohesion	
Varied (different plot sizes)	
Monotonous	V
Self-Identity (Neighbourhood sense perception)	V
Without self-Identity	

Figure 6. City centres of Braga and Guimarães and the municipalities location in Portugal

Figure 7. Braga Pedestrian City Centre areas (before and after urban intervention)

Figure 8. Guimarães Pedestrian City Centre areas (before and after urban intervention)

Figure 9. Map of Guimarães comprising site area

Figure 10. Three urban design proposals in Guimarães

Urban design may be assessed via quantitative analysis (see table 9) or, via qualitative analysis by assigning a value to different qualitative indicators of urban space.

Table 9 – Urban Design quantitative assessment

Typologies	Public Green Areas	Public Equipment	Infrastructure	
			Streets	Parking
Housing Single Unit	1288 m^2	1610 m^2	-----	130
Collective Housing	1930,6 m^2	2413,2 m^2	-----	133
Commercial	186,2 m^2	166,2 m^2	-----	22
Sevices	186,2 m^2	166,2 m^2	-----	26
Total	3447,4 m^2	4176,4 m^2	PT ≥ 9,7 m FR =6,5 m P = 1,6 m	311

The land occupancy index can also be collected by using approved detailed plans, giving a general overview of the types of buildings present in the selected area. For example, in the post-EXPO'98 development phase, it is possible to identify the distribution of land occupancy in the following figure.

Table 10 – Synthesis of Occupancy Areas

Location	Total area of plots	Gross Surface Area (m²)								Parking Places		
		Housing	Services	Commerce	Public Equipment	Tourist Equipment	Urban Infrastructures	Industry/ Storage	Total	Private	Public	
											Inside Plot	Outside Plot
PP1	278.760	219.551	398.929	104.871	21.510	34.183	4.995	0	784.039	13.443	13.017	797
PP2	282.315	69.464	87.103	33.926	169.956	0	0	0	360.449	3.572	2.899	530
PP3	177.043	249.029	87.541	24.069	41.611	0	1.201	0	403.451	6.253	2.760	556
PP4	353.533	643.971	37.918	26.589	68.610	0	18.073	25.482	820.643	11.648	2.058	1.055
PP5	71.465	57.450	14.985	3.400	5.000	0	0	0	80.835	1.138	0	190
PP6	429.367	0	8.500	805	23.803	4.000	0	0	37.108	408	0	2.316
PR	181.584	0	1.503	5.010	493	0	0	210	7.216	50	0	80
CFR	1.774.067	1.239.465	636.479	198.670	330.983	38.183	24.269	25.692	249.3741	0 36.512	0 20.734	835.607

9. Synthesis

As concluding remarks, in the first place, urban planners need to be professional. This means being informed, involved in professional networks, both formal and informal, both national and international, as well as endowed with updated training and life-long learning especially from past urban experiences, both failures and successes. This is what EUSS – European Urban Summer Schools are about and that is why we are here.

In the second place, urban planners must be committed to urban quality of life. Openness to and respect for local needs and wishes should be a central tenet. As an example, some forms of participatory planning have acquired much relevance in the last years. The methodologies described in this chapter to assess urban quality of life show how this can be achieved more easily, with user-friendly, interactive forms of GIS applications that should be available in specific sites dedicated to the quality of life topic.

In the third place, urban planners need to be open minded. Flexibility, innovation, persistence and creativity must guide our work. Urban planning requires an integrative and holistic vision that understands the different interrelations that produce urban space and their impacts on the quality of life of inhabitants. We need to apprehend better the consequences of urban interventions, and understand the city as a dynamic entity that changes continually, and evolves accordingly.

In an interconnected and fast changing world, we - as urban planners - need to frame our activity within the wider territory focusing on a long term perspective.

We need to commit ourselves to alleviate through urban design, the socio-economic and environmental problems in the city. It is not a matter of bringing happiness according to the old leit-motif of a planner playing God, but a matter of helping to bring comfort to urban dwellers. It is among our priority tasks to contribute to try and find a balance for a city that attempts to be economically competitive, socially integrative, and environmentally friendly, and therefore sustainable.

In this context of fast changing cities, urban planning needs appropriate information in order to adjust urban interventions to evolving needs. The development of appropriate indicators appears as a central need because it enables us, urban planners, but also politicians and all other involved stakeholders as well as citizens to monitor the past and present trends in a more efficient way.

References

1. Apparicio, P., Seguin A.M., and Naud, D., (2007), The Quality of the Urban Environment Around Public Housing Buildings in Montre´al: An Objective Approach Based on GIS and Multivariate Statistical Analysis, Springer Science and Business Media B.V, 86:355–380, Dordrecht.

2. Brown, R.I.; Brown, P.M.; Bayer, M.B. (1993), A quality of life model: New challenges arising from a six year study. In D. Goode (Ed.), Quality of Life, Brookline, New York.

3. Cummings, R.A. (1998), the comprehensive quality of life scale-Fifth Edition. In Proceed. Of First International Conference on Quality of Life in Cities, Singapore, 67-77.

4. Cummings, R. A. (1999). A psychometric evaluation of the comprehensive quality of life scale. In L. L. Yuan, B. Yuen & C. Low (Eds.), Urban quality of life: Critical issues and options (5th ed., pp. 32–46). Singapore: Singapore University Press.

5. Deelstra, T. (2000) The resourceful city: Examples of good practice in Europe. To be published

6. Felce, D.; Perry, J. (1995), Quality of life: Its definition and measurement, Research in Developmental Disabilities, 16, 51-74.

7. Findlay, A.; Morris, A.; Rogerson, R., (1988), Where to live in Britain in 1998: Quality of life in British Cities, Cities, 5(3), 268-276.

8. Gomes, E.G. G., and Lins M.P.E, (2002), Integrating Geographical Information Systems and Multi-Criteria Methods: A Case Study, Annals of Operations Research 116, 243-269, Kluwer Academic Publishers, Netherlands.

9. Kamp, I., Leidelmeijer, K., Marsman, G., & Hollander, A. (2003). Urban environmental quality and human well-being towards a conceptual framework and demarcation of concepts; a literature study. Landscape and Urban Planning, 65(1), 5–18.

10. Lourenço, J.M., et. al., (2000), Evaluating urban quality of life in Portugal, pp.143-153, Report on Present and futures measures to achieve sustainability on international and local levels, Austrian Research Center Seiberdorf.

11. McCrea, R., Shyy, T., & Stimson, R. (2006). What is the strength of the link between objective and subjective indicators of urban quality of life? Applied Research in Quality of Life, 1(1), 79–96.

12. Mendes, J.F.G. (1999), Onde Viver em Portugal, Ordem dos Engenheiros, Coimbra, Portugal.

13. Perfect, M.; Power, G. (1997), Planning for Urban Quality: urban design in towns and cities, Routledge, London.

14. Rogerson, R. J.; Findlay, A.M., Morris, A.S. (1989), Indicators of quality of life: some methodological issues, Environment and Planning A, 21 (12), 1655-1666.

15. Savageau, D.; Loftus, G. (1997), Places Rated Almanac. Your guide to finding the best places to live in North America, Macmillan, New York.

16. Senlier, N., Yildiz R., Aktas D., (2008), A Perception Survey for the Evaluation of Urban Quality of Life in Kocaeli and a Comparison of the Life Satisfaction with the European Cities, Springer Science and Business Media B.V, Dordrecht