

STAGES AND ELEMENTS AFFECTING DEVELOPMENT OF LOW CARBON PARKS IN MALAYSIA: AN EXPERT REVIEW

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ABSTRACT

The purpose of this paper is to explore carbon performance at Malaysia Parks. This article aims to identify stages and elements that contribute carbon emission at parks based on expert review. The stages and elements were identified through document review process and experts validation. At the end of these phases, a list of carbon contributor at parks is proposed. Based on findings, (3) three stages (construction, operation and maintenance) and (24) twenty-four elements have been identified from the literature. Afterwards, data will be collected from two Landscape Architects (LA), two Subject Matter Experts (SME), and two Contractor Experts (CE). Fleiss kappa analysis was used to measure the percent agreement to determine interrater reliability. In order to measure the percent agreement among the data collectors, a matrix table has been created. The finding from this study it is reveals that parks also contributes carbon to environment. The findings of the study substantially highlighted that all experts agreed with the stages and elements that contribute carbon to the parks. The main contribution of this paper is to highlight stages and elements needed to be taken into account when creating a sustainability parks in Malaysia.

Keywords: : Carbon, Parks, Construction, Operational, Maintenance.

1. INTRODUCTION

Presently, Malaysia's rapid economic development contributes to urbanization and shift in the global climate change issues. Carbon is one of the principal contributors to changes in global temperature and environments. Research in carbon development has grown dramatically in the past and current decades, yet it is distinguished by multiplicity approach. There is a developing declaration that will require a low carbon contribution that will influence all parts of society. At the worldwide atmosphere meeting in Cancun 2010 it was agreed that "developing nations ought to grow low-carbon advancement methodologies or arrangements" (UNFCCC, 2010). Besides that, the world sustainable development conference in Kyoto also has resulted in a legally binding agreement called the Kyoto Protocol. Through this effort, the industrialized countries have pledged to reduce their carbon emission toward world sustainability (UNFCCC, 2013). Although low carbon development has been implemented around the globe, Malaysia through its Ministry of Energy, Green Technology and Water (KeTTHA) aims for 40% GHG reduction for every GDP per capita year by year 2020. The main objective being to decrease carbon outflow up to 40% of GDP relative to the 2005 level. This research expand to the park due to their large element and facilities. In order to manage, parks nowadays include element such as employees house, accommodate tourists, and provide all the services to meet their as Information centers, supermarkets, cafeterias, restaurants, public transportation and recreational activities (Villalba et. al, 2013). Many research study about Low carbon city and assume parks as a green mitigation. While parks have always being used as an indicator of green-ness, question relating to how green is 'green' still remains. Importantly, with all the fact, it's so important to measure the carbon contribution especially focusing on our parks. The United States National

Parks Service (NPS) has also committed to reducing energy consumption and GHG emissions and has set to do so through its 2012 Green Parks Plan (GPP) (National Park Service, 2012). The GPP was created in response to Executive Order 13514 Federal Leadership in Environmental, Energy and Economic Performance, and sets the target of reducing carbon by 2020, using a baseline of 2008 for all park operations (such as facility energy consumption and fleet operations). So in our contact, it is important to identify the stages and elements at parks that will emit carbon to environment.

2. LITERATURE REVIEW

Fundamentally, Low carbon guides have been created by European countries such as the United Kingdom and Denmark, and as well as from Asian countries such as Japan and Singapore. Another initiative is the Transition Town development that connects with individuals at the group level to investigate how an option low carbon future could resemble (Villalba et. al, 2013). Malaysia had contributed relatively high greenhouse gas (GHG) emission if compared to other Southeast Asian countries and the world average, due to its rapid urbanization and high economic growth. Even though the CO2 emission per capita is much smaller than most of the developed countries, Malaysia still rated in the third places in Southeast Asia countries, after Brunei and Singapore (LCCF,2011). Carbon emission in parks, arise from the concept of low carbon community as part of an effort towards global climate change phenomenon. Carbon emission at park is part of sustainable development in believed of that carbon emissions can be decreased effectively without compromising the need of urban economic growth (Nooriati et. al, 2016). Nevertheless, Yuan et. al, (2011) introduce a three stage concept of low carbon development that comprises the primary stage (low carbon economy), the developmental stage (low carbon society) and maturity stage (low carbon world). According to this model, green recovery is one of the initiatives towards enhancement low carbon development and can act as additional strategy is by identify the stages and elements in parks.

Apart from all the policies exist, the recent Low Carbon Cities Framework and Assessment System (LCCF, 2011) is developed to link the gap between existing policies of the government with many building rating tools currently available. Under the LCCF, the parameters were divided into four main categories which include urban environment, urban transport, urban infrastructure and building. Urban environment focusing on natural ecology, water body and biodiversity Green open spaces Number of trees. The new concept of the urban parks had begun in the early nineteenth century and throughout the Industrial Revolution period (Suhardi, 2002).

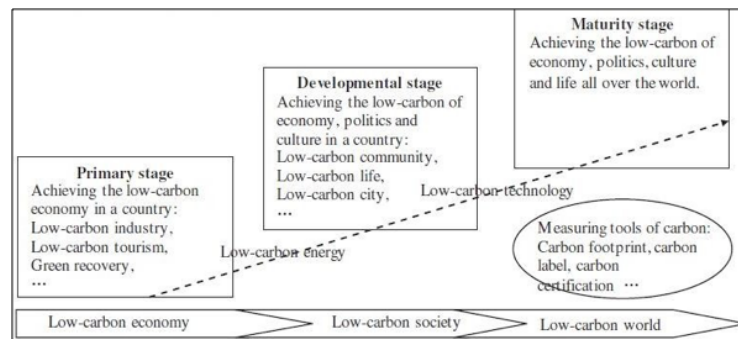


Figure 1. Three phases of low carbon development
(Source: Yuan et. al, 2011)

Due to the Revolution, parks gained important roles especially within residential areas. Nooriati et. al (2016) noted that landscape and trees are some of the most important elements in reducing temperature and act as a shield for the overall architecture elements. For this reason, the provision of user comfort zones, especially the thermal comfort of outdoor environment using landscape elements such as vegetation and water features should be highlighted (Shahidan et.al, 2015). Theoretically, there are two primary elements that may be found at parks, namely hardscape and softscape elements. Examples hardscape are man-made elements such as walk-way, yards, seats and etc. On the other hand, softscape elements are objects such as plants, lands, flowers and among others (Fitriadiya et. al 2015).

The statement is agreed by Hussain et. al (2014) suggested that elements of landscapes includes, softscape, hardscape, and water elements are critical to make an adjustment at parks. The function of hardscape and softscape particularly give a wistful esteem and add character to the landscape. It can be imagined using fluctuated sort of plants, for example, fancy plants, herbs/kitchen plant, shaded plants and palm in the greater part of their grass and front yard area. Among the hardscape elements that are regularly used as a part of the landscape in a housing area including gazebo as a place to meet, pergola, solid pots, water highlights, wellsprings, swings, and seats. A study by Hussain et. al. (2014) indicated that people prefer to have basic softscape elements in their housing area to express feeling and doing routine activities. The basic elements of landscape design that usually applied include matured trees, flower pot, shrubs and grass. The landscape elements consist of fountains, gazebos, plants, benches, pergolas, trellis, planter boxes, rock gardens, lawn areas and others.

Shukur et. al (2013) also validate this view and mentioned that parks should have softscape elements such as trees, climbers, turf, groundcover and aquatic plants as well as hardscape elements such as bench, dustbins, gazebos, pergolas, signages, lighting, public toilets, guardhouses, parkings, bus stops, railings, steps, warning alarms, children playgrounds, exercise stations, jogging paths, reflexology paths, skate parks, multipurpose courts, water with fountains, water without fountains, retaining walls and walkways. Today, the debate is shaped by concerns about elements such as lighting, dustbins, play areas, seats, jogging path, exercise stations, gazebos, signage, walkways and directional signage were observed to be of most significant need (Park et. al, 2015). It appears that properties with incorporate great office, clear signage, and better lighting are fundamental things that clients expect from parks (Park et. al, 2015)

Practically, Marcus et. al. (2013) highlighted that kids enjoy opportunities do exercises at parks with all the facilities if play area frequently turned into a social place for kids capable of providing seating spot where parents can watch their children. Marcus et. al. (2013) suggested that landscape structures such as playgrounds, seats, bins, lighting, pergolas and gazebos are structures that are fundamental in parks development. Moreover, Marcus et. al. (2013) noted that open spaces for parks goers to meet others, appreciate the nature and perform exercise activities are similarly essential to their wellbeing and socialization. Hence, landscape arrangement that are associated with their home as a rule has functional segments such as stepping stone, slopes, walkways, railings, signages. Therefore, in view of comfort and safety, the effect of landscape design, for example, fences and buffers can create a sense of security and safety for the residential environment. Towards that, Paper (2015) suggested that in addition to planting, there are other important softscape elements, for example arrangement of water and water system frameworks which may be exemplified by rivers, lakes, or artificial water features such as ponds, fountains, and so forth. Hardscape elements such as site furnitures, pedestrian and cycling areas, open air lighting, clearings and other ground cover elements, dividers, fences or other hindrance elements, playing and sport equipments are also likewise important.

3. MATERIAL AND METHOD

In order to identify the stages and elements, the study was conducted qualitatively in the form of a document review. M. Mc Hugh (2013) stated that stages and elements can be identified using two approaches, which are document review and expert verification. According to the study by Sallabaş (2013), the document review method is the most appropriate tool to collect information in a qualitative study. Stewart (2009) defines materials

and resources that can be used as documents to carry out the analysis and interpretation of which are (i) journals and books, (ii) research literature and (iii) reports from scholarly research papers and materials. Several previous studies including reports, conference proceedings and journals were referred to as literature review. Analysis on stages and elements related to carbon emission at park was determine through document analysis. All stages and elements that were determined from document analysis were then validated by experts to make sure that meets the objectives of the study. Expert is defined as a professional who has extensive knowledge or skill in a particular subject or field through study and practice for more than 10 years (Ericsson et. al., 2006; Affandy, 2014). However, Madani et. al. (2015) pointed out that the expert should eligibility at least 5 years' experience in the field. According to Affandy (2014), expert validation is essential to ensure the accuracy of the factors and elements defined. In this study, experts' validation is used to assess the level of agreement among experts on all the stages and elements defined. The collected data were then analyzed using a matrix table. The research method is illustrated in Figure 2.

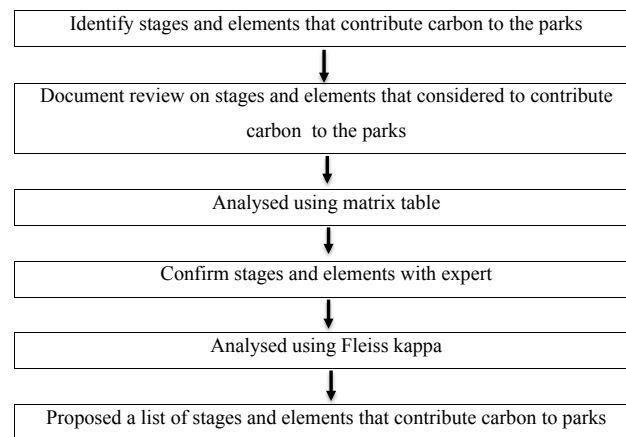


Figure 2. Research Method Framework

Furthermore, before proposed a stages and elements, it is important to test interrater reliability to ensure that the data collected in this study represents the variables measured accurately. Interrater reliability is referred to as the extent of agreement among data collectors. McHugh (2013) said to measure interrater reliability, several statistical analysis methods, such as Cohen's kappa (two raters) and Fleiss kappa (extended from Cohen's version for three or more raters), are employed. In this study, data will be collected from two

landscape architects (LA) experts, two subject matter experts (SME), and two contractor experts (CE). Fleiss kappa analysis will be used to measure the total agreement to determine interrater reliability. In order to measure the agreement among the data collectors, a matrix table has been created, in which the columns represent the different raters, and the rows represent the variables for which the raters had collected data. The interrater reliability value can be interpreted by referring to Table 1.

Table 1: The interrater reliability value

Kappa Value	Interpretation
< 0.40	Poor agreement
0.41-.74	Intermediate to good agreement
0.75 – 1.00	Excellent agreement

Source (Fliess et al, 2003)

4. RESULT AND DISCUSSION

The survey obtained information on the demographic characteristic of the Results from the document review, the elements affecting low carbon parks development are summarized in Table 2. A matrix table has been drawn to determine the main elements affecting low carbon parks. Table 3 show that three stages will affect the development of low carbon parks.

After data were obtained, experts validation and verification through checklist was carried out to obtain feedback on this study. It also presents the findings based on the focus of this study, which was to measure integrated agreement of three stages and twenty-four elements that were determined previously. Results in table 4 shows a 100% agreement between the experts.

Table 2 : Elements that contribute to carbon emission in parks

Reference	Elements
Fitriadiyah et.al (2015)	patios, benches, plants, flowers
Hussain et.al (2014)	Plant, gazebo as a place to meet, pergola, concrete pots, water features, fountains, swings and benches.
Park et.al (2015)	lighting, dustbins, children’s playgrounds, benches, jogging paths, exercise stations, gazebos, signage, walkways and directional signage
Hussain et.al (2014)	fountains, gazebos, plants, benches, pergolas, trellis, planter boxes, rock gardens, lawn areas and other landscape design such as fences and buffers can create a sense of security and safety
Shukur et. al (2013)	Plant, bench, dustbin, gazebo, pergola, signage, lighting, public toilet, guardhouse, parking, bus stop, railing, step, warning alarm, children playground, exercise station, jogging path, reflexology path, skate park, multipurpose court, water with fountain, water without fountain, retaining wall and walkway
Marcus et.al (2013)	Playground, parking, ramps, walkway, railings, signage, guiding tactile, playground
Cobham et.al (1990)	playgrounds and play-equipment, benches, litter bins, lighting, pergolas and gazebo
Paper et.al (2015)	Plant, river, lakes, ponds, fountains, site furniture, pedestrian and cycling areas, outdoor lighting, paving and other ground cover elements, wall, fence or other barrier elements, playing and sport equipment’s.
Nooriati et. al (2016)	Landscape, trees

Table 3: Matrix table on element that contribute carbon in parks

ELEMENTS	STAGES		
	construction	operation	maintenance
Plant	✓		✓
turf	✓		✓
bench	✓		
pergola	✓		
dustbin	✓		✓
Lighting	✓	✓	
fence	✓		
walkway	✓		✓
gazebo	✓		
Concrete pot	✓		
Pond	✓	✓	✓
playground	✓		✓
Jogging path	✓		✓
signage	✓		
trellis	✓		
Planter box	✓		
Public toilet	✓	✓	✓
Guardhouse	✓	✓	✓
parking	✓		✓
Bus stop	✓		
railing	✓		
step	✓		✓
Exercise station	✓		✓
court	✓		✓

This review confirms that three stages that influence the development of Low Carbon Parks namely construction, operational and maintenance. Most importantly, every one of them was in perfect agreement with the statements about the elements determined from the literature. The results are illustrated in figure 3. These explanations are important to provide information to important parties including designers themselves during parks planning stage.

Table 4: Fleiss Kappa Analysis

STAGES	LA1	LA2	SME1	SME2	CE1	CE2	RESULT
Construction	1	1	1	1	1	1	100%
Operation	1	1	1	1	1	1	100%
Maintenance	1	1	1	1	1	1	100%
Interrater reliability							100%
Value of Kappa							1

Even more interesting is that the full extent of its scope is proven that landscape design is an importance while selecting element in parks development since it can contribute carbon to environment. According to Mohd Hussain et. al (2010), good design should contribute positively to making places better for people.

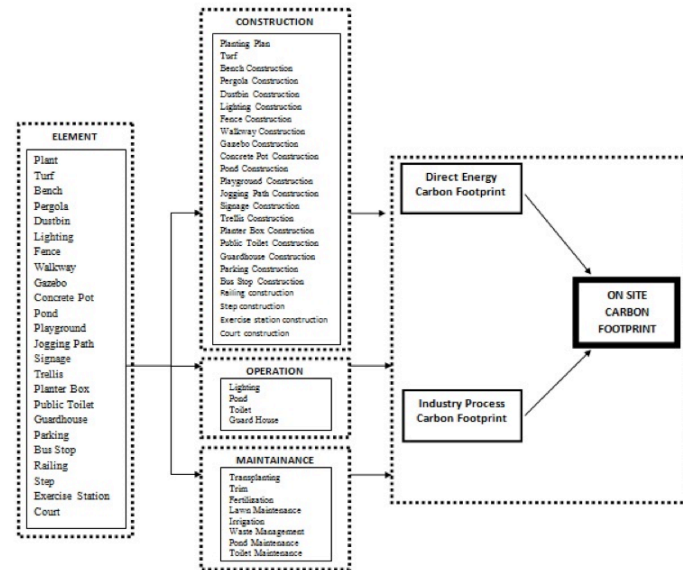


Figure 3. Proposed stages and elements that contribute carbon to the parks

There is empirical evidence to validate that parks have always been perceived as a mean of mitigation of climate change effects. However any activities carried out at any park will certainly require contribute a large amount of carbon. All elements will affect the development of parks from construction, operation and maintenance stage. These findings also confirm Garvin (1999) findings which showed that the impacts were not likely to be positive when a parks was not well-designed, not well-maintained, was in the wrong place, was the wrong size and shape, the hardscape are not well-developed, not produce attractive landscape. This is also confirmed by Clare (2008) that a good parks must be properly sized and designed, provides a variety of activities, should be easy to get to, accessible to everyone and connected to the surrounding community. Therefore, landscape designers should have knowledge of carbon and parks design based on a size, shape, connections, appearance to meet the needs to achieve sustainability (Paul, 2006). Due to the lack of knowledge on the stages and elements associated with carbon reduction in environments it is difficult for city planners and landscape architects to design environments that match carbon reduction efforts.

5. CONCLUSION

Evidently, it has been proven that carbon dioxide will increase our greenhouse gases and might be harmful to the environment. A parks as a green mitigation also contributes carbon to the environment due to large facilities and human activities. Findings of the study substantially highlighted that there are three stages (construction, operational and maintenance) and twenty four elements that contribute carbon in parks. The study point out the need of the lifecycle assessment of a parks starting from its construction stage until the maintenance stage. For this purpose, a list of stages and elements that contribute carbon in parks has been suggested. This paper supported by various relevant literature that can be used by landscape architect, green space managers, planners and designers to integrate sustainability to achieve the primary goal of reducing GHG emission. This finding has provide a better understanding of managing parks. As a way forward, more effort can be directed towards reducing GHG emission that leads into healthier economic and social effects

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