



Appropriate Urban Livability Indicators for Metropolitan Johor, Malaysia via Expert-Stakeholder Approach: a Delphi technique

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ABSTRACT

Metro Johor is one of the fast emerging metropolitan urban centers where its current progress and spatial transformation have made it a key player in the economic growth of Malaysia. The recent creation of the Iskandar Malaysia, an economic strategy which aims to be a global player as potential destination for high-value investments, has certainly added social, environmental and economic stress to its urban citizens. This paper intends to develop urban livability indicators for Metropolitan Johor anchored on the changing urban complexion in the face of climate change, economic, governance, social and cultural dynamics, among others. The urban livability conundrum of Metro Johor illustrates that indicators are imperative, especially policy-based indicators, which would aid to scale-up the desired progress according to urban livability metrics. The study involves iterative 3-rounds of Delphi blind survey with Likert scale's degree of agreement, and finally assigning weightings to each sub-indicator. Thus, with the expert-stakeholders involvement, constituting broad-sectoral community representation, a robust and appropriate urban livability index for Metro Johor was generated - a comprehensive framework yet prospective benchmark in appropriating timely policy decisions that would redound to the benefit of urban citizens ensuring a livable Metropolitan Johor

1. Introduction

Metropolitan Johor, known as South Johor Economic Region (SJER) is one of the fast emerging metropolitan urban centers in Malaysia. A highly urbanized settlement where employment, business opportunities abound and best educational institutions, among others, lures rural people. Its rapid development and continued spatial transformation have made it a key player in the economic growth of Malaysia. Its proximity to Singapore has made it a vibrant economic and tourism corridor. The *Iskandar Malaysia* economic initiative, which paved the way for the economic development blueprint aimed to be a global player for high-value investment destination, has certainly compounded social, cultural, environmental and economic challenges to its urban citizens.

Unrelenting urbanization and unabated growth create higher urban stress that lead to the decline of urban livability. The International Society of City and Regional Planners (ISOCARP, 2010) argues that livability is essential to improving city's identity and values, making it attractive to its citizens, visitors, talents, as well as real estate developers and investors. Girardet (2000) characterized human social activity as city's most important layer and the absence of that layer, the city loses its livability. More often, urban growth is frequently associated with increased crime rate, urban mobility nightmare and generates adverse environmental impact. It also earns an impression that highly urbanized cities are at risk from industrial hazards, natural disasters, and the specter of global warming. To achieve urban livability, Metro Johor has to embrace a cogent notion in creating a livable community, as

emphasized by Douglass (2000) by providing its urban citizens the benefit of life chances through shelters for comfort, social interaction and accumulation of material wealth, health and education, livelihood to improve self-esteem and personal fulfillment, clean and safe urban environment, and finally good governance. Thus, the objective of his study is to develop appropriate urban livability indicators for Metropolitan Johor which could be embedded in government policy to promote urban livability.

2. Urban Livability Conundrum of Metro Johor

Metropolitan Johor is still extremely low dense center for international trade, manufacturing, finance and telecommunication networks with little over a million people living in a huge land mass of 2,217 sq. km. of urban area (CDP SJER 2016-2025). With the advent of *Iskandar Malaysia* strategy, pronounced spatial expansion and urban sprawl have been a common site. Newly-constructed structures are changing the skyline and are perceptible along the coast of Danga Bay – modern landscapes are remarkably conceived. Despite its rush for metropolitanization, there are challenges that Metro Johor has to address: inclusiveness and urban livability, thus the following:

Urban housing - Citing the Ninth Malaysia Plan, Leby and Hashim (2010) indicated that the emergent deterioration of urban livability in Malaysia was due to rapid urbanization. Contributory to this imbalance is the concern on governance, and decent and affordable housing which Malaysia has to contend with (UN-HABITAT, 2008). Joeman (2013)

reported that about 10,000 individuals live in dilapidated low cost flats in Metro Johor, while a study of Bujang et al. (2005) revealed that 55.8% of Johor Bahru’s households remain wanting to own residential property. They emphasized that the Bumiputera Lot Quota Regulation, which provides 30% allocation of low and medium cost urban housing to the bumiputera buyers, have “failed to be sold” due to high cost despite the 15% purchase discount (Buang, 2002). This experience could be traced to mostly rural bumiputera ethnic Malay migrants with low to medium monthly income where 67.5% earn below MYR 2,000.00 (Bujang, et al., 2005). In housing affordability, about 52.3% of the respondents can only afford if the housing units are priced below MYR 50,000.00, while 31.4% if priced below MYR 150,000.00. In effect, these bumiputera immigrants establish illegal urban settlement due to unaffordability of housing prices in Johor.

Business governance and related infrastructure - The 2012 study on business environment index (MBEI 2012) by Asia Foundation, showed that Johor Bahru ranked 5th among the 11 city and municipal districts in Malaysia. Accordingly, the obstacles to business growth were (in order of importance) lack of customers, powerful competitors, lack of credit, and lack of qualified personnel aside from Johor Bahru’s highest cost in obtaining business amounting to MYR 500.00, while the lowest was Kuala Terengganu and Kemaman with only MYR 30.00. In enterprise growth governance, the Index exposed that about 90% of the of firms in Johor Bahru agreed that personal connections to officials are important for winning public contracts, while 85% agreed that political party backing is important to corner public procurement contracts. However, in terms of perceived need to pay protection money to local police officers, only 6% of the surveyed firms in Johor Bahru agreed, while 21% in Kuala Terengganu. The BEI 2012 report showed that Johor Bahru ranked 4th in infrastructure availability. Across all districts covered in the study, 26.6% of all firms agreed that availability of electricity remains an obstacle to business, followed by road quality with 15%, water supply with 11.5% and street lighting 9.1%.

Urban safety and crime incidence – Crime incidence has been a prevalent concern in Johor for both private and public stakeholders or “an endemic problem in Malaysian urban communities” (Johar & Zulkarnain, nd). Johor is considered to be one of the hotspots of high crime incidence in Malaysia (Annual Report 2010). The same annual report showed that crime is the second most important concern to the *rakyat* next to economy.

Scarcity of health professionals - Human resource in the health sector in Malaysia continues to be a recurring challenge. The supply of health professionals in Malaysia is seriously constrained by shortages (Kanchanachitra et al., 2011) where Malaysia has 0.9 physicians per 1000 population vis-à-vis 2.2 in upper middle income countries (WHO, 2011). Fewer doctors for its population, while only 2.45 registered nurses per 1000 population (Ministry of Health, 2010) or a combined 2.73 nurses and midwives (WHO, 2011) compared to Philippines with 4 per 1000. Similarly, Malaysia has 0.14 dentists per 1000 population compared to 0.7 for upper middle-income countries (WHO, 2011). Out of 17 countries in the Western Pacific, Malaysia ranked 12 when it comes to ratio of nurses to doctors in the period 2004-2010. Finally, the supply of hospital beds in both public and private have declined from 2.4 beds per 1000 population in 1980 to 1.8 beds in 2009, and has not kept pace with population growth. In the same vein that are only 26 pharmacies and drugstores in Johor Bahru in 2007 with 148 in the entire Johor State (Healy, 2013).

Climate change adaptation - Cities in Malaysia, like the Philippines,

Thailand, and Indonesia are prone to flooding. The 2007 floods in Metro Johor was considered the most devastating climatic incident to hit the Metro where 18 lives were expended and recorded US\$500 million damage to properties (Ludin & Barau, n.d.) The amount of rainfall that created a strong flashfloods to hit the Metro in July 2010 was 10 times above the usual rainfall level and beyond the capacity of the drainage system in the urban center (IRDA, 2010).

Urban transportation and mobility – Metro Johor has a current modal split of 70:30 (CDP SJER 2016-2025) between private vehicle ownership and public mass transport services - an aberration from the projected 50:50 established by the National Transportation Program by year 2020. If the current modal split continues, Metro Johor may condescendingly experience irreversible massive road congestion affecting both travel time and transport costs, including the deterioration of air quality in Metro Johor. As cited by Minhans & Moghaddasi (2013) road incidents would geometrically rise with the increased private vehicle ownership which is projected to surge 15 times by 2020. By road incidents, motorcycle owes a high 64% of road incidents, private vehicles 16% while public conveyances is quite negligible at 1% (Minhans & Moghaddasi, 2013).

3. Urban Livability Indicators Framework

Through various studies and comprehensive literature review, the preliminary framework was developed which include 76 sub-indicators categorized under 11 domain indicators, thus:

Domain Indicators	Sub-indicators
Urban Infrastructure and Services	<ul style="list-style-type: none"> Access to electricity Access to potable drinking water Telecommunication with global network Provision of public spaces for public event Safe and orderly pedestrian sidewalks and overpasses Access to low cost and quality public housing affordable house rentals Access to government records
Climate Resiliency and Disaster preparedness	<ul style="list-style-type: none"> Flood control system Availability of geo-hazard map to citizens Identified fire zones Citizen participation in risk assistance Availability of risk reduction and assistance facilities potential economic loss due to disasters
Protection of Urban Environmental Resources	<ul style="list-style-type: none"> Air quality Water quality Drainage system Urban greenbelt Solid waste management system Sanitary landfill Managed urban sprawl Protection of natural waterways
Public Health and Wellness Services	<ul style="list-style-type: none"> Ratio of medical officer per 1,000 population Ratio of hospital beds to 1,000 population Average cost of hospital room per day number of urban medical/health centers
Access to Quality	<ul style="list-style-type: none"> alternative education centers for out-of

	school youth
Education	Availability of schools for higher learning Teacher-student ratio in elementary level Ratio of teacher with post-graduate level education Percent of high school graduate to grade one enrollment Percent of high school dropout
Social Equality and Security	Crime rate incidence Ratio of crime solution to total crimes committed technology on crime response and public safety Police to population ratio Accessibility of disabled person to establishments well-lighted streets and thoroughfares at nighttime Access to property rights
Urban Recreation and Accommodation Facilities	Recreation center Public parks Hotel rooms Shopping malls Supermarkets Public markets
Dynamism and Promotion of Local Economy	Business licensing for new enterprise City gross domestic product per person Employment rate Inflation rate Average cost of office space Growth rate of private investments Rate of local taxes Incentives to new investors Conducive working environment
Ease in Urban Transportation and Mobility	Urban transport connectivity Quality of urban transportation system Quality of urban road network Availability of transport and traffic management office Traffic enforcers knowledgeable in traffic laws Access to 24/7 urban transportation Reasonable public transport fare Alternative modes of urban transport Pedestrian sidewalk free from vendors
Good Governance	national laws and local ordinances properly implemented Transparency in government transactions Accountable city officials Responsive to needs of citizens Citizen participation in government policy making process Government employee performance
Social Cohesion and Connectedness	Respect of traditions among diverse cultures Common language Participation in social activities Sense of local community Access to social network Community resilience Doing things for other people/volunteerism

As indicated, the consolidated framework was reached through an expansive and critical review of literature on various urban livability issues confronting cities in Southeast Asian countries, including Metro Johor as the focal study area.

4. Objectives of the Study

This study intends to develop appropriate urban livability indicators for Metro Johor. The study, through the participation of expert-stakeholder approach, shall identify preliminary urban livability indicators through the framework-based indicators and to supplement indicators as they deemed it necessary and essential to the livability of Metro Johor. The study shall culminate with synthesized livability indicators into urban livability index for Metro Johor.

5. Methodology

An iterative, three-round blind survey generic Delphi toolkit (Day and Bobeva, 2005) method was conducted to pre-qualified 20 expert-stakeholders from Metro Johor who went through a selection process. The expert-stakeholders include the academe, government functionaries, professionals, entrepreneurs, and non-government organizations. The inclusion of both professional and academic experts is substantiated by Vaugeois et al. (2005), Sunstein (2006), Briedenhann & Butts (2006), Alberts (2007) and Donohoe and Needham (2009) as a means to achieve a balance between differing perspectives.

The first round of Delphi or the *scoping phase* intends to gain a common understanding (Donohoe, 2011) of the pre-identified 11 domain indicators vis-à-vis its respective sub-indicators which were judiciously leafed from literature review (Wong, 2006) including the supplemental urban livability indicators that expert have provided which reflects the community's involvement in indicator development (de Villa & Westfall, 2001) which were presented to experts in Round 2. The scoping phase further determines the scope and content that took forward the initial determination of significance made in screening to the next stage of the resolution – determining which sub-indicators are considered important with significant impacts that require focus (Donohoe, 2011). Questionnaires were sent to the experts by email and some were handed personally on the last week of September 2014 containing the purpose of the survey, the guidelines on how to go through the survey, the enumeration of 76 sub-indicators for their selection under the auspices of the respective domain indicators. The last answered questionnaire was received on mid-December 2015.

The second round or the *convergence phase* has generated the most appropriate urban livability sub-indicators, grounded on the revision by the experts' choices and the inclusion of supplemental sub-indicators on the first round. The Round 2 questionnaires were sent on mid-January 2015 incorporating the consolidated results of Round 1. The experts were requested to reconsider their responses and presented the supplemental sub-indicators proposed in Round 1. Round 2 assures that the chosen sub-indicators in Round 1 have undergone reconsideration as to its suitability as urban livability indicators. For the domain indicators, the experts were directed to initially rate the domain indicators using a 5-point Likert Scale and afforded preliminary ranking.

The third and final round or the *consensus phase* has evolved a consensus from the experts to generate conclusive framework of urban livability indicators; hence an urban livability index for Metro Johor.

The sub-indicators with 50% and more percentage scores were considered for the final round. A 5-point Likert Scale was utilized to afford ranking of the indicators and finally the weightings of concluding urban livability indicators was afforded.

6. Results and Discussion

6.1 Round 1: Scoping phase

The scoping phase (Round 1) yielded moderately-scored sub-indicators which can be viewed in Table 1. The low response turnout was considered logical since some sub-indicators were perhaps remotely unimportant or innovations to some experts to be considered indicators for urban livability. It should also be thought of that this phase indicates the simple determination of the choices of experts to determine the scope and direction of the research, and to recognize which sub-indicators are considered important with significant impacts that require focus (Donohoe, 2011). As anticipated, a total of 32 supplementary sub-indicators were proposed by the experts. Interestingly, the most supplemented domain indicator was Ease in Urban Transportation and Mobility with eight indicators, while Public Health and Wellness Services has six and the Dynamism and Promotions of Local Economy has five supplementary sub-indicators.

6.2 Round 2: Convergence Phase

6.2.1 Urban infrastructure, recreation, accommodation and other urban services

Improved percentage scores were noted in convergence phase (Round 2) as shown in Table 1. Under the domain indicator Urban Infrastructure and Services, the sub-indicator 'affordable quality public housing' remained the most preferred urban livability sub-indicator, followed by the 'provision for public space for public event' and 'telecommunication with global network' that slipped to third spot. Meanwhile, 'access to potable drinking water' was extricated, thus ineligible to be included in Round 3, and was replaced with 'affordable house rentals'. The prominence of sub-indicators related to housing can be gleaned from the recurring issue in Metro Johor regarding the provision of public housing.

Under the domain indicator Urban Services, Recreation and Accommodation Facilities, the 'recreation/entertainment centers' was consistently on top with 100% of the experts apparently in favor to have more of it. Leisure with the provision of modern urban amenities reflects greater demand of Johoreans coupled with the assumption that urban citizen of Johor have high disposable income. 'Shopping centers, public parks, supermarkets and public markets' remained within the framework of urban livability. The two supplemental sub-indicators 'public library' and 'religious facilities' have managed to score better and let slip the 'hotels/inns/lodging houses' to the last spot, which seems to aver some thought of exclusivity for its citizens and are disinterested on visitors or perhaps tourists.

6.2.2 Climate change readiness and protection of urban natural environment

Climate change adaptation and resiliency bears to be in the forefront of the experts in considering the urban livability of Metro Johor in Round 2. Having experienced unusual climatic changes during the immediate past years characterized by abnormal rainfall levels and devastating flash floods, the sub-indicator 'flood control system' was the persistent top

preference of the experts, followed by the supplemental sub-indicator 'disaster response system' which can be seen in Table 1 under the domain indicator Climate Resiliency and Disaster Preparedness. Perhaps the experts were conceivably aware of the level of readiness of the government in terms of disaster response through logistical preparation, manpower and skills availability, and quick response. In the same vein that the experts have considered the mobilization of urban dwellers, through community organizations given appropriate training in disaster preparedness and post-disaster assistance, as an extended manpower of the government during natural calamities. Meanwhile, it is to the interest of the urbanites to be rightly informed on the various vulnerabilities through the availability of geo-hazard information. This is to reduce the loss of lives and properties through disaster preparedness of the community.

However, it is imperative that urban natural resources should be protected to mitigate the consequential impacts of the changing climate and to sustain a livable urban environment *a priori*. 'Water quality' and 'protection of natural waterways', under the domain indicator Protection of Urban Environmental Resources as shown in Table 1, clearly indicate of experts' existent principle for a livable urban center. Directly related to each other are the sub-indicators 'drainage system' and 'solid waste management', and if not addressed by the government with celerity, will have catastrophic effect to the total urban environment in terms of urban livability. Moreover, high motorization level of Johor, due to high per capita vehicle ownership, remains to be a challenge to Metro Johor's air quality.

6.2.3 Urban Health Services and Accessibility to Education

Metro Johor in particular and Johor State in broad concern remained challenged on the issue of services and human resource in the health sector, including the general health spectrum of Malaysia (WHO, 2011). It is oddly interesting to note that in Round 1, all sub-indicators under the domain indicator Public Health and Wellness Services scored so poorly that only the 'average cost of hospital room per day' barely crossed the 50 percentage score as shown in Table 1. Similarly interesting was the supplemental sub-indicator 'availability of universal medical insurance' which landed on top of the heap was the significant choice of the experts in Round 2. However, compared to Round 1, it was quite evident the there was generous percentage scores given by the experts to all sub-indicators in Round 2 with the inclusion of the three supplemental sub-indicators that scored past other framework-based sub-indicators.

According to World Health Organization (WHO, 2010) "Malaysia is below the international norm in its population ratio of doctors, dentists, nurses and other health workers." Despite the increased number of medical learning institutions including post-basic and specialist training centers, severe shortages of health professionals still persist. The recommendation of WHO is to recruit foreign professionals and re-hiring of retired professionals (Healy, 2013, p. 81), among others. Anent to this, it is exigent for Malaysian government or Johor State to address the educational and training needs, incidentally in the medical profession, thereby increasing the health professional ratio, including other educational discipline for urban citizens by having more choices and access to quality education.

In a policy-related sub-indicator, the experts indorsed the 'number of schools of higher learning' as the topmost urban livability indicator in Round 2 for Metro Johor as shown in Table 1, followed by 'education centers for out-of-school youth' which implies the provision of learning

Table 1: Comparative Percentage Scores of Sub-indicators (1/4)

Domain Indicators	Sub-indicators	Round 1	Round 2	Eligible for Round 3
		%	%	
Urban Infrastructure and Services	affordable quality public housing	75.0	90.0	90.0
	provision of public spaces for public event	60.0	90.0	90.0
	telecom with global network	75.0	85.0	85.0
	safe & orderly sidewalks and overpasses	65.0	80.0	80.0
	access to electricity	65.0	70.0	70.0
	affordable house rentals	40.0	55.0	55.0
	access to potable drinking water	60.0	40.0	n.e
	access to gov't records	45.0	15.0	n.e
Climate Resiliency and Disaster Preparedness	flood control system	85.0	90.0	90.0
	disaster response system	s	80.0	80.0
	citizen participation in risk assistance	50.0	75.0	75.0
	availability of risk reduction facilities	45.0	70.0	70.0
	availability of geo-hazard info. to citizens	60.0	65.0	65.0
	potential economic loss due to disasters	35.0	45.0	n.e
	identified fire zones	30.0	20.0	n.e
Protection of Urban Environmental Resources	water quality	80.0	95.0	95.0
	protection of natural waterways	90.0	90.0	90.0
	drainage system	85.0	85.0	85.0
	solid waste mgt. system	65.0	85.0	85.0
	air quality	70.0	80.0	80.0
	sanitary landfill	50.0	75.0	75.0
	urban greenbelt	45.0	40.0	n.e
	managed urban sprawl	45.0	40.0	n.e
Public Health and Wellness Services	availability of universal medical insurance	s	85.0	85.0
	number of urban- based medical/ health centers	50.0	70.0	70.0
	response to medical emergencies	s	70.0	70.0
	average cost of hospital room/per day	55.0	65.0	65.0
	health/ medical subsidy	s	65.0	65.0
	ratio of medical officer to 1000 population	50.0	65.0	65.0
	ratio of hospital bed to 1000 population	50.0	55.0	55.0
	average life expectancy	s	40.0	n.e
	center for alternative medicine	s	30.0	n.e
	maternal mortality rate	s	15.0	n.e

NOTE: s = supplemental sub-indicator
n.e. = not eligible

Table 1: Comparative Percentage Scores of Sub-indicators (2/4)

Domain Indicators	Sub-indicators	Round 1	Round 2	Eligible for Round 3
		%	%	
Choices and Access to Quality Education	number of schools of higher learning	75.0	85.0	85.0
	education centers for out-of school youth	70.0	85.0	85.0
	ratio of teachers with graduate level education	65.0	80.0	80.0
	per capita expenditure for education	s	65.0	65.0
	teacher student ratio in elementary level	50.0	60.0	60.0
	percent of college drop-out	40.0	50.0	50.0
	percent of high school drop-out	35.0	40.0	n.e
	percent of elem. school drop-out	s	30.0	n.e
Social Equality and Security	crime rate incidence	85.0	85.0	85.0
	technology in crime response & public safety	70.0	85.0	85.0
	well-lighted streets and thorough fares	65.0	80.0	80.0
	crime prevention measures	s	70.0	70.0
	ratio of crime solution to crimes committed	60.0	60.0	60.0
	ratio of police to population	60.0	60.0	60.0
	access of differently abled to establishments	40.0	60.0	60.0
	visibility of law enforcers	s	40.0	n.e
Urban Services, Recreation and Accommodation Facilities	access to property rights	30.0	35.0	n.e
	recreation/ entertainment centers	100.0	100.0	100.0
	shopping malls	75.0	95.0	95.0
	public parks	85.0	95.0	95.0
	supermarkets	60.0	85.0	85.0
	public markets	80.0	85.0	85.0
	public library	s	70.0	70.0
	religious facilities	s	55.0	55.0
	hotels/ inns/ lodging houses	55.0	50.0	50.0
	museum	s	20.0	n.e
crèche/ exhibition facilities	s	15.0	n.e	

NOTE: s = supplemental sub-indicator
n.e. = not eligible

Table 1: Comparative Percentage Scores of Sub-indicators (3/4)

Domain Indicators	Sub-indicators	Round 1	Round 2	Eligible for Round 3
		%	%	
Dynamism and Promotion of Local Economy	employment rate	75.0	80.0	80.0
	ease in business licensing for new enterprise	70.0	70.0	70.0
	incentives to new investors	55.0	70.0	70.0
	growth rate of private investments	50.0	65.0	65.0
	rates of local taxes	65.0	65.0	65.0
	average income	s	60.0	60.0
	inflation rate	50.0	55.0	55.0
	gross city domestic product per person	35.0	50.0	50.0
	available office space for occupancy	s	45.0	n.e
	rent of office space	40.0	40.0	n.e
	business support organization	s	40.0	n.e
	conducive working environment	35.0	30.0	n.e
	business incubators	s	30.0	n.e
	micro- credit facilities	s	20.0	n.e
Ease in Urban Transportation and Mobility	urban transport connectivity	90.0	95.0	95.0
	quality of urban road network	90.0	95.0	95.0
	availability of bicycle lanes	s	85.0	85.0
	quality of urban transport system	65.0	80.0	80.0
	availability of transport and traffic mgt. system	60.0	80.0	80.0
	pedestrian sidewalk free from vendors	55.0	80.0	80.0
	availability of road signs	s	80.0	80.0
	alternative modes of urban mass transport system	60.0	70.0	70.0
	reasonable transport fare	70.0	55.0	55.0
	access to 24/7 urban transport	50.0	50.0	50.0
	side-street parking	s	45.0	n.e
	traffic congestion/jam	s	40.0	n.e
	traffic enforcers familiar on traffic laws	35.0	30.0	n.e
	availability and connectivity of pedestrian sidewalks	s	30.0	n.e
	visibility of traffic enforcers	s	30.0	n.e
	bicycles for hire	s	10.0	n.e
solar- powered vehicles	s	5.0	n.e	

NOTE: s = supplemental sub-indicator
n.e. = not eligible

Table 1: Comparative Percentage Scores of Sub-indicators (4/4)

Domain Indicators	Sub-indicators	Round 1	Round 2	Eligible for Round 3
		%	%	
Good Governance	local & national laws properly implemented	90.0	95.0	95.0
	gov't employees performance	75.0	90.0	90.0
	transparency in gov't transactions	85.0	85.0	85.0
	accountable city officials	80.0	80.0	80.0
	citizen participation in policy making process	75.0	65.0	65.0
	responsive to needs of its citizens	55.0	60.0	60.0
	revenue generation function	s	30.0	n.e
	educational qualification of elective officials	s	25.0	n.e
	local gov't election mechanism	s	20.0	n.e
Social Cohesion and Connectedness	respect of traditions among diverse ethnic cultures	90.0	95.0	95.0
	participation in social activities	70.0	80.0	80.0
	doing things for other people/ volunteerism	80.0	75.0	75.0
	sense of local community	70.0	70.0	70.0
	community resilience and adaptability	45.0	70.0	70.0
	access to social network	65.0	60.0	60.0
	religious tolerance	s	45.0	n.e
	common language	50.0	40.0	n.e

NOTE: *s* = supplemental sub-indicator
n.e. = not eligible

centers for skills and livelihood development to add wealth creators and become productive in the urban community. The 'ratio of teachers with graduate level education' was highly regarded by the experts towards a livable urban community by way of leveling up the quality of education. Another policy-related sub-indicator was the extent of government spending on education per capita.

6.2.4 Security, social, harmony and synchronicity

Secured streets and safe urban environs for Metro Johor is evidently the primary aspiration of the experts. This can be seen in Round 2, Table 1 where their top four choices were 'crime rate incidence', technology in crime response and public safety', and well-lighted streets and thoroughfares' including the supplemental sub-indicator 'crime prevention measures' under the Social Equality and Security domain indicator. Despite official government pronouncement that crime rate in Malaysia have declined by 15% from 2009 to 2010 (Reducing Crime, Government Transformation Program, Annual Report 2010. pp. 30), the threat to life and property by various criminal offenses continue to persist. In 2011, 13% of businesses in Johor Bahru experienced losses from crime incidence due to theft, robbery, vandalism and arson (Terpstra Tong, et al, 2013). Thus, other livability indicators that expert would like measure is 'crime solution ratio' and 'ratio of police to population' which are significant in consideration for safe and secure urban surroundings.

Considerably, the expert-stakeholders have recognized that 'respect of traditions among diverse ethnic cultures' could sustain social

cohesion and connectedness in the urban setting, owing to the fact that Johor is multi-racial, multi-ethnic community. Further, the experts have also aspired for the urban citizen their 'participation in social activities', 'volunteerism, and to eventually to establish a 'sense of local community'. 'Common language and the supplemental sub-indicator 'religious tolerance' were relegated to the bottom spot, thus ineligible for Round 3.

6.2.5 Good Governance cum Competitive Business Climate

To have a livable urban society, good governance is one of the significant and strategic approaches towards the establishment of the envisioned sustainable development. Thus, as shown in Table 1, the sub-indicator 'local and national laws properly implemented' was consistently the top choice of the experts in both Rounds. It was likewise aspired by the experts that 'government employees performance' be given due attention, perhaps in terms of job productivity vis-à-vis public clientele and job-related duties and functions. The third spot was the 'transparency in government transactions' which is the core of government's credibility, and if performed arbitrarily, could deliberately erode business and people's confidence in the government. Moreover, 'citizen participation in policy-making process' and government 'responsive to needs of its citizen' were also qualified by the experts to be indicators for urban livability.

In the context of the domain indicator Dynamism and Promotions of Local Economy, the sub-indicator 'employment rate' took the first

spot. This was logically followed by the four sub-indicators which are important factors in generating employment. Other sub-indicators that level-up to Round 3 include 'average income', inflation rate, and 'gross domestic product per capita.

6.2.6 Ease in Urban Transportation and Mobility Sub-indicators

The 'quality of urban road network' and transport connectivity were consistent top sub-indicators in both rounds as shown in Table 1, Round 2. This implies that the experts are keen on the efficient movement of people and transport of goods to and from the destinations in the urban center. Curiously, the supplemental sub-indicator 'availability of bicycle lanes' landed third spot indicating the interest of the experts to reduce the dependency on motorized vehicles and to mitigate air pollution. However, for the broad convenience of the urban citizens, the 'quality of urban mass transport system' needs to be taken into consideration by the government. Other sub-indicators that are eligible to the third round were 'availability of transport and traffic system, pedestrian sidewalks free from vendors, availability of traffic signs, alternative modes of urban mass transport system, and reasonable transport fare' in public conveyances.

6.2.7 Initial ranking of domain indicators in Round 2

Simultaneous with the reconsideration of the sub-indicators using the same questionnaire in Round 2, experts have initially rated the 11 domain indicators using the 5-point Likert scale ranging from 1=extremely disagree, 2 = agree, 3 = neutral, 4 = agree, and 5 = extremely agree. The initial ranking was developed based on the mean ratings (Yeung et al, 2007) advocated by 20 experts. Thus, the results in Table 2.

Quite evidently, there is high agreement of all the expert-stakeholders on the 11 domain indicators as shown in Table 2. This preliminary ranking reveals the primary consideration of the experts on their preferences and choices of the domain indicators.

Table 2: Mode, Mean Rating and Rank of Domain Indicators in Round 2

Domain Indicators	Mode	Mean Rating	Rank
Urban infrastructure and services	5	4.80	1
Protection of urban environmental resources	5	4.55	2
Good governance	5	4.55	2
Urban services, recreation and accommodation facilities	5	4.55	2
Choices and access to quality education	5	4.40	5
Ease in urban transportation and mobility	5	4.35	6
Social equality and security	4	4.15	7
Public health and wellness services	4	4.10	8
Climate resiliency and disaster preparedness	4	4.00	9
Social cohesion and connectedness	4	3.95	10
Dynamism and promotion of local economy	4	3.80	11

Number of sample (n): 20

Mean rating: 1 = extremely disagree and 5 = extremely agree

6.3 Round 3: Consensus phase

6.3.1 Urban infrastructure, recreation, accommodation and other urban services

The descending order of indicators in Round 2, except for the 'availability of public spaces for public event' that went down to rank 6th, remained consistent for the experts as shown in Table 3. For the

Table 3: Rank and weightings of sub-indicators under the domain indicators Urban Infrastructure and Services, and Urban Services, Recreation and Accommodation Facilities

Domain Indicators	sub-Indicators	mode	mean rating	rank	weighting
Urban Infrastructure and Services	affordable quality public housing	5	4.85	1	0.1830
	telecommunication with global network	5	4.65	2	0.1755
	safe and orderly sidewalks and overpasses	4	4.40	3	0.1660
	access to electricity	4	4.35	5	0.1642
	availability of public spaces for public event	4	4.20	6	0.1585
	affordable house rentals	4	4.05	7	0.1528
Urban services, recreation and accommodation facilities	recreation/entertainment centers	5	4.70	1	0.1335
	public parks	5	4.65	2	0.1321
	public markets	5	4.65	2	0.1321
	shopping malls	5	4.55	3	0.1293
	public library	5	4.55	3	0.1293
	supermarkets	5	4.60	4	0.1307
	hotels/inns/lodging houses	4	3.80	5	0.1080
religious facilities	3	3.70	6	0.1051	

Table 4: Rank and weightings of sub-indicators under the domain indicators Climate Resiliency and Disaster Preparedness, and Protection of Urban Environmental Resources

Domain Indicators	Sub-Indicators	mode	mean rating	rank	weighting
Climate resiliency and disaster preparedness	flood control system	5	4.35	1	0.2153
	availability of risk reduction facilities	4	4.15	2	0.2054
	disaster response system	4	3.95	3	0.1955
	availability of geo-hazard info. to citizens	4	3.90	4	0.1931
	citizen participation in risk assistance	4	3.85	5	0.1906
Protection of urban environmental resources	drainage system	5	4.45	1	0.1692
	solid waste management system	5	4.45	1	0.1692
	protection of natural waterways	4	4.45	1	0.1692
	air quality	4	4.40	2	0.1673
	water quality	4	4.30	3	0.1635
	sanitary landfill	4	4.25	4	0.1616

sub-indicators under the ‘Urban Services, Recreation and Accommodation Facilities, ‘recreation/entertainment centers’ has always been consistently on top and ranked number one by the experts.

6.3.2 Climate change readiness and protection of urban natural environment

‘Flood control system’ ranked 1st with the experts which means they have extremely agreed as manifested with the mode of 5 as shown in Table 4. The descending order in rank follows with the ‘availability of risk reduction facilities’ with 2nd rank, disaster response system at the 3rd rank, and down the line. Correspondingly ‘drainage system’ which is directly related to the ‘flood control system’ ranked 1st under the domain indicator Protection of Urban Environmental Resources. Sharing the same rank were ‘solid waste management’ and ‘protection of waterways’ which have extreme impact to ‘flood control system’. ‘Air quality, water quality, and sanitary landfill took the remaining ranks in orderly descending.

6.3.3 Urban Health Services and Accessibility to Education

It can be gleaned from Table 5 that the ‘number of medical/health centers’ in Metro Johor appears to be necessitated by the experts as it was ranked 1st. The supplemental sub-indicator ‘availability of universal medical insurance’ placed second rank. Sharing the third rank were ‘ratio of hospital beds to 1000 population’ and the provision of ‘health/medical subsidy’. The ‘ratio of medical officer to 1000 population’, ‘response to medical emergencies’, and ‘average cost of hospital room/per day’ were ranked 4th, 5th and 6th, respectively.

Sharing the top rank, under the domain indicator Choices and Access to Quality Education are the ‘number of schools of higher learning’ and ‘ratio of teachers with graduate level education’. These two are mutually related in the light of accessibility to high quality learning instructions. The ‘education centers for out-of school youth’ was ranked 3rd, followed by ‘teacher-student ratio in elementary level’ and

Table 5: Rank and weightings of sub-indicators under the domain indicators Public Health and Wellness Services, and Choices and Access to Quality Education

Domain Indicators	Sub-Indicators	mode	mean rating	rank	weighting
Public health and wellness services	number of urban medical/health centers	5	4.30	1	0.1536
	availability of universal medical insurance	4	4.05	2	0.1446
	ratio of hospital bed to 1000 population	4	4.00	3	0.1429
	health/medical subsidy	4	4.00	3	0.1429
	ratio of medical officer to 1000 population	4	3.95	4	0.1411
	response to medical emergencies	4	3.90	5	0.1393
	average cost of hospital room/per day	4	3.80	6	0.1357
Choices and access to quality education	number of schools of higher learning	4	4.10	1	0.2097
	ratio of teachers with graduate level education	4	4.10	1	0.2097
	education centers for out-of school youth	4	4.00	2	0.2046
	teacher-student ratio in elementary level	4	3.80	3	0.1944
	percent of college dropout	4	3.55	4	0.1816

Table 6: Rank and weightings of sub-indicators under the domain indicators
Social Equality and Security, and Social Cohesion and Connectedness

Domain Indicators	Sub-Indicators	mode	mean rating	rank	weighting
Social equality and security	crime rate incidence	5	4.75	1	0.1618
	well-lighted streets and thoroughfares	5	4.50	2	0.1533
	technology in crime response & public safety	4	4.25	3	0.1448
	ratio of crime solution to crimes committed	4	4.00	4	0.1363
	access of differently-abled to establishments	4	4.00	4	0.1363
	ratio of police to population	4	3.95	5	0.1346
	crime prevention measures	4	3.90	6	0.1329
Social cohesion and connectedness	respect of tradition of diverse ethnic cultures	5	4.75	1	0.1955
	community resilience and adaptability	4	4.10	2	0.1687
	sense of local community	4	4.10	2	0.1687
	participation in social activities	4	3.95	3	0.1626
	doing things for other people/ volunteerism	3	3.60	4	0.1481
	access to social network	3	3.80	5	0.1564

‘percent of college dropout’ which ranked 4th and 5th, respectively.

6.3.5 Security, social harmony and synchronicity

Securing the urban center from various externalities is indeed a challenge to local authorities. In Table 6, sub-indicator ‘crime rate incidence’ ranked number one and relatedly, the necessity for ‘well-lighted streets and thoroughfares’ ranked second. In terms of equality and convenience ‘access of differently-abled citizens to urban establishments’ ranked fourth. In terms of obtaining social harmony in the multi-ethnic urban dimension, the sub-indicator ‘respect of tradition

of diverse ethnic cultures’ was consistently the choice of the experts from Round 1 to Round 2, thus ranked first in Round 3. Ranked second were ‘community resilience and adaptability’ and ‘sense of local community’ which are both slot-in together through social connectedness, including ‘participation in social activities’ which ranked third.

6.3.6. Good governance toward competitive business climate

In a broader context, business growth and competitiveness is highly dependent on good governance. In the same context that the sub-

Table 7: Rank and weightings of sub-indicators under the domain indicators
Good Governance and Dynamism and Promotions of Local Economy

Domain Indicators	Sub-Indicators	mode	mean rating	rank	weighting
Good governance	local & national laws properly implemented	5	4.55	1	0.1730
	government employees performance	5	4.50	2	0.1711
	accountable city officials	5	4.50	2	0.1711
	transparency in government transactions	4	4.40	3	0.1673
	responsive to needs of citizens	4	4.20	4	0.1597
	citizen participation in policy making process	4	4.15	5	0.1578
Dynamism and promotion of local economy	employment rate	5	4.75	1	0.1489
	ease in business licensing for new enterprise	4	4.30	2	0.1348
	growth rate of private investments	4	4.15	3	0.1254
	rates of local taxes	4	3.95	4	0.1238
	average income	4	3.90	5	0.1223
	inflation rate	4	3.65	6	0.1144
	incentives to new investors	4	3.60	7	0.1129
gross city domestic product per person	4	3.60	8	0.1129	

Table 8: Rank and weightings of sub-indicators under the domain indicators
Ease in Urban Transportation and Mobility

Domain Indicators	Sub-Indicators	mode	mean rating	rank	weighting
Ease in urban transportation and mobility	urban transport connectivity	5	4.90	1	0.1114
	quality of urban transportation system	5	4.85	2	0.1102
	quality of urban road network	5	4.75	3	0.1080
	availability of bicycle lanes	5	4.55	4	0.1034
	availability of transport & traffic managt. system	5	4.55	4	0.1034
	alternative modes of urban mass transport	5	4.55	4	0.1034
	pedestrian sidewalks free from vendors	4	4.25	5	0.0966
	reasonable public transport fare	4	4.00	6	0.0909
	access to 24/7 urban transport	4	3.90	7	0.0886
availability of road signs	4	3.70	8	0.0841	

indicator ‘local & national laws properly implemented’ is highly favored by the experts and was ranked first. Congruently, the succeeding three sub-indicators ‘government employees performance’, ‘accountable city officials’ were both ranked second, and most importantly the ‘transparency in government transactions’ was ranked third.

6.3.7 Ease in urban transportation and mobility

For the rapidly changing urban complexion of Metro Johor characterized by urban sprawl and the changing skyline, urban mass transportation system is direly vouched by the experts to complement urban livability. Thus, ‘urban transport connectivity’ which ranked first is imperative to complement the development plan of Metro Johor for global positioning. This sub-indicator provides for the unhampered freights of goods into the urban center. The essence of urban connectivity typifies linkage to other metropolitan areas including cities in Southeast Asian region. Moreover, the ‘quality of urban mass transportation system’ in second rank is similarly a necessity as shown in Table 8. Empirical observations show that Metro Johor has ‘quality urban road network’, in the third rank, yet the experts still vouched for this sub-indicator perhaps to be reassured of its standards. The supplemental sub-indicator ‘availability of bicycle lanes’ in the fourth rank, indicates the changing attitude of the experts towards pollution-free urban center and for healthier urban citizens. Significantly, ‘alternative modes of urban mass transport system’ specifies greater mobility of people in the urban center.

6.3.8 Rank and weightings of domain indicators

Investments in transportation have been continually a definitive strategy despite its waning link between the urban form and transportation due to continuing innovations in the telecommunication age. Metro Johor’s claim to becoming a global metropolitan center should be coupled with ‘post-industrial urbanization patterns where urban transportation should be shifting towards a transit-oriented transport systems and pedestrian space improvement particularly in central locations’ aptly described as embracing twin policy effects: competitiveness and urban livability’ (Murakami, 2010). Life in cities is possible only if people have mobility on a daily basis which is to move between points in an urban community through private or public means of transportation (Grava, 2004). It is tantamount therefore that Ease in Urban Transportation and

Mobility was significantly ranked first among the choices of indicators as shown in Table 9. This ushers new polemics from the expert-stakeholders in the dynamics and practical urban regeneration approaches in Metro Johor. Coincidentally, Urban Infrastructure and Services ranked second to complement the track where the former anticipates to be directed.

Vetted to the 10th rank, the ‘Dynamism and Promotion of Local Economy’, even though there is a considerable potential in addressing unemployment for urban citizens and migrants through the infusion of new financial capital for various industry sectors, the expert-stakeholders was perhaps had that sense of adamancy in receiving new business entrants. Finally the Social Cohesion and Connectedness, which was relegated to be ranked at the bottom, remains a challenge to urban livability of Metro Johor.

7. Conclusion

This study has explored to develop urban livability indicators for Metro Johor which is undergoing spatial transformation posing to become a key player in the world stage economy. However, this entrepreneurial metro area has to recognize that urban livability, aside from economic dynamism and increased infrastructure spending, it also encompasses environmental sustainability. It likewise extends to career opportunities, including the recreational and cultural activities. Meanwhile, one critical factor is the ability of the government to integrate and embed urban livability indicators into the urban culture of Metropolitan Johor through the policy development agenda as attendant regulators, rather than politically short-term initiatives. As to Phillips (2003) indicators are like bits of information that when aggregated, create an image of what is going on in the community; offers inner perspective into general direction of the community either it is progressing, declining, or standing still (Andrews 1996; Redefining Progress, 1997). The synthesis of indicators into an urban livability index provides the persuasive and desired aspirations of the expert-stakeholders wanting to establish a livable Metropolitan Johor in a sustainable manner; thus the overarching theme of urban livability. Thus, in an attempt to construct urban livability indicators for Metro Johor, the following concluding synthesis of urban livability index is presented:

Table 9: Rank and weightings of domain indicators

Domain Indicators	mode	mean rating	rank	weightings
Ease in urban transportation and mobility	5	4.85	1	0.1013
Urban infrastructure and services	5	4.80	2	0.1002
Protection of urban environmental resources	5	4.80	2	0.1002
Good governance	5	4.75	4	0.0992
Urban services, recreation and accommodation facilities	4	4.30	5	0.0898
Social equality and security	4	4.30	5	0.0898
Public health and wellness services	4	4.25	7	0.0887
Climate resiliency and disaster preparedness	4	4.20	8	0.0877
Choices and access to quality education	4	4.00	9	0.0835
Dynamism and promotion of local economy	4	3.90	10	0.0814
Social cohesion and connectedness	4	3.75	11	0.0783

Number of sample (n): 20

Mean rating: 1 = extremely disagree and 5 = extremely agree

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Table 10: Urban Livability Index for Metropolitan Johor (1 / 2)

Rank/ Domain Indicators	Sub-Indicators	Rank	Weighting
RANK 1 Ease in urban transportation and mobility	urban transport connectivity	1	0.1114
	quality of urban transportation system	2	0.1102
	quality of urban road network	3	0.108
	availability of bicycle lanes	4	0.1034
	availability of transport & traffic mngt. system	4	0.1034
	alternative modes of urban mass transport	4	0.1034
	pedestrian sidewalks free from vendors	5	0.0966
	reasonable public transport fare	6	0.0909
	access to 24/7 urban transport	7	0.0886
	availability of road signs	8	0.0841
RANK 2 Urban Infrastructure and Services	affordable quality public housing	1	0.1830
	telecommunication with global network	2	0.1755
	safe and orderly sidewalks and overpasses	3	0.1660
	access to electricity	5	0.1642
	availability of public spaces for public event	6	0.1585
	affordable house rentals	7	0.1528
RANK 3 Protection of urban environmental resources	drainage system	1	0.1692
	solid waste management system	1	0.1692
	protection of natural waterways	1	0.1692
	air quality	2	0.1673
	water quality	3	0.1635
	sanitary landfill	4	0.1616
RANK 4 Good Governance	local & national laws properly implemented	1	0.173
	government employees performance	2	0.1711
	accountable city officials	2	0.1711
	transparency in government transactions	3	0.1673
	responsive to needs of citizens	4	0.1597
	citizen participation in policy making process	5	0.1578
RANK 5 Urban services, recreation and accommodation facilities	recreation/entertainment centers	1	0.1335
	public parks	2	0.1321
	public markets	2	0.1321
	shopping malls	3	0.1293
	public library	3	0.1293
	supermarkets	4	0.1307
	hotels/inns/lodging houses	5	0.1080
	religious facilities	6	0.1051

Table 10: Urban Livability Index for Metropolitan Johor (2/2)

Rank/ Domain Indicators	Sub-Indicators	Rank	Weighting
RANK 6 Social equality and security	crime rate incidence	1	0.1618
	well-lighted streets and thoroughfares	2	0.1533
	technology in crime response & public safety	3	0.1448
	ratio of crime solution to crimes committed	4	0.1363
	access of differently-abled to establishments	4	0.1363
	ratio of police to population	5	0.1346
	crime prevention measures	6	0.1329
RANK 7 Public health and Wellness services	number of urban medical/health centers	1	0.1536
	availability of universal medical insurance	2	0.1446
	ratio of hospital bed to 1000 population	3	0.1429
	health/medical subsidy	3	0.1429
	ratio of medical officer to 1000 population	4	0.1411
	response to medical emergencies	5	0.1393
	average cost of hospital room/per day	6	0.1357
RANK 8 Climate resiliency and disaster preparedness	flood control system	1	0.2153
	availability of risk reduction facilities	2	0.2054
	disaster response system	3	0.1955
	availability of geo-hazard info. to citizens	4	0.1931
	citizen participation in risk assistance	5	0.1906
RANK 9 Choices and access to quality education	number of schools of higher learning	1	0.2097
	ratio of teachers with graduate level education	1	0.2097
	education centers for out-of school youth	2	0.2046
	teacher-student ratio in elementary level	3	0.1944
	percent of college dropout	4	0.1816
RANK 10 Dynamism and promotion of local economy	employment rate	1	0.1489
	ease in business licensing for new enterprise	2	0.1348
	growth rate of private investments	3	0.1254
	rates of local taxes	4	0.1238
	average income	5	0.1223
	inflation rate	6	0.1144
	incentives to new investors	7	0.1129
	gross city domestic product per person	8	0.1129
RANK 11 Social cohesion and connectedness	respect of tradition of diverse ethnic cultures	1	0.1955
	community resilience and adaptability	2	0.1687
	sense of local community	2	0.1687
	participation in social activities	3	0.1626
	doing things for other people/ volunteerism	4	0.1481
	access to social network	5	0.1564

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