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A Review of the Parametric Characteristics of Urban Environment and it's Influence to the Urban Quality of Life

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Abstract
This study covers the influence of the parameters and factors that modify the urban inhabitants' quality of life. Recently, professionals paid attention in and concern for environmental effects to the cycle of urban fabrics and structural health. The parametric matrix confronted by urbanization growth and affects the daily routine of urban dwellers. Then the purpose is to investigate the parametric characteristics of the urban environment at scale and which needs to be validated by experiments and observation. A valid model in neighbourhood scale has been employed for the data analysis. Results displayed environmental modification in micro level and enormous macro-level.

Keywords: Urban structure and microclimate, design and construction industry, Stressed conditions and urban health, parametric characteristics.

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1.0 Introduction

From the researcher's interpretation, it is observed that the urban environment influences the urban quality of life (QoL) has been based on the various parameters and factors. On the other hand there is a strong relationship between the urban environment as key factor and that influence the QoL of inhabitants and visitors (Streimikiene, 2015). Since the concept of quality of life is multi-dimensional and involves with many indicators, the parametric models are able to provide an appropriate fretwork for measuring and investigation (Lotfi and Solaimani, 2009; Koltsova *et al.* 2012). Recently due the massive conventional urban development, increases of vehicle uses and consumption of fossil fuel, insufficient level of services, reduced air quality, ruined sense of place, discrimination in land use and other non-urban feature problems negatively affect the human quality of life. In this text Quality of life is considered one of the most important dimensions for sustaining any urban development (Serag *et. al* 2013) activities. Besides, the design and construction industries have an increasing attention in and concern for environmental effects over its total life cycle of urban fabrics through the continuous observing of structural health individually.

Though, QoL is complex, multi-dimensional parameter that needs multiple methods from various academic perspectives. It has been extensively used in an extensive range of contexts, includes the fields of international development, healthcare, political science, built environment and fabric health monitoring, education, recreation and leisure time and social belonging, refer to figure 1 (Serag *et. al* 2013; Streimikiene, 2015). Reason of that a significant arrangement of literature has provided positive indication as auxiliary to the effects of natural environments on urban comfort parameters.

A parametric approach of urban environment can be studied by a dynamic model and it's traditional indicators include mobility, building construction, energy efficiency, air and water quality, environmental quality, and urban complexity which is comprised with some elements such as urban canyon and urban canopy of Urban Boundary Layer (Eusuf *et. al*. 2014 and Norhaslina *et.al.* 2013). Similarly,

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urban sustainability can be measured on the basis of the parameterization of indicators and **urbanization processes** in Malaysia. Moreover, the design and construction industries have an increasing attention in and concern for environmental effects over its total life cycle of urban fabrics (Norhaslina *et.al.* 2013)**.** The essential parameters and factors need to be characterized in order to design a futuristic urban location on the stressed situation also. Interactions among those factors create urban environmental stress.

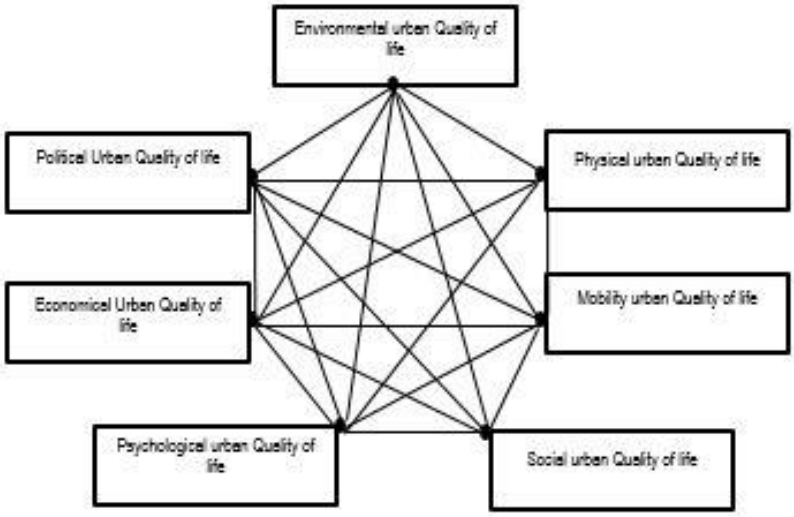

Fig. 1 Dimensions of Urban quality of life
(Source: Serag at. el. 2013)

An overview of parameterization process has been given emphasize on the flexibility that needs in the particular location for application. The process described by the necessary parameters, which is directly proportional to the process's complexity. The aim of this paper is to develop a framework for the assessment of urban environmental indicators relevant to the quality of life and applied to assess the influential factors that modified the urban quality of life in the cities of Malaysia.

1.1 Study Structure

From various research (Keles 2012; Mohit 2013; Grifoni *et al.* 2013; Barbosa *et.al.* 2015; Devilee *et al.* 2017) that involved with parametric- relation to the QoL journal articles- conference proceedings, reports and policies and hazard impact concerning urban parameters and related factors; Parameterization and it's methods; causes of urban stressed and it conditions; urban environment and microclimate; and impact of the risk of climate changes.

Little has been known about the specific spatial patterns of urban nature as parametric-relation to the urban QoL. Urbanization processes in Malaysia have become an integral part of the various parametric matrix confronted by rapid growth. The essential parameters and factors need to be parametrized in order to design a futuristic urban location on the stressed situation (**Burton 1990;** Beil and Hanes 2013)**,** is a recent overwhelming growth of urbanization. Figure 2 Illustrate the characterize the causes of Urban stress and their influence to the QoL. This research investigated a method in order to accumulate the parameters and factors those are guided the urban Quality of Life under a stressed condition. The main objective of the research is to parametrize the urban environment at the multidimensional neighbourhood scale and that needed to be investigated.

On the other hand, researcher revealed that two prominent basic approaches such as a subjective (or endogenous) and an objective (or exogenous) has been identified on the study of UQoL. Where subjective (or endogenous) approach has to focus on the individual or group feelings, perceptions, opinions and mental states and an objective (or exogenous) approach tries to do establish the QoL on the basis of a wide range of measurable or observable indicators in an individual and an environmental dimension (Kladivo and Halás, 2012).

Interactions among those factors create urban environmental stress. Local environmental conditions distress the health of the exposed urbanization. Nevertheless, environmental problems distressing urban areas are closely interconnected with surrounding sub-urban and rural areas by their common causes and interdependent effects (Eusuf *et. al*. 2014).

Researcher (Eusuf *et al.* 2014) revealed that an outdoor environment hampers the outdoor instant mobility; accelerate the degree of distress sensitivities of changing outdoors due to the lack of enough facilities and then retard physical activities, which is finally concomitant with humble QoL parameters for urban dwellers and visitor's irrespective of demographic distribution. The investigatory outcomes have been provided a perception on 'how negative features of the outdoor environment influence the parameter of QoL. This study is essentially needed to confirm the interest of urban dwellers and visitor's on the adverse impact of outdoor urban thermal environment as one of the feature of QoL. The primary aim of this study is to analyze the outdoor thermal environment and comfort in urban housing communities level in a tropical climate, Malaysia and associated with the relationship of between microclimate and outdoor thermal environment and outdoor spaces. The identifiable objectives of this research are as to clarify- the determinants of QoL; analysis of outdoor thermal environment and comfort level for urban dwellers and visitor's; GHG emission and health of urban dwellers

and measurements of air quality index. The environmental performance index has shown the high-priority of environmental issues such as protection of human health and protection of ecosystem (Hsu, 2016).

Table-1: Selected Indicators to measure QoL

No	Research Points	The Criterion for the Indicators	Indicators
1	Demography	• Urban hierarchy and size	• Urbanization rate • Density • Growth rate
2	Housing	• Measureable through collected data at urban level • Clear relationship with issued policy	• Household size • Price to Income ratio • Rental to Income ratio • Floor space ratio • Housing stack
3	Economy	• Effective costing	• Unemployment rate • Career growth rate • Labour growth rate • Poverty level • Income distribution
4	Utility and Infrastructure	• Data for the magnitude of problems • Data reliability	• Water consumption per capita per day • Water loss • Percentage(%) of Flooding Area • Waste generation and collection • Centralized sewerage system (% of houses)
5	Public facility	• Definition and objectives/ issue	• Doctors to population ratio • Open space per 1000 population • No. of primary school children per teacher • No. Kg- school per total urban population • No. of city hall per total urban population
6	Environment		• % of financial budget for environmental Management • No. of Lungs cases per 10000 population • Budget allocation for landscape program • River water quality index • Waste disposal services • % SW that has been recycling • Noise pollution • No. of waterborne and food disease • Air quality index.
7	Sociology and social impact		• % of population involved in community program • Level of health quality services • Crime index per 10000 • Children case per 1000 • Social crime cases and arrested per 1000 • Divorce rate per 1000
8	Landuse		• % of Forests • % of land for public facilities • % of Residential floor space area
9	Tourism and Heritage		• % of maintenance expenditure • Urban heritage elements • % of attraction area
10	Transportation and accessibility		• % of urban public transport • Quality level of public transport services • % of expenditure to increase accessibility system • Ratio of road accident cases per 10, 000
11	Management and finance		• Income revenue • Tax collected • Cash flow ratio as compared to emoluments • Urban development expenditure per capita • Ratio of administration and professionals • % of expenditure as compared to overall revenue

(Source: Ibrahim, 2015)

Fig. 2: Photo's illustrated the urbanization process and characteristics of environmental settings & stresses that influence the urban quality of life. (Source: Beil et al. 2013)

Urbanization processes in Malaysia (Ibrahim, 2015) have become an integral part of the various parametric matrix confronted by rapid structural growth that influence the life pattern of urban dwellers at large. Table 1 shows selected indicators in Malaysian perspective and contribute to this research. A review on the urban microclimate has been studied by the researcher (Toparlara et. al. 2017) and that that influence urban fabric and modification of QoL. Figure 3 depicts the characteristics of the geometry of urban fabrics. The essential parameters and factors need to be characterized in order to design a futuristic urban location on the stressed situation, a recent overwhelming growth of urbanization alarming to modification of situation. The primary objective of the research is to investigate the parametric characteristics of the urban environment at the multidimensional scale and that needed to examine.

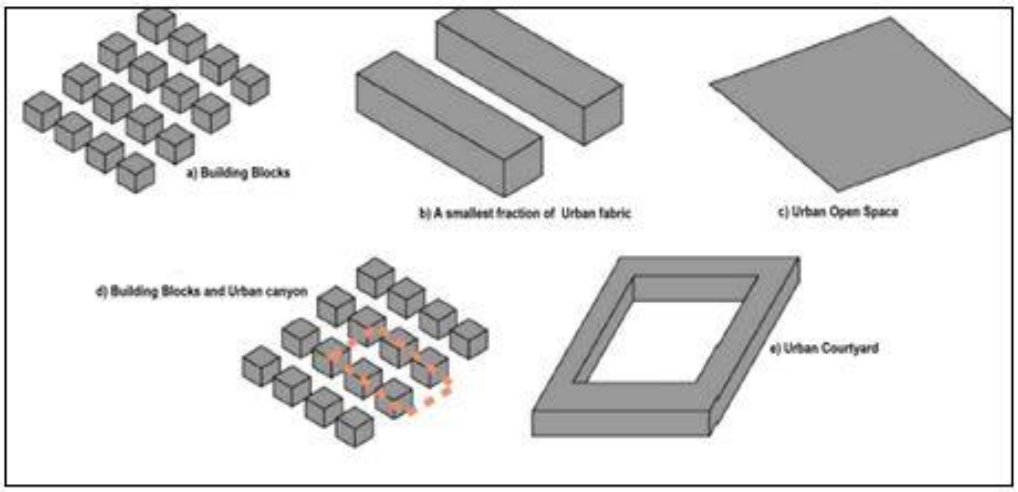

Fig. 3 Characteristic of the geometry of Urban fabric for the study of Urban microclimate and the influence of Urban QoL. *(Source: Toparlara et al. 2017; Eusuf et al. 2017)*

2.0 Flow of Materials and Methods

This research investigated a method in order to accumulate the parameters and factors those are guided the urban environment and their influence to QoL under a stressed condition. There are many approaches to assessing this interdisciplinary term of urban environment, where may focus this issue by experiment and observational process. Table 2 describe the parametric approach that influences the QoL.

Table 2: Parametric influence the Urban Quality of Life (QoL)

No	Elements		Influenced to QoL
1	Site		• Health impacts
2	Original Grid		• Air Quality
3	Urban fabric		• Water and Sanitation
4	Buffer Zone		• Water Resources
5	Gross building area		• Agriculture
6	Infrastructural height		• Forests
7	Orientation		• Aquaculture
8	Voids and porosity		• Bio-diversity and Habitat
9	Canyon		• Climate and Energy

(Source: Salem et. al. 2016)

There are many approaches to assessing this interdisciplinary term QoL where may focus this issue using experimental and observational process.

1 Urban parameter and factors, Parameterization-1; Stressed conditions,
2 Urban Environment and microclimate

2.1 Method for Parameterization of Urban Quality of Life

This part presents a method of parameterization and that identify the influence of UQoL and their subsequent evaluation through parametrically and procedurally generated urban models (refer to figure4).

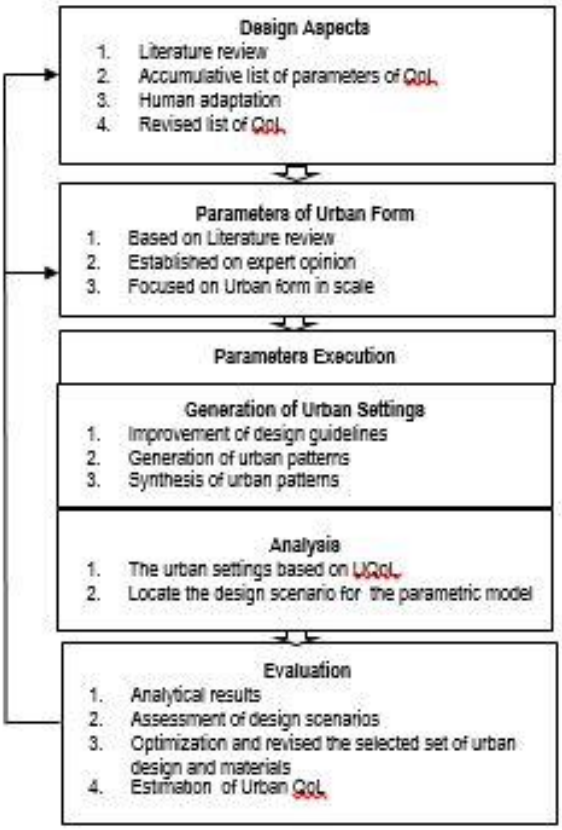

Figure 4: Diagram showing the method for the parameterization and influence the UQoL.

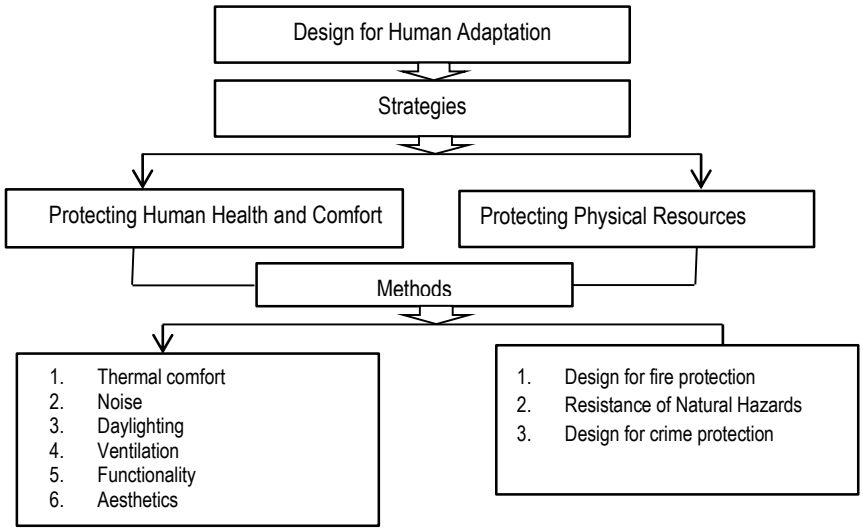

Figure 5 Design for Human Adaptation (Source: Optiz- stapleton, *et al.* 2017)

2.2 Governing Equations

The governing equations can be expressed for eddy dissipation model scheme (De Lieto Vollaro et al. 2015).

The momentum equation is $\overline{u_j}\frac{\partial \overline{u_i}}{\partial x_j} = -\frac{1}{\rho}\frac{\partial \bar{p}}{\partial x_i} + \frac{\mu}{\rho}\frac{\partial^2 \overline{u_i}}{\partial x_i \partial x_j} - \frac{\partial}{\partial x_j}(\overline{u_i' u_j'}) + f_i$ (1)

The continuity equation is $\frac{\partial \overline{u_i}}{\partial x_j} = 0$ (2)

The heat and mass conservation is $\overline{u_i}\frac{\partial T}{\partial x_i} + \frac{\partial}{\partial x_i}\left(K_T \frac{\partial \bar{T}}{\partial x_i}\right) = 0$ (3)

The turbulence Kinetic energy k and its rate of dissipation ε are obtained from the transport equation;

$\frac{\partial}{\partial t}(\rho k) + \frac{\partial(\rho k u_i)}{\partial x_i} = \frac{\partial}{\partial x_j}\left[\left(\mu + \frac{\mu_t}{\sigma_k}\right)\frac{\partial k}{\partial x_j}\right] + G_k + G_b - \rho\varepsilon$ (4)

Where $\overline{u_i}$is the average speed of flow:$\overline{u_i' u_j'}$ is the Reynold stress: $\rho$is the density of air fluid: $\mu$is the absolute viscosity: $f_i$is the thermal-induced buoyant force: $\bar{T}$is the potential temperature:K_T is the heat diffusivity: This model has been used to solve the problem.

The boundary condition of urban canyon is **as-**

$$-k\frac{\partial T}{\partial z} = S(1-\alpha) + R_{Ln} - H \quad (5)$$

Where, *k* is the thermal conductivity of the surface material: *T* is the potential surface temperature: *S* is the total short-wave radiation incident to the surface; α is the canyon surface reflectivity; R_{Ln} is the net infrared radiation to the surface and H is the convective heat flux. The temperatures inside the canyon vertical structure and at depth are considered constant.

3.0 Results and Discussion

For the analysis of collected data here employed a parametric valid model with a significant integration of various parameters and factors related to quality of living conditions. The analytical results displayed the vital importance of the most effective environmental mitigation strategies in micro level and enormous macro-level. The diurnal variation of heat Influx has been presented in figure 6, where showing the comparison between computed and observed diurnal variations of heat fluxes within the urban canyon (Eusuf *et.al*. 2017).

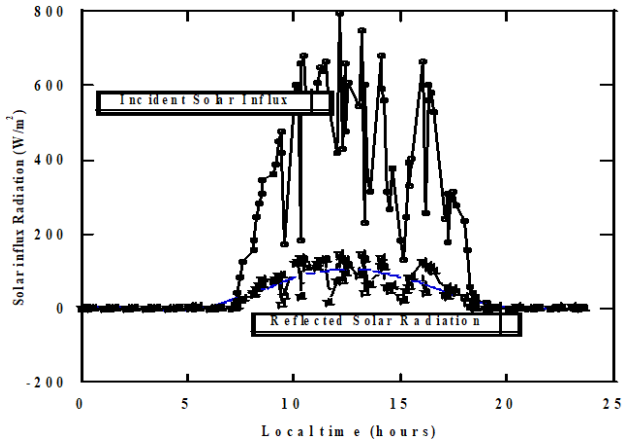

Fig. 6 describes the observed diurnal solar influx: incident (Si-eqn 6) and reflected radiation (Sr-eqn 7).

$$S_i = 0.51 \times 10^2 + 0.16 \times 10^3 t - 0.945 \times 10^2 t^2 + 0.196 \times 10^2 t^3 - 0.164 \times 10 t^4 + 0.06 t^5 - 0.8032 \times 10^{-3} t^6$$

Root mean square (RMS)=90% (6)

$$S_r = 0.088 \times 10^2 + 0.301 \times 10^2 t - 0.182 \times 10^2 t^2 + 0.037 \times 10^2 t^3 - 0.031 \times 10^{-1} t^4 + 0.1136 \times 10^{-1} t^5 - 0.1522 \times 10^{-3} t^6$$ RMS=91%

(7)

$$\alpha = \frac{\sum S_r}{S_i} \quad (8)$$

The comparison between Environmental Performance Index of some selected Asian countries under the ASEAN and SAARC has been given in Table 2. It is found that EPI index in Malaysia is lower than Singapore within the ASEAN states. It is essentially needed to improve the EPI parameters for Malaysian urban areas, because parameters of EPI has also been influenced the Quality of life of urban inhabitants and that presented in Table 3. Parameters related to the measurement of Quality of life index and their performance has been described in Table 4. QoL index of an urban area is functionalized by the performance of several depended parameters. The functional performance is given in the following equation (9).

$$QoL_i = \int_A (p, s, h, c_o, p_r, i, \mu, c) dA \quad (9)$$

Where, $QoL_i$is the Index of quality of life of an Urban area: p is the purchasing power of urban inhabitants: s is the safety aspects of urban dwellers:h is the health care and physical facilities for Urban dwellers: $c_o$is the cost of living and life standard in urban locality: p_r is the affordable price of urban property: i is the level of income: μ is the dispersion and concentration of pollution scalars in urban sky: c is the climate change index of a location. A is the area of urban location.

Table 2: Environmental performance Index of Selected Asian countries

No	*Country*	*Year*					*Remarks*
		2016		*2014*		*Changes in rank*	
		Score	*Ranking*	*Score*	*Ranking*		
1	*Singapore*	*87.04*	*14*	*81.78*	*4*	*-10*	*The member state of ASEAN**
2	*Malaysia*	*74.23*	*63*	*59.31*	*51*	*-12*	*The member state of ASEAN*
3	*The Philippines*	*73.70*	*66*	*44.02*	*114*	*+48*	*The member state of ASEAN*
4	*Thailand*	*69.54*	*91*	*52.83*	*78*	*-13*	*The member state of ASEAN*
5	*Brunei Darussalam*	*67.86*	*98*	*66.49*	*37*	*-61*	*The member state of ASEAN*
6	*Indonesia*	*65.85*	*107*	*44.36*	*112*	*+5*	*The member state of ASEAN*
7	*Vietnam*	*58.5*	*131*	*38.17*	*136*	*+5*	*The member state of ASEAN*
8	*Cambodia*	*51.24*	*146*	*35.44*	*145*	*-1*	*The member state of ASEAN*
9	*Lao PDR*	*50.29*	*148*	*40.37*	*127*	*-21*	*The member state of ASEAN*
10	*Myanmar*	*48.98*	*153*	*27.44*	*164*	*+11*	*The member state of ASEAN*
11	*Japan*	*80.59*	*39*	*72.35*	*26*	*-13*	*ASEAN plus three***
12	*South Korea*	*70.61*	*80*	*63.79*	*43*	*-37*	*ASEAN plus three*
13	*China*	*65.1*	*109*	*43*	*118*	*+9*	*ASEAN plus three*
14	*Sri Lanka*	*65.55*	*108*	*53.88*	*69*	*-39*	*The member state of SAARC*
15	*Bhutan*	*64.99*	*110*	*46.86*	*103*	*-7*	*The member state of SAARC*
16	*The Maldives*	*57.1*	*137*	*-*	*-*		*The member state of SAARC*
17	*India*	*53.58*	*141*	*31.23*	*155*	*+14*	*The member state of SAARC*
18	*Pakistan*	*51.42*	*144*	*34.58*	*148*	*+4*	*The member state of SAARC*
19	*Nepal*	*50.21*	*149*	*37*	*139*	*-10*	*The member state of SAARC*
20	*Bangladesh*	*41.77*	*173*				*The member state of SAARC **
21	*Afghanistan*	*37.5*	*176*	*21.57*	*174*	*-2*	*The member state of SAARC*

Extracted from (Hsu. A.2016); https://www.numbeo.com/quality-of-life/rankings.jsp

*Note: *Association of Southeast Asians Nations; **South Asian Association for Regional Cooperation; ***Trilateral Summit*

Table 3: Index of urban quality of life from 2012 to 2017

Countries	QoL Index											
	2012		2013		2014		2015		2016		2017	
	Rank	Values	Rank	Values	Rank	Values	Rank	Values	Rank	Values	Rank	Values
Singapore	24	87.08	47	69.17	38	87.99	34	111.29	49	93.06	60	86.50
Malaysia	28	65.31	40	79.74	37	89.05	45	85.32	56	63.80	65	51.65
Cambodia							81	-4.40				
Vietnam							84	-19.52			66	36.12
Indonesia	34	37.22	66	-12.54	62	21.85	73	22.70	53	72.19	62	62.02

Thailand	40	24.89	51	54.80	52	56.64	62	47.37	55	63.83	63	57.21
The Philippines	46	-3.77	59	21.08	59	28.09	68	36.95	54	65.83	64	56.87
Japan	13	130.52	15	159.79	12	168.47	13	168.28	16	176.06	30	147.49
South Korea			23	135.62	28	117.90	31	120.03	21	170.29	22	162.49
China	51	-49.77	58	31.50	58	30.30	76	15.99	46	99.03	57	90.95
India	33	44.01	43	73.70	42	78.01	51	78.60	43	109.28	51	101.52
Bangladesh							82	58	88.99			
Sri Lanka							59	49.87			58	88.99
Pakistan	45	-3.05	63	7.67	60	22.32	74	21.82	48	93.99	55	93.41

Data extracted and analysis from **https://www.numbeo.com/quality-of-life/rankings_by_country.jsp**

Table 4 : Parameters related to urban Quality of life

Country	Index Parameter 2017							
	QoL							
		Purchasing power	Safety	Health care	Cost of Living	Property Price/ Income	Pollution Index	Climate Index
Japan	155.80(17)	92.48(14)	80.50(5)	81.33(4)	89.50(4)	13.27(14)	41.02(22)	81.44(33)
S.Korea	142.67(25)	89.74(17)	70.60(16)	82.46(2)	81.07(14)	14.28(10)	52.48(31)	65.86(12)
Singapore	134.53(32)	88.14(20)	83.10(1)	68.50(27)	88.07(6)	22.18(4)	34.82(18)	47.99(5)
India	110.39(43)	67.15(29)	55.51(37)	67.50(30)	27.48(55)	9.88(29)	76.63(52)	55.60(10)
Malaysia	104.15(44)	64.43(32)	36.43(54)	65.66(34)	43.31(44)	9.54(32)	65.19(43)	42.25(4)
Indonesia	103.85(45)	32.63(52)	56.23(36)	68.16(29)	42.32(45)	13.01(15)	58.02(35)	49.30(6)
Pakistan	94.23(48)	35.88(50)	46.48(51)	56.85(45)	27.65(54)	11.82 (20)	77.88(53)	69.33(16)
The Philippines	92.93(49)	31.88(53)	59.96(31)	68.46(28)	36.51(50)	17.18(8)	71.32(49)	49.65(7)
China	91.29(51)	62.21 (33)	67.51(21)	61.56(43)	45.78(40)	27.40(2)	86.82(55)	72.54(18)
Thailand	82.02(55)	28.61(54)	51.12(45)	80.57(5)	47.20(37)	25.95(3)	72.83(50)	51.85(8)

Note: ( ) Rank; Data extracted and analysis **from** https://www.numbeo.com/quality-of-life/rankings_by_country.jsp

Table 5: Quality of life Index

No	*Country*	*Year*						*Changes in rank*	*Remarks*
		2017		*2016*		*2014*			
		Score	*Rank*	*Score*	*Rank*	*Score*	*Rank*		
1	*Singapore*	*134.53*	*32*	*87.04*	*14*	*81.78*	*4*	*-10*	*The member state of ASEAN**
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17	*India*	*110.39*	*43*	*53.58*	*141*	*31.23*	*155*	*+14*	*The member state of SAARC*
18	*Pakistan*			*51.42*	*144*	*34.58*	*148*	*+4*	*The member state of SAARC*
19	*Nepal*			*50.21*	*149*	*37*	*139*	*-10*	*The member state of SAARC*
20	*Bangladesh*			*41.77*	*173*				*The member state of SAARC **
21	*Afghanistan*			*37.5*	*176*	*21.57*	*174*	*-2*	*The member state of SAARC*

Data extracted and analysis from https://www.numbeo.com/quality-of-life/rankings_by_country.jsp

*Note: *Association of Southeast Asians Nations; **South Asian Association for Regional Cooperation; ***Trilateral Summit*

4.0 Conclusion

This scenario contributes to the significant mitigation of microclimate on the improvement of Urban Qol. The benefits of the parametric study are overstated when applied on a spatial scale, which is larger than the urban neighbourhood scale. This scale is used to measure the level of the environment and there influence on the quality of life in the city of Malaysia. Based on the parameters and assessment of the individuals present study, is that all activities and quality of life are correlated and affected by the location (urban/rural). And among the urban inhabitants, there is a significant, positive and moderate correlation between the parametric levels in the domain of the quality of life. The social and physical purview of the quality of life are addressed in the next study which includes design aspects on the basis of cross sectional (Urban and regional context), quantitative, observational, experimental and they intersect with each other for a clearer scenario.

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