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## Theoretical Review on Sustainable City Indicators in Malaysia

Filzani Illia Ibrahim\*, Dasimah Omar, Nik Hanita Nik Mohamad

*Department of Postgraduate Studies, Faculty of Architecture, Planning and Surveying, Universiti Teknologi Mara (UiTM), 40450 Shah Alam, Selangor, Malaysia*

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### Abstract

There are many studies discussing the complexity's demand of city sustainability worldwide. This includes on the issue of developing tools and indicators for measuring the level of a sustainable city. Sustainability city indicators can be seen as a measure that gives a summary of information about the subject of the problem. As there are many sets of indicators are being implemented worldwide, this paper deals with a set of sustainability indicator tools that are implemented in Malaysia. The objective of this paper is to review the theoretical framework of sustainable city indicators implemented by the Malaysian local authority and organizations.

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*Keywords:* Urban sustainability; sustainable city; sustainable indicators; human interaction

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### 1. Introduction

Sustainability can be defined as the capacity to endure. It derived from Latin word where it means to hold. Hence, sustainable development can be seen as a development that meets the needs of the present without compromising the ability of future generations to meet their needs. According to the World Summit on Social Development, sustainable development requires three main reconciliation that are environmental, social equity and economic sustainability (Tanguay, Rajaonson, Lefebvre, & Lanoie, 2010). It provides a main domain for various sustainability standards in recent years. Thus, sustainable development can be seen as a way of developing urban areas by compromising both present and future generations' needs. The emergence of sustainability ideas during the

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\* Corresponding author. Tel: +6-013-636-5208; fax: +0-000-000-0000 .

E-mail address: [filzanillia@gmail.com](mailto:filzanillia@gmail.com)

past three decades has catalysed high levels of activity in generating ‘facts on sustainability’ in the form of indicators (Hezri, 2004). There are many efforts and research done to develop sustainability indicators among researchers, and this includes Malaysia governance and institutional. In this paper, it will be discussing the topic of sustainable city in the general while is taking sustainable city indicators in Malaysia as a case example.

## 2. Sustainable city

Jenks & Jones (2010) in *Dimension of the Sustainable City* stated that there has been a considerable amount of research that defines and characterises the form of a sustainable city and that urban forms may most affect sustainability. The physical dimensions of urban form may include its size, shape, land uses, configuration and distribution of open space; which comprises a composite multitude of characteristics, including the city’s transportation system and urban design features (Jenks & Jones, 2010).

However, its sustainability depends on more abstract issues, which include environmental, social and economic. Research suggests that no one, but some urban forms may be sustainable. Much of the debate about the sustainability of cities and urban forms has focused on increasing the density of development, ensuring a mix of uses, containing urban sprawl and achieving social and economic diversity and vitality, which is then often characterised as the concept of a ‘compact city.’

Sustainable city can be seen as a city that can provide the basic needs of city inhabitants such as infrastructure, civic amenities, health and medical care, housing, education, transportation, employment, good governance and ensure the populations needs are met benefiting all sectors of society. According to Marzukhi, Karim, & Latfi (2012), sustainable city is vital in controlling the development of a town based on the quantity and quality of infrastructure and facilities are sufficient to avoid other problems, for example lack of housing in urban areas that will cause squatter settlements.

Understanding the dimensions of the sustainable city is a complex issue. Care needs to be exercised over the content within which the cities exist, their cultural background and regional and national differences. There will be significant differences in different parts of the world of the interpretation of the sustainable city; however, there are common underlying and enduring themes that appear to inform both the debate and claims for urban forms that promote sustainability. Overall, research indicates that there are unlikely to be single spatial or physical solutions, rather that there may be many forms that can achieve sustainability, depending on the context in which they are applied.

Hence, sustainable and urban planning is vital for the establishment of a further urban envisioning where it is a key element for the creation of sustainable cities (Rosales, 2010). At the regional and municipal levels, sustainability takes on greater complexities shaped by the nature of the place and the varying demands of citizens (Agency, 2012). Leaders at the regional and municipals levels are faced with the challenge of balancing the broader theoretical demands of sustainability and the specific practical demands of citizens. Thus, cities and organisations are focusing on the development of indicators to measure progress.

Thus, sustainable development can be seen as a way of developing urban areas by compromising both present and future generations’ needs. The sustainable city can be seen as a complete by meeting the demands of the present and future generations. Hence, leaders, municipal organisations and academicians are developing the indicators as to measure the level of the sustainability from time to time.

## 3. Sustainable city indicators

As cities and organizations are focusing on the development of indicators to measure progress, an indicator can be seen as a provider of information on the state or condition of something. In terms of sustainability indicators, it can be defined as a policy-relevant variable defined in such a way as to be measurable over time and space (Agency, 2012).

According to Othman, Hamzah, & Abdullah (2013), sustainable referred as a management tool. It has predicted to be one of the best yardsticks to determine the well-being of a development. Hence, it can be seen that indicators are most useful in sustainability planning when linked to sustainability threshold or targets. Thresholds are scientifically determined points where the state of thing will change dramatically. Targets are often determined by

policy makers or through public consultation and point to the level that must be met in the future is sustainability goals are to be reached (Agency, 2012).

Thus it can be stated that indicators used as a tool in monitoring and show the sustainability of city development and should closely associated with the main objective of sustainable development (Marzukhi, Omar, Oliver, Hamir, & Barghchi, 2011). It also can be defined as to show trends and provide quantitative and qualitative information. It also acts as one of the measuring tools that can be used effectively to enable interested parties; to assess the achievement of the community, or a city. Previous studies have shown that the lacing of the indicator formed from the weaknesses process of development indicators (Othman et al., 2013). Thus, sustainability indicators and indices may serve as compasses on the journey to urban sustainability. They also act as vital tools for evaluating, reporting and reorienting progress towards sustainable development.

Hence, these indicators should be able to show the level of sustainability of the city. It also serves as a tool for guidance in sustainability policies, including monitoring of measures and their results and communication to the public. Hence, to measure the level of sustainability of the city and the quality of life of urban dwellers, various urban indicators were developed intensively to provide a sound basis for planning and decision-making to make a sustainable city worked (Hezri, 2004). Urban sustainability indicators have been selected as main elements for communicating the status of the practice, which then serve to determine how successful strategies and policies have been in the attainment of sustainability goals (Shen, Jorge Ochoa, Shah, & Zhang, 2011).

#### 4. Sustainable city indicators in Malaysia

Sustainable development has been a much-debated subject in the most recent years especially in developing countries. Due to rapid urbanisation with increased population and rapid economic growth, every developing country is now moving forward in implementing sustainable development. The Malaysian government has expressed its concern in achieving the goal of sustainability through several strategies formulated in their five-year national development plans (Yakob, Yusof, & Hamdan, 2012).

Basically, sustainable development was adopted in Malaysia during the 1992 NGO Forum RioC10 Malaysia-Chapter 40 of Agenda 21 (Yiing, Yaacob, & Hussein, 2013). Planning by Malaysia constitutes a National Plan where sustainable development was outlined as of the goal (see Table 1). Table 1 shows the key emphasis from Seventh the Malaysian Plan (1996-2000) to Tenth Malaysia Plan (2011-2015).

Hence, as with most countries, environmental and sustainable city planning in Malaysia has evolved in three stages from the quantification of environmental problems to health and ecologically monitoring programmes (Hezri, 2004). As there are many sets of indicators programme being develop in addressing the challenges set out in Agenda 21, this paper will discuss in detail the development of urban sustainability indicators developed by the Malaysian local authority or well-known as Malaysian Urban Indicators Network (MURNInet).

Table 1. Malaysia's National Five Year Development Plan is showing Sustainable Development Concepts.

Malaysia Plan	Key Emphasis
Seventh Malaysia Plan (1996-2000)	Sustainable Development
Eighth Malaysia Plan (2001-2005)	Sustainable Development of energy resources and renewable.
Ninth Malaysia Plan (2006-2010)	SD was covering social, economic and environmental aspects. Improving accessibility to and within the country, enhancing transportation links and communications services and the internet at entry points.

Tenth Malaysia Plan (2011-2015)	Improving the standard and sustainability of quality of life through better access to healthcare, public transport, electricity and water. AFFIRM framework (Awareness, Faculty, Finance, Infrastructure, Research and Marketing) was established to promote the implementation of SD in the construction industry. Green building as part of SD is government’s consideration to achieve a better future for next generation (Sood et. al)
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Source: Yiing et al., (2013)

### 5. Malaysian Urban Indicators Network (MURNInet)

In the context of Malaysia, the rapid growth of population and development has urged the Federal Department of Town and Country Planning Peninsular Malaysia, Ministry of Housing and Local Government Malaysia to develop MURNInet as an approach to measuring and evaluate the sustainability of Malaysia towns and cities. The International Council for Local Environmental Initiatives, ICLEI, in Department of Town and Country Planning Peninsula Malaysia (2005) explain that indicators act as a measure that gives a summary of information about a subject or description of the problem (Marzukhi et al., 2011). It also creates an opportunity at the Municipal level to address in a more innovative, cost-effective way to challenges they are facing, and create a vision for the future they want to see in their city considering all aspects of the economy, environment and society (Agency, 2012).

The Malaysian Urban Indicators Network (MURNInet) application system was created based on a computer network designed to analyse present urban conditions, effects of development, to survey temporal changes and formulate sustainable urban scenarios for the future based on fixed standards. The system serves as an approach that can measure the sustainability of the city and region through the 11 planning sectors. This approach is implemented by all Local Authorities in Malaysia. Hence, there are total fifty-five (55) indicators were then used as an overall indication of the sustainability of the city (see Table 2). According to Marzukhi et al., (2011) starting in 2004, the efforts to provide a set of indicators of sustainable development has been disclosed with the intention of using it as a tools to ensure that the planning and development might give several positive impact to public. Hence, several set of sustainability indicators are use, by using data as a key reference in the analysis of the sustainability of the area. The result of the analysis will then be used by the local authority to focus on the follow-up process for solving the problems and related issues in the planning and development. From Department of Town and Country Planning Peninsular Malaysia (2004), there are five main stages in the implementation of MURNInet system in Local Authority as shown in Fig.1. below.

Table 2. List of Indicators of Malaysian Urban Indicators (MURNInet).

Sector	Focus	Indicator
Population	Total number of population in a city or town is proportionate with its carrying capacity of its infrastructure, social facilities, economy and environment.	Urbanization rate Population density Population growth rate Median age
Housing	Adequate housing to support the increase in population and satisfy individual needs.	Average household size Housing price to income ratio Housing rental ratio against income Individual floor space ratio (measure overcrowding) Percentages of non-selling housing stock (overhang issues).
Economy	Eradication of poverty, increase the productivity of urban areas, increase	Unemployment rate Job growth rate

	employment opportunities to promote the further continuous growth of urban areas.	Labor growth rate Poverty level Income distribution
Utility and Infrastructure	Water supply, electricity and telecommunication supplies that is efficient and adequate to ensure the health and well-being of residents.	Daily water consumption rate of every population Water loss Percentage of flooding area Total daily garbage collection Percentage of houses services by centralized sewerage
Public Facilities	Availability of adequate public and recreational facilities by the authorities need to be in line with population growth.	Doctors and population ratio Total public open space per 1000 population Number of primary school children per teacher Number of kindergarten per total population number of civic. Halls per total population
Environment	Sustainable environment concept to be based on the balance between development and environment.	Percentage of financial budget for Environmental Management Number of Asthma Cases per 10, 000 population Percentage of budget allocation for landscape program River Water Quality Index Percentage of area that received waste disposal services Percentage of solid waste that has been recycling Number of cases reported on noise complaint cases Number of waterborne and food disease per 10,000 population Air Quality Index
Sociology and Social Impact	Saw from the quality of life aspect (peaceful, safety, health and cleanliness, without pollution).	Percentage of the population involved in community program The level of health quality service Crime index per 10,000 population Ratio of juvenile case per 1,000 population Ratio of arrests due to social ills per 1,000 population Divorce rate per 1,000 population
Land use	Land use that is planned and implemented within the carrying capacity of the respective area.	Percentage of C.F.O Approvals Percentage of land for public facilities Percentage of residential floor space area in

		the city centre.
Tourism and Heritage	Tourism and heritage element need proper and adequate maintenance for sustainable.	Percentage of maintenance expenditure heritage elements and urban Beautification Percentage of attraction area
Transportation	Sustainable transportation characteristics are safety, comfort and efficient from the aspect of economy and power usage while minimizing environmental pollution.	Percentage of public bus users The quality level of public bus services Percentage of expenditure to increase accessibility system. Percentage of single occupancy vehicles that enter the city centre during peak hours. Ratio of road accident cases per 10,000
Management and Finance	Sustainable Local Authority is an organization that can adjust and adapt for the long term.	Local authority capita income revenue Tax Rate collected Cash flow ratio as compared to emoluments Development expenditure per capita Administration and professional officers ratio Percentage of expenditure as compared to overall revenue.

Source: Federal Department of Town and Country Planning of Peninsular Malaysia (2004)

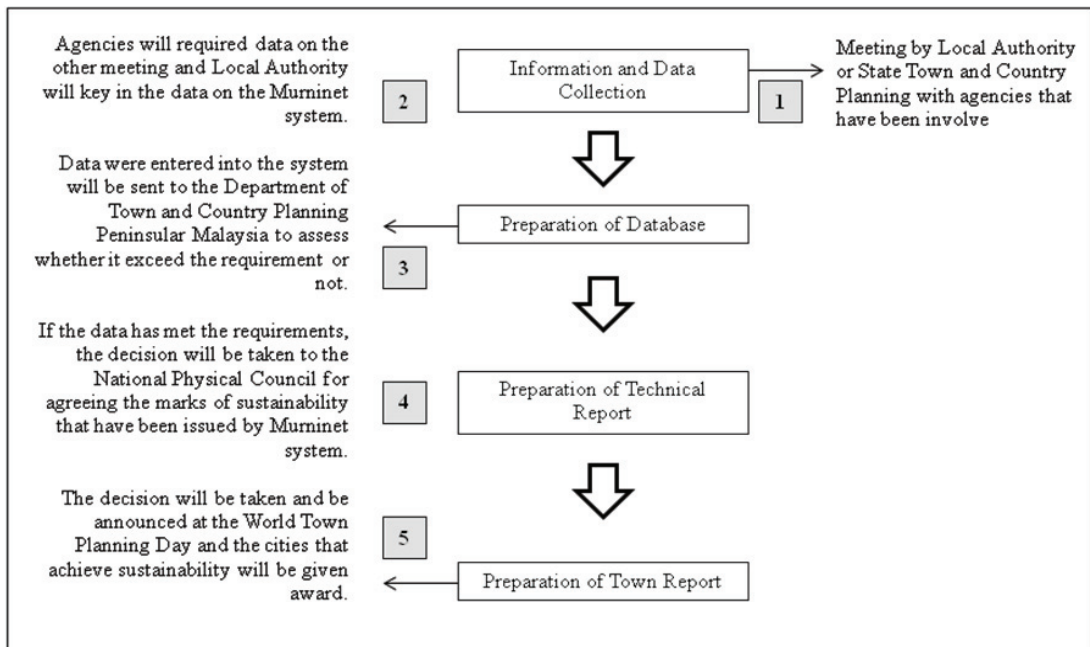


Fig.1. Implementation of MURNInets System.

Source: Federal Department of Town and Country Planning of Peninsular Malaysia (2004)

However, Marzukhi et al., (2011) argued that there are still some problems on the system. Hence, several proposals should be formulated to create a new injection for the MURNInet system. It also includes some uniform indicators that are closely related to the determination of sustainability criteria and types of data needed to meet the requirements (Marzukhi et al., 2011).

## 6. Impact of Malaysian Urban Indicators Network (MURNInet)

According to Federal Department of Town and Country Planning Peninsular Malaysia, a sustainable city or town is a city that is able to provide the basic needs of city inhabitants such as infrastructure, civic amenities, health and medical care, housing, education, transportation, employment, good governance and ensure the population needs are met benefiting all sectors of society.

Hence, the impact of the urban sustainability indicators can be seen from three perspectives that are towards the federal and state government, local authority and local community and the public. For the federal and state government, the indicators can help to evaluate the city performance, improve services for the public, and can be seen as basic evaluation and measurement to upgrade an urban area status and channel their investment. As for local authority, it can help to identify problems using indicators, urban quality issues and addressing those issues. Apart from that, it can help to improve service levels to the public and to provide feedback to National Integrity Plan. For the local community and public, it can help to realise the effort done by the government that sensitively care towards the public needs in terms of service level, facilities level in the urban area and local authority. In Table 3 shows the overall impact of sustainability indicators towards three stakeholders involved.

Table 3: Impact of urban indicators.

Stakeholders	Impacts
Federal and State Government	To evaluate city performance To improve services to the public The indicators can be made as a basic evaluation to upgrade an urban area's status (district/municipality) and; Urban indicators can be made as a measurement for government to channel investment
Local Authority	To identify problems using indicators, urban quality issues and addressing those issues; To improve service levels to the public; and To provide feedback to National Integrity Plan target. i.e.: <i>Social and Environmental Commitment</i>
Local Community and Public	To realize that the government is sensitive towards public's needs from MURNInet indicators that measure the service level, facilities level in urban areas or local authority.

## 7. Conclusion

Indicators and their variants are not just mere numbers (Hezri, 2004). The case of Malaysia, specifically MURNInet being discussed in this paper is the just mere example of an evolving institutional arrangement orienting towards more democratic and scientifically credible information to track urban sustainability. The system with its sustainable development indicators for Malaysian towns and cities is expected to contribute towards indicating if the cities are showing progress towards achieving sustainable urban development objectives. Most importantly, it should provide the much-needed quality and accurate knowledge and information at the city level for formulating effective urban policies and programmes towards fulfilling the desired urban objectives. Thus, to have more policy-resonant urban indicators, more discussion and research needed to make the system improve from time to time.

Hence, to enhance the links between sustainability indicators and policy process, several formulations of strategies should be used to promote the instrumental and conceptual use of indicators. Apart from that, local authority involved should look beyond data collection and critically examine the issue of surrounding instead of only focusing on how to achieve a level of sustainability.

However, as there are still many issues that still need to be considered and better understood, the effort done by the local authority for the implementation of MURNInet should be given credit. But yet, there are still room for improvement and ultimately more functional penetration in execution into the policy systems and process.

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