
A comparative requirement of space design: green and open space analysis

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Abstract: Planning guideline is a document that governs the design process of our physical environment. It is important in ensuring urban spatial development to oversee whether that is healthy, safe, attractive, and economically viable. This study focused on studying a few sets of planning guidelines, namely for Selangor, Melaka, and Johor States in Malaysia. To have a good outcome, this study compared and analysed the open and green space requirements on the six elements for land use development. An assessment of the guidelines was done using several variables, such as: 1) the amount of open and green space required; 2) vegetation characteristic; 3) green space distribution; 4) configuration. The study findings by the content analysis and ordinal scale assessment suggested that the existing planning guidelines have not been specific on the provision and design aspect for the open and green space. This study suggests some feasible motivations in planning for the enriched *Open Green Space Guidelines*.

Keywords: planning guidelines; spatial development; green requirement; space distribution; content analysis.

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1 Introduction

Many design concepts and standards are now targeting a greener environment with a number of scientific references those are currently available in the literature (Fastenrath and Preller, 2018; Niğâ et al., 2018; Fenton and Gustafsson, 2017; Andersson, 2016). The concept of greener built environment and its design process for our physical environment contributes to a healthy and liveable city (Smith et al., 2013; Jabareen, 2006; Jim, 2004; Bryne and Sipe, 2010). The design aspect of the open and green space could be enforced through various mechanisms such as design, structure, modernisation, laws, policies and guidelines (Southworth, 2005; Bengston et al., 2004). How a planner should design a structure with green management plan that governs the greener built environment structure and sustainable development to the design process is always a debatable issue (Smith et al., 2013). Particularly, built environment toward a sustainable development to govern the design process is not just a concept but also the design tool that allows a holistic approach. Moreover, it recognises how issues are bond together to oversee a healthy, safe, attractive, and economically viable urban spatial development (Birkeland, 2012).

With this background, this study is intended to focus on the guidelines of design and planning aspect of the open and green space. The guidelines are set by the recent researches to signify the importance of the open and green space as a greening process requirement. This study explored further the set requirements with the various components of the built environment forms, design strategies, and the provision of different categories of open spaces. Thus, the study efforts can contribute to a better living environment, especially the design and planning structures in the urban areas by improving the configuration of the open spaces. Those open spaces are recognised as the 'green infrastructure' (Saffuan et al., 2014).

According to the recent literature and study findings, a greening process in the urban development requires various forms of the open and green space components to be placed in the development structure (Hernández-García, 2013; James et al., 2009). The green component includes the passive and active green areas with or without mature vegetation (Vijayaraghavan, 2016). The requirement of the open and green space and the size of the area might affect the surrounding areas' heats. A great example is Shanghai, China where comfort is seriously sought to increase the level of vegetation around its urban centre to

deal with the city's thermal discomfort (Yang et al., 2017; Trenberth et al., 2000; Gartland, 2008). Consequently, the urban greenery per capita has increased from 1.0 m² to 12.5 m² in Shanghai since 1990s (Thani et al., 2013; Rosenzweig et al., 2011).

Thus, the concepts of the new urban development and integrated environmental regulation are necessary on the politics of urban development especially for the newly developed cities, like in Malaysia (Jonas et al., 2017). Those concepts should govern the urban development and integrated environmental regulation as the guidelines of planning development to be further improvement for a healthier setting. Hence, this study aimed to analyse the open and green space requirements in the planning guidelines and propose an improvement for the open and green space planning in Malaysia to improve the urban development with a healthier environmental setting.

Particularly, a detail land use requirements of urban space in planning standard such as residential, commercial, and industrial areas are studied for the states of Malacca, Selangor, and Johor to see whether the minimum requirement of the planning standard is met (JBPD, 2014, 2015, 2016). Finally, an assessment is discussed and explored by using several content variables such as the amount of open and green space required against amount of spaces available with future planning guidelines.

2 Research method

The subjects of this study and their contents were analysed using the variables based on the open and green space design framework. The design framework was involved by the three planning guidelines, namely:

- 1 *Selangor State Planning Guidelines*
- 2 *Melaka State Planning Guidelines*
- 3 *Johor State Planning Guidelines.*

The three planning guidelines were selected to review the necessity actions for the urban development and to oversee the integrated environmental issues for newly cities. The decision of the selection process was based on the fact that those three states were among the well-developed states in the Peninsular Malaysia. The availability of data was also another factor taken into consideration as not all other states are equal in development and well-organised in planning (procedures) to enable a comparative content analysis to be carried out.

3 Data sources

This study involved with secondary data and included three sets of local planning guidelines from the states of Selangor, Melaka, and Johor in Malaysia. The official planning guidelines and related documents for the three states were obtained from the Town and Country Planning Department of each state (JBPD, 2017). The contents of these three planning guidelines were reviewed and analysed by the content analysis and ordinal scale assessment accordingly based on the targeted goals.

3.1 Comparative content analysis

Technically, an analysis of the study technique, e.g., comparative content analysis was utilised with a few sets of official papers. Content analysis is used to understand a wide range of manual or computerised techniques for contextualised interpretations of the information from official papers, interviews, texts, documents, multimedia contents and many other reference forms (Kaninya, 2016). Content analysis is referred as the extraction or retrieval of relevant information or artefacts. Comparative content analysis involved three sets of planning guidelines to find a significant relation to the open and green space provision with existing design. Importantly, content analysis were systematically reviewed and explored the gap of the existing planning guidelines by comparing them with the variables for the enhanced, modern open and green space design. Additionally, a matrix comparison was also carried out at the end of the analysis.

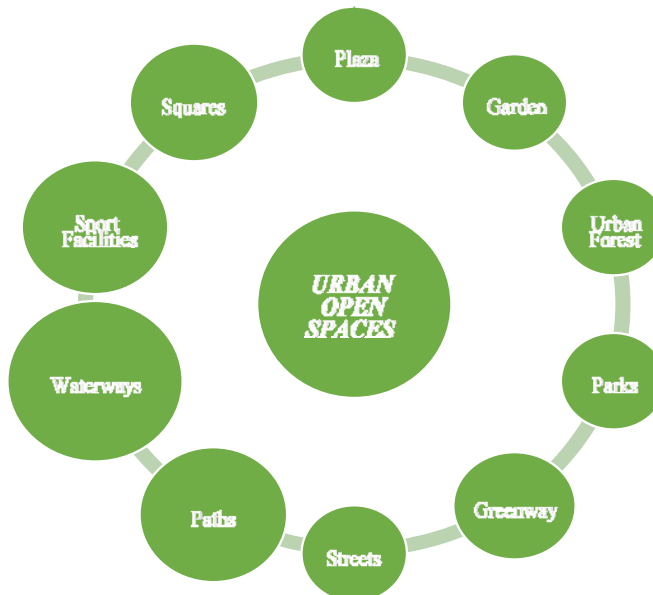
3.2 Variables for urban open and green spaces analysis

Data compilation for the variables of the urban open and green space includes:

- a typology
- b provision
- c vegetation characteristics

The used typologies for the parks and open space developed by American Planning Association (Steiner and Butler, 2012) are shown in Figure 1 which describes a sketch of each type of the provisional settings.

Figure 1 Typologies of urban open spaces (see online version for colours)



Source: Marcus and Francis (1998) and Steiner and Butler (2012)

Table 1 Examples of space requirement in the provision of open spaces in Selangor, Melaka and Johor – scale assessment

Aspects	Selangor	Score	Melaka	Score	Johor	Score
National park	* Size: No limit * Population: No limit * Location: Everywhere	2	N/A	1	* Size: Depending on needs * Population: Local and tourism	2
Regional park/state park	* Size: > 250 ac * Population: 1 park/1 region or 1 district * Location: 1 hour drive	4	* Size: > 100 ac * Population: 1 park/1 region/1 district	3	* Size: 250–500 ac * Population: Local and tourism	4
Urban park	* Size: 100–200 ac * Population: > 50,000 * Location 1/2 hour drive	4	Location: 1 hour drive * Size 40–100 ac * Population: > 50,000 * Location: 1/2 hour drive	3	* Size 100–250 ac * Population: 50,000–100,000	4
Local park	* Size: 20–100 ac * Population: 12,000; additional population 12,000 require 20 acres Location: 3 km	4	* Size 8–40 ac * Population: Every 12,000	3	* Size: 30,000–100,000 * Population: 20,000–50,000	4
Neighbourhood field	* Size: 3.0 ac * Population: 3000; additional 3,000 require 5.0 ac * Location: 1.5 km	4	* Location 3 km * Size: 3 ac * Population 3,000; additional 3,000 require 5.00 ac * Location 1.5 km	4	* Size: 5–30 ac * Population: 5,000–100,000	4
Playing field/sports field	* Size: 0.5 ac Population: 3,000, additional 3,000; 5.0 ac * Location: 1.0 km	3	* Size: 0.6 ac * Population: 1,000; additional 1,000 require 5 ac * Location: 1.0 km	3	* Size: 2–5 ac * Population: 2,000–5,000	4
Playground	* Size: 0.5 ac Population: Every 300; 5.0 ac * Location: 0.5 km	4	* Size: 0.2 ac * Population: every 300 * Location: 0.5 km	3	* Size: 0.1–1 ac * Population: 500–2,000	3
<i>Total score</i>		25/28		20/28		25/28

Notes: Scale: 1 – not available; 2 – not specified; 3; lower provision; 4 – higher provision.

Table 2 Requirement of open and green space for housing development in the state of Selangor, Melaka and Johor – scale assessment

<i>Aspects</i>	<i>Selangor</i>	<i>Score</i>	<i>Melaka</i>	<i>Score</i>	<i>Johor</i>	<i>Score</i>
Landed housing	*10% for development of > 50 units or 5 acres *5% for development of < 50 units or, 5 acres	4	*10% of open space	4	*10% of open space *Location must be centralised	4
• Terrace						
• Cluster						
• Semi-detached						
• Detached						
• Landed strata						
Town house (strata)	*10% (70% functional + 30% from perimeter planting, buffer zones, swimming pool and recreational facilities)	4	*10% of open space	4	*10% of open space *Location must be centralised	4
Apartments	*10% (70% functional + 30% from perimeter planting, buffer zones, swimming pool and recreational facilities)	4	*10% of open space (at least 70% must be landed)	4	*10% of open space *Location must be centralised	4
• Low/low-medium/medium cost						
Apartments	*10% (70% functional + 30% from perimeter planting, buffer zones, swimming pool and recreational facilities)	4	*10% of open space (at least 70% must be landed)	4	*10% of open space *Location must be centralised	4
• Free cost						
Selangorku homes	*10% of open space			4	As in the low and medium cost	4
Total score		20/20		20/20		20/20

Notes: Scale: 1 – not available; 2 – not specified; 3 – lower provision; 4 – higher provision.

An *Open Green Space Guideline* (OGSG) (TCP, 1976; TCPB, 2016) with six categories was looked into for the details of comparative data for Selangor, Melaka, and Johor states as by:

- 1 typologies and hierarchy of open spaces
- 2 housing guidelines
- 3 commercial guidelines
- 4 industry planning guidelines
- 5 community facilities
- 6 infrastructure and utilities development planning guidelines.

Each sector of the planning guidelines is measured using factors of ratio, vegetation, distribution, and spatial configuration using a measurement scale of 'ordinal level' as such; scale 1 – not available; 2 – not specified; 3 – lower provision; 4 – higher provision. However, in this study, only two components of space requirement are demonstrated. These are the categories of various open spaces and open space requirements in the various categories of housing development.

Table 1 shows the comparative space requirements of the open spaces in Selangor, Melaka, and Johor states according to the hierarchy of the open space structures. On the other hand, Table 2 shows the comparative space requirements as stipulated for the housing development for Selangor, Melaka, and Johor states. An accumulation of measurement scale was added up to each sector on the planning guidelines for a comparative analysis. Each sector was measured based on the compliance on the guidelines and provisions as projected in the existing guidelines.

4 Results and discussion

This section discuss the results to understand which states have a better and complete structural planning guideline, and which states need an improvement. Scores from the previous analysis are accumulated and presented in Table 3. It can be seen in Table 1 that Selangor obtained the highest scores in the analyses, followed by Melaka and Johor state. However, scores from the content analysis above cannot be used as a concrete reference point alone to realise which state promotes a greener physical development compared to others. Selangor state planning guidelines achieved a higher score because its guidelines are found complete and cover most aspects of the development components although the provision of its open and green space in some developments observed in Table 3, standard from the targeted standards. Meanwhile, Melaka and Johor state planning guidelines have been common for the open and green space provision overall and do not have a complete component for an enhanced greener structure and design.

For example, if we look at the commercial component, Melaka state does not have guidelines for petrol stations, markets, arcades and stations. Johor's guidelines are quite general too and do not specify clearly on the open and green space requirements in the structural components. Those contribute to lower score for Melaka and Johor states. However, it does not mean that those states are not green at all. By having general guidelines, those states put flexibility on the local authorities to impose the open and

green space requirements based on their state judgements. Other than that, although Melaka and Johor have found incomplete state planning guidelines, however, they have some modern structures with the enhanced greener options prepared by Peninsular Malaysia Town and Country Planning Department. Realising the necessities, the authorities in Melaka and Johor States have taken an initiative to produce their guidelines as a supplementary to the existing guidelines as approved recently by the Majlis Bandaraya Johor Bahru Tengah.

Table 3 Accumulation of ordinal measurement scores in the analysis conducted for Selangor, Melaka and Johor state planning guidelines

Aspect	Score		
	Selangor	Melaka	Johor
Typologies and hierarchy of open spaces	25/28	20/28	25/28
Housing	20/20	20/20	20/20
Commercial	39/56	25/56	29/56
Industry	15/20	14/20	10/20
Community facilities	44/52	33/52	27/52
Infrastructure and utilities	16/16	16/16	11/16
<i>Total score</i>	<i>159/192</i>	<i>128/192</i>	<i>122/192</i>
	<i>(82.81%)</i>	<i>(66.66%)</i>	<i>(63.54%)</i>

4.1 Findings from the analysis on open space typologies and hierarchy

This section discusses the findings of issues and problems of the guidelines. Following the typologies and hierarchy of the guidelines, several issues which have been identified as indicated below:

1 Unstandardised size and scale of the same open spaces of the three guidelines

From the content analysis carried out, it was found that each of the state guidelines has unstandardised specifications for the same open spaces. For example, the minimum sizes of a local park in Selangor, Melaka, and Johor are found 20 acres, 8 acres, and 30 acres respectively. Unstandardised size and scale of open spaces caused an uneven number for an 'area per person' and also the total green coverage in the area.

2 Specifications and details of the open and green spaces are too general

Specifications and details of the open and green spaces are found very general to figure out the right space typologies. For example, it is revealed that the righteous specification and details of the open and green spaces direction appear to be major lacking – as the case for the *Johor State Planning Guidelines*. The state planning guidelines in Johor only explains the size of the open and green space requirements and the population to be covered, but does not explain the placement of the spaces.

3 Size of some of the open spaces is too small

A suitable size of the open and green spaces is always important. However, it has been noted from the study that the open space available in Melaka and Johor is too

small for a large population ratio. If we look at the specifications of a playground in Johor, the minimum size is 0.16 acre for a coverage of 500 population, means an area per person is about 0.0003 acre. In Selangor and Melaka, the size of a playground is larger a bit which is 0.5 acre for 300 population and 0.2 acres for 300 population, respectively. Thus, the less area coverage makes the open space more congested and less accessibility overall.

4.2 Findings from the analysis on open and green space ratio

The ratio of open and green space is compared to the total land size which is used as the second variable in the analysis. Throughout the study, the ratio was assessed to see the percentage of the land requirements to be green in any type of land development. Additionally, some issues were discovered as indicates as follows:

1 The requirements of open and green spaces are below the regular standards

Content analyses in the previous section found that the requirement of green area in some development components, particularly in *Selangor State Planning Guidelines*, was lower compared to regular standards. For instance, in the most commercial components in Selangor State, such as shops, shopping complexes, offices, convention centres, exhibition centres, hotels, shopping malls, and others did not maintain the minimum standard to be green and the overall minimum requirement of the green area was only 5%. It was found similar for the industrial developments and community facilities. The calculation of open and green space considered also perimeter planting and inactive space which is not correct to take into the calculation to meet the minimum percentage. This should have been avoided, however, the space was not properly landscaped by the owner.

2 Guidelines are too general and do not specify open and green space requirements

Content analyses in this study indicated that the requirement of the open and green space in Selangor is below regular standards to be green by definition. The guidelines in many of the development components in Johor and Melaka, in fact, have been defined by a very general foundation. Additionally, the guidelines on the percentage of the land to be kept to be green are not specified in details. This is found in all the commercial and community planning facilities both in Johor and Melaka states.

4.3 Findings from the analysis on vegetation characteristics

Type of vegetation is also another important variable in ensuring urban spatial development to deal with microclimate in a compact urban area. An open and green space plantation with trees have been proven to be more effective in cooling an area compared to open spaces which are only covered with shrubs and small plants. Therefore, some vegetation characteristic issues have been identified with the following guidelines:

1 Guidelines do not focus on the vegetation aspect of the open and green spaces

Guidelines did not focus on the vegetation aspect for the open and green space for Selangor, Johor and Melaka. Thus, there is lacking of guidelines to provide a

reference point on the type of plant species that should be planted to be greener in the open and green spaces. There is only one part is found in the guidelines and that is for parking facilities which explained a reference for plants to be planted. However, there is no explanation given on the vegetation aspect for the open and green space in any other development components. Lack of attention resulted in inefficient to deliver an optimum function in controlling surrounding to be green.

2 Lack of focus on other alternatives

Guidelines did not focus on the other alternatives such as green building, water elements, and others necessary facilities in the case of Selangor, Johor and Melaka. Moreover, it was found that the guidelines also did not focus on other alternatives in dealing with urban heat and new green building approach in designing green space which is found a good alternative in reducing heat absorption and energy consumption.

4.4 Findings from the analysis on spatial configuration of the open and green spaces

Open and green space which was found in this study arranged in a scattered pattern. Below are the findings from analyses carried out involving the open space distribution and configuration:

1 Guidelines are too general

Guidelines were found too general to provide a reference on the open and green space organisation. From the study outcomes, it was found that the guidelines did not provide much information on the distribution of the open and green space. This led to an inefficient arrangement of the open space and contributed to an inefficient cooling effect.

2 Guidelines promote only centralised open space

There are certain development components in the guidelines which explained the distribution of the open and green space as only centralised instead of scattered open space. The examples included the offices, development of shopping complexes, convention centres, townhouse apartments, and others in the *Selangor State Planning Guidelines*. The similar lacking also found for the case of Johor and Melaka.

However, the idea proposed in the guidelines for Selangor state planning or Johor and Melaka may be a good view in terms of making an equal range of access by the residents from the surrounding neighbourhood. However, in terms of managing the urban heat a decentralised approach is found a better alternative. Thus, it is recommended that the changes and improvements for the open space guidelines should include:

- 1 a Re-determine open and green spaces: Size and obligation.
- b Site design for open spaces and green space: Detailing the site designs.
- c Locational aspect of the open space: Options for variations of the space design and use.

- 2 a Principles of the general framework for the open and green space: Should be based on for locational choice and site design may adopt the scatter vs. aggregation.
- b Site: Vacant site optional use/integrated/compatible use.
- c Preservation: Tree preservation compliance.

The overall compliance of the open green space to be operational by definition with the range of green surrounding in between 63.5% and 82%. Therefore, the urban developers must be encouraged to provide more open spaces, not just to fulfil a minimum requirement as per development consent but also green criteria compliance as required by the greener definition. It is found that the green space practice in Malaysia is still very low compared to other developed nations. The neighbouring country Singapore is maintaining a minimum of 40% and above for the requirements of the open green space. Therefore, this study discussed what is the obligation and what is needed to be done for the provisions of the open green space for each category of land use and adjustments for the best alternatives with some feasible incentives in planning guidelines.

5 Conclusions

The existing guidelines in the *Malaysia's Planning Guidelines* can be further improved by incorporating recent environmental consideration. The new incorporation can help to set the direction for a better and healthier urban development for the dwellers. The adopted planning guidelines in this study were chosen as the case study because those would address further to improve the existing guidelines as a way forward and those are related to the issues of thermal discomfort to comfort. The recommended guidelines in this study specify the requirements for the open space for physical development and planning. The comparative content analysis and ordinal scale assessment analysis show the specific provision and design aspect that can be applied to improve the existing direction. This study does not intend to propose the new sets of planning guidelines; however, provide an option of the improvements. The guidelines suggested will be helpful for the Malaysian policymakers to enhance our design process to be more fruitful for our physical environment.

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