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DEVELOPMENT OF SUSTAINABLE CAMPUS LANDSCAPE CRITERIA: AN EVALUATION UPSI AS A GREEN CAMPUS

and

PROPOSED SUSTAINABLE CAMPUS LANDSCAPE DESIGN FOR SULTAN ABDUL JALIL SHAH CAMPUS,

UNIVERSITI PENDIDIKAN SULTAN IDRIS



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By

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Dissertation Submitted to

Faculty of Design and Architecture, Universiti Putra Malaysia,

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Abstract

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The term “*Sustainable Campus Landscape*” means implementing the capable and nature behavior into the landscape, nourish the ecosystem with biodiversity, promote quality living, introduce secure livelihood and campus pleasing. This means a campus landscape must be sustainable within environmental, social and economical. (by AASHE, page 2). The “*Green Campus*” means a higher education community that is improving energy efficiency, conserving resources and enhancing environmental quality by educating for sustainability and creating healthy living and learning environments. The process of sustainable campus confidence us to make changes within the individual influence by improve energy efficiency, recycle, reuse and renewable waste and conserve valuable resources. The issue is, lack of sustainability approach to reducing the negative impact of activities and making the campuses landscape more sustainable. Therefore, this study proposes a theoretical framework integration of three(3) spheres, environment, social and economic. What are the criteria to create sustainable campus landscape that can bring conducive environment? Can Sustainable Campus Landscape criteria check list been used to evaluate the campus is A Green Campus? The objective of this research is to examine the criteria of Sustainable Campus Landscape. To develop a check list base on criteria of Sustainable Campus Landscape and to evaluate on site at Campus Sultan Abdul Jalil Shah, UPSI. This study attempts to answer the question by using the Check list. Method used by identified the criteria and using the check list through site observation. The result from evaluation indicate Campus Sultan Abdul Jalil Shah, UPSI are a Green Campus.

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Keywords: Sustainable Campus Landscape, Landscape criteria and Green Campus

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1.0 INTRODUCTION

During the United Nations Earth Summit held by the United Nation Environment Programme (UNEP) in Rio De Janeiro 1992, a sustainable development was defined as "improving the quality of human life while living within the carrying capacity of supporting eco system". This definition has an impact on environment, social and economic development.

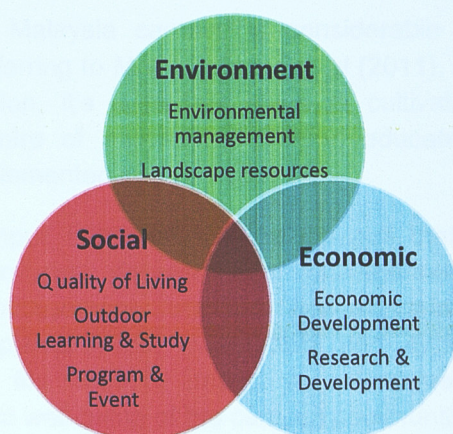


Figure 1 : The Three Sphere of Sustainable Campus Landscape

Sustainable development refer to balanced and harmonious relationship between social need, economic activity and environment. It also known by definition of sustainable development that 'meets the needs of present without compromising the ability of future generations to meet their own needs' by Brundtland Commission, 1987.

The campus building and landscape are part of the physical university 's value. Varsity lifestyle like recreational spaces and open spaces provide outdoor learning class and activities. It's also as a library for researcher, student and public.

A survey result done by APPA, attractive campus with outdoor spaces and activities will attracted the student to studied at this institution. (ASSHE HOW TO GUIDE/PROMOTING SUSTAINABLE CAMPUS LANDSCAPE, page 1)

According to Meyer (2008), sites are beautiful when they function both ecologically and socially so it can inspire user to spend time outdoor and connect with nature. It is important to be explored this issue in the context of Sustainable Campus Landscape. Brainstorming on Sustainable Campus Landscape and what are the criteria to be determine. That can bring a conducive environment to student, staff and visitor.

In order to solve the issue, by examine and creating the criteria of the Sustainable Campus Landscape will be the first stage. The criteria should be focus more on Campus Landscape and divided into environment, social and economic factor.

The hypothesis of the study tried to provide the value criteria on campus landscape towards green campus. What are the best design, practice can be applied and how to

educate and encouraged the user to participate and understand what is Sustainable Campus Landscape? This study need to be conduct and the result obtain Campus Sultan Abdul Jalil Shah, UPSI in which category.

2.0 LITERATURE REVIEW

In this decade, Malaysia campus is considerable awareness on achieving sustainable campus. Referring to Mohd Zulhanif et al (2011), Universities are centres of knowledge and innovation, it's a perfect place to cultivate ideas development for sustainability. This centre of excellence, able to educate public awareness, how sustainability can be implemented into everyday life.

Sustainable Campus Landscape is the campus that manages the landscape resources through appropriate designs, best management practice on landscape management, waste management, functions and activities of a university through teaching, research, implementation, operational and coordination that can move continuously to reduce the negative impact to environment. It's also function to emphasise the health and well-being of the campus communities.

According to Siti Khalijah, UniMap (2002), To safe guard a good future for young generation, implementation of green campus with good practice of resources will bring benefit to the university.



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2.1 Theoretical Framework of Sustainable Campus Landscape (SCL) Criteria

The Sustainable Campus Landscape criteria that are generally thought to be importance to universities concerned with sustainability. The theoretical framework with integrated of three element are Environment, Social and Economic are a main subject to create the criteria. The criteria are determine with indicators.



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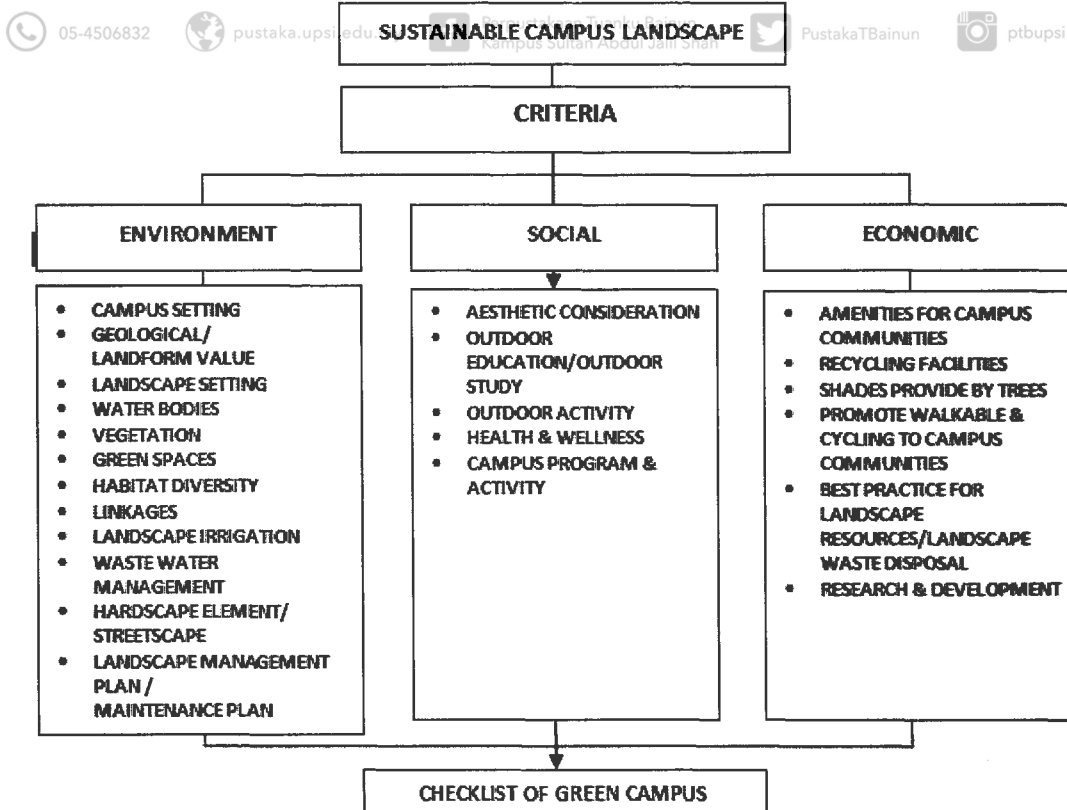


Figure 2 : Sustainable Campus Landscape Criteria Framework

2.2.1 Environment (E)

The environment information will be given the basic information of the university consideration towards green environment. The criteria and indicator with the highest weighting in this ranking and will also shown whether the campus deserve to be called Sustainable Campus Landscape(SCL) or Green Campus. The criteria are define several indicators for this landscape particular area of concern are campus setting, geological/landform value, landscape setting, water bodies, vegetation, green spaces, Habitat diversity/benefit. Landscape irrigation, waste water management, hard landscape element/streetscape and landscape management plan & maintenance plan. The aim is to provide and maintain green space and concern about environment.



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2.2.2 Social (S) 25%

The social development or social interaction, the university need to consider more on aesthetic pleasing, outdoor spaces and activity, these can inspire the campus communities to spend time outdoors and connect with nature. The criteria with 25% weighting are defined with several indicator for social concern are aesthetic consideration, outdoor education/outdoor study, outdoor activity, health and wellness spot and The Campus Program. The aim is to improve the quality of the campus communities' life.

2.2.3 Economic (Ec) 25%

In economic development, the criteria will save the university consumption. The 25% weighting are defined with several indicator for economic concern are amenities for campus communities, recycling facilities, shade provided by trees, promote walk able and cycling to campus communities, best practice for landscape resources and research & development. The aims is to making it possible to use limited resources and introduce low carbon impact.



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**SUSTAINABLE CAMPUS LANDSCAPE CRITERIA:
CHECK LIST TO EVALUATE UPSI AS A GREEN CAMPUS**

CRITERIA		INDICATOR	IF APPLICABLE ON SITE	TOTAL POINT	PERCENTAGE (%)
A	ENVIRONMENT			40	50%
1	Campus Setting	Rural Suburban Urban		/40	
2	Geological/Landform value	Closed to Mount or Banjaran Topography/landform flat/slope Remain Landform			
3	Landscape Setting	20% of area on campus covered in vegetation in the form of forest. 20% of area on campus covered in planted vegetation (include lawns, gardens, green roofs, internal planting)			
4	Water Bodies	Retention Pond Water features/water fountain or water element River			
5	Vegetation	Matured Trees 80% Diversity of plants Canopy Shade/tree can significantly reduce storm water runoff Native Plants- conserve water Air quality and climate benefit			
6	Green spaces	Green field Lawn Recreational green space Garden Pocket Garden			
7	Habitat Diversity/Benefit	Natural area provide living space for variety of animal species A habitat is a home environment which provides the natural conditions / environment for a plant or animal to live			
8	Linkages	Pathway/walkway Cycle Track/Path Rain Harvesting System			
9	Landscape Irrigation	Reuse recycle water from storm or Gray water Rain Garden Retention Pond			
10	Waste Water Management	Flood Water Management Storm Water Management Gray Water Management			
11	Hardscape Element/Streetscape	Seating and Benches Directional Signage Gazebo Lighting Sculpture Bollard			
12	Landscape Management Plan & Maintenance Plan	Maintenance Schedule Management Plan			
B	SOCIAL			12	25%
1	Aesthetic consideration	An aesthetically pleasing campus garden and landscape		/12	
2	Outdoor education/outdoor study	Garden Pocket garden			
3	Outdoor Activity	Meeting Gathering Point Reflexology path Jogging Track			
4	Health & Wellness Area	Par course Station Outdoor Gym Station			
5	Campus Program & Activity	Earth Day Campaign Tree planting Program Earth Hour Campaign			
C	ECONOMIC			13	25%
1	Amenities for campus communities	Bank Food Kiosk Cafe Convenience Shop		/13	
2	Recycling Facilities	Recycle Disposal Station A Recycling Program			
3	Shade Provided by Trees	Cool the campus area Bring shade to the pedestrian/users (student, staff and maintenance workers)			
4	Promote walk able and cycling to campus communities	Reduce carbon emissions Protect the environment from pollution			
5	Best Practice for Landscape resources/Landscape waste disposal	Compost dry leaves can return the soil nutrient Reuse Sewerage Water Treatment Plant for landscape purposes and toilet purposes			
6	Research and development	Serve as living labs for collaborative research by student, staff and faculty			
TOTAL POINT				/65	/100%

Table 1: Sustainable Campus Landscape Criteria (Rosa Malinda 2014)



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Case Study: Sultan Abdul Jalil Shah Campus, Universiti Pendidikan Sultan Idris

2.3.1 Background Campus

Campus Sultan Abdul Jalil Shah, UPSI is located at Tanjong Malim, Perak. It is approximately 70 km from Kuala Lumpur. The university was set up in 1922 as **Sultan Idris Teaching College (SITC)**. The area of the campus is 323,748.5 m² (80 acre), built up area & road is about 186,155.39m² (46 acre) and green area is 137,593.11m² (34 acre). The Campus Landscape had been developing since 1922, the campus canopy had been cover with the matured trees. The university still remain the English Planting concept, as we can seen lawn or green field from the main entrance of the campus.



Figure 3 : Sultan Abdul Jalil Shah Campus, UPSI (photo Personal collection)

2.3.2 Issues and Problem

The campus addresses an issues , unappreciated the environment as we known it will bring conducive spaces and give healthy living. The problem in the first instance there is less information and effort on sustainable. Secondly lack of a long term institutional planning and implementing Best Management Practice on Sustainable Campus Landscape



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3.0 METHODOLOGY

In addition to precedence from literature reviews, a checklist on Sustainable Campus Landscape criteria was created in the study to discover the Green Campus. By using the evaluate checklist and site observation the result can be accumulate using points for all criteria and percentage. The study involves the following steps.

3.1 Research Design

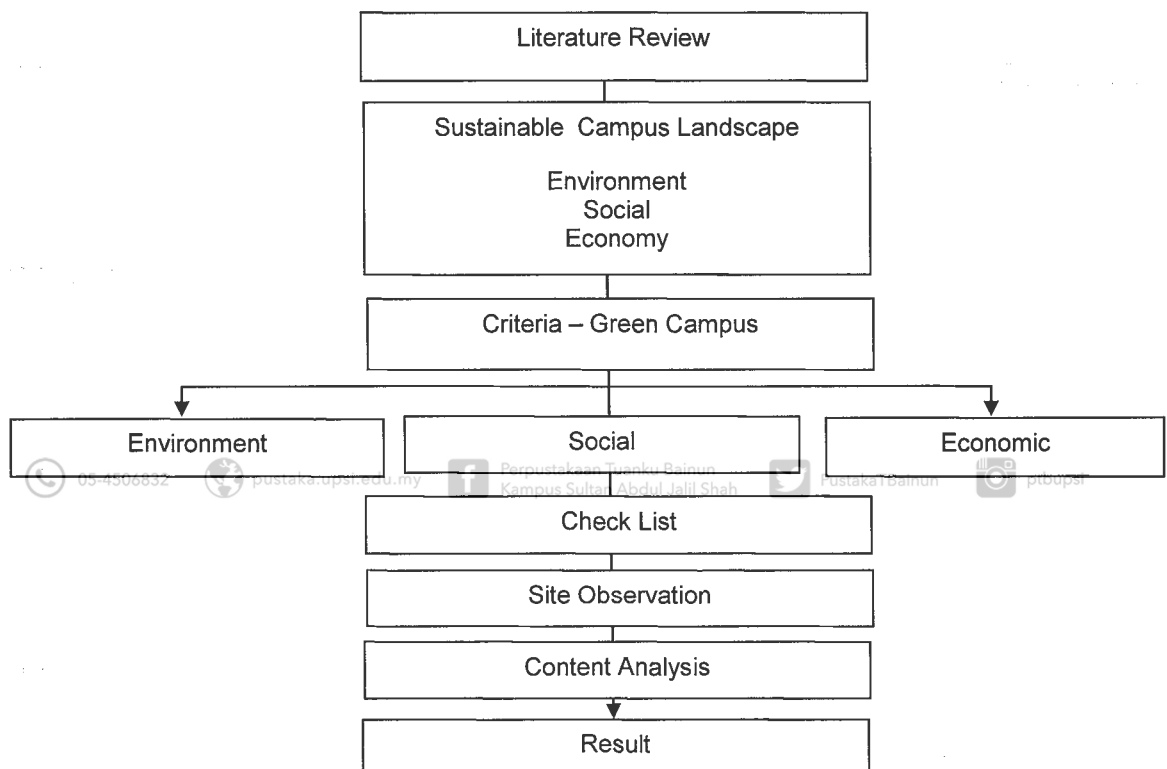


Figure 4 : Research Design Chart

3.2 Sustainable Campus Landscape (SCL) Criteria

The Sustainable Campus Landscape criteria that are generally thought to be importance by universities concerned with sustainability. Environment, Social and Economic (ESEc) are a main subject to create the criteria. By putting the high weightage on environment criteria are 50%, social criteria are 25% and economic criteria are 25%. The theory of the weightage are considering more on campus landscape. The development of criteria checklist to provide point and percentage to identify and evaluate UPSI meets the criteria needs.

Every criteria and indicators, SCL checklist will evaluates the site performances and get score. The value of certain percentages for the areas mean the site is SCL within which percentage category.

3.3 Check List, Observation & SCL Percentage Category

The check list is a tool to assist on site. It's state specific criteria and allow to observe and gather information or data to made judgements about what can we do with the outcomes. The quality of information acquired through the use of checklists, is highly dependent on the quality of the indicator chosen. Their benefit is also dependent on observers and understanding of the research study. It's offer systematic ways of collecting data about specific knowledge. The purpose of checklist is to:

- Provide tools for systematic recording of observation
- Provide tools for self assessment

Sustainable Campus Landscape Percentage category is a chart to rectify the Sultan Abdul Jalil Shah, Campus ranking.

	100% - 80%	
Gold		
Silver	79% - 50%	
Certified	49% - 30%	

Table 2 : Sustainable Campus Landscape Category

3.4 Content Analysis

A SWOT analysis is a type of content analysis. A procedure to be used to analysis strengths, weakness, opportunity and threats of a site.

- **Strengths:** Site characteristics that give it an advantage over others.
- **Weakness:** Site characteristics that give disadvantage relative to others
- **Opportunities:** Elements can be highlight could exploit to its advantage
- **Threats:** Elements can be highlight against environment could cause trouble for the site

4.0 RESULTS AND DISCUSSION

Referring to the Pie Chart result of Sustainable Campus Landscape Criteria Check list, as shown in Figure: 5, Campus Sultan Abdul Jalil Shah, UPSI had totally score 80.31%. The result of Environment weightage are 36.25%, Social weightage are 22.91% and Economic weightage are 21.15%, others weightage are 19.69%.

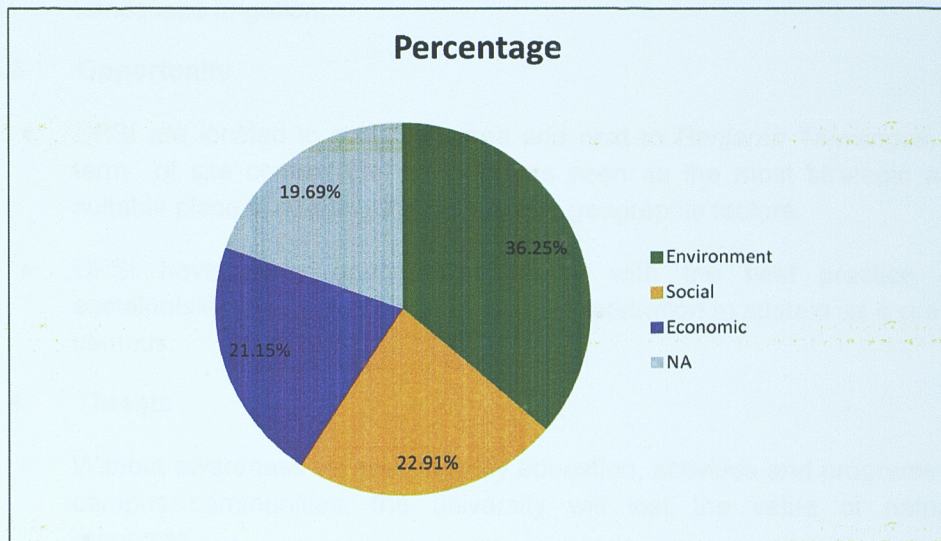


Figure 5: Result from the SCL Check List

An unexpected, but interesting, the result of the analysis by referring to the category ranking, Campus Sultan Abdul Jalil Shah can be called Green Campus. Therefore to fulfil the NA (non applicable) item, the Campus Management need to apply a best practice on technology and design, to achieve 100%. An assessment on Sustainable Campus Landscape criteria for Campus Sultan Abdul Jalil Shah, UPSI are 80.31% meets the criteria. These SCL criteria can be a model to assess other campus. According to the SWOT analysis on the criteria:

3.1 Strengths

- Natural and cultivated landscape across Campus Sultan Abdul Jalil Shah, UPSI plays an important role in maintaining a healthy ecosystem.
- Robust Landscape provides previous surfaces, improving groundwater recharge and preventing soil contaminated.
- Planting with native plants will keep soil healthy, contribute to clean air and water, provide shading and improve energy efficiency for buildings and provide habitat for wildlife. Example: Enggang and Owl
- The amenities inside the campus can be a place to hang out and help to create a better sense of community



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4.2 Weaknesses

- The pathway/walkway are not continuously to each other and less connectivity from other places.
- Non best management practice of Rainwater Harvesting & Water from Sewerage Treatment Plant – Grey water and Black water as water for flushing toilet, Mechanical cooling, maintenance for hard surfaces and Landscape irrigation.

4.3 Opportunity

- UPSI are located in suburban area and next to *Banjaran Titiwangsa*. In term of site context the campus was seen as the most strategic and suitable place in meeting the criteria and geographic factors.
- UPSI have many opportunities to do with the best practice on sustainability through activities as campus operation to sustain as a green campus.

4.4 Threats

- Without awareness on sustainability education, activities and programs to campus communities, the university will lost the value of natural resources.



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- Large areas of parking contribute to increasing stormwater, polluted water, puddles on campus pathways and flooding.

5.0 CONCLUSION

Base on the finding, the SCL criteria, is very important because it enhance the environment of the campus community, especially for student, staff and visitor in term of social facilities and education for excellence living atmosphere.

Checklist of Sustainable Campus landscape provide a great impact on campus life. These finding proves, to solve the issue regarding SCL, there are many aspect to be considered by putting following practice into campus.

The best practice for campus communities to go green:

- University management must develop green campus through research, implementation and promoting green campus in teaching
- Promote environmental awareness to campus communities
- Preserve natural resources and reduce pollution
- Campus design should considered user needs and must aware on existing landscape resources



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DEVELOPMENT OF SUSTAINABLE CAMPUS LANDSCAPE CRITERIA : AN EVALUATION UPSI AS A GREEN CAMPUS

by Rosa Malinda

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Keywords: Sustainable Campus Landscape, Landscape criteria and Green Campus





1.0 INTRODUCTION

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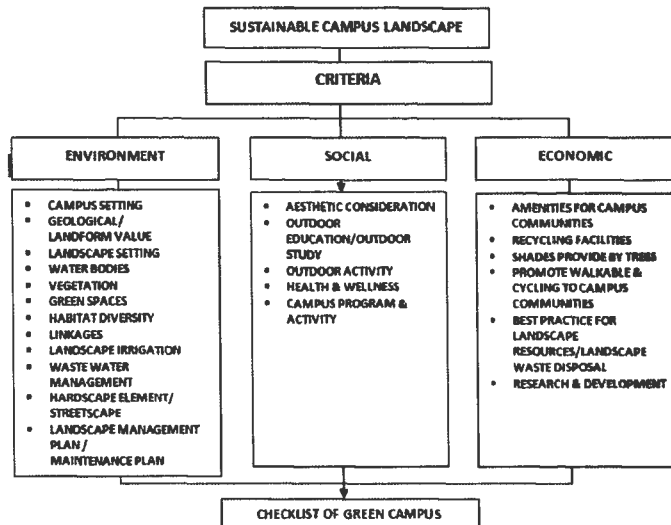


Figure 2 : Sultan Abdul Jalil Shah Campus, UPSI (photo Personal collection)

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2.2.2 Social (S) 25%

The social development or social interaction, the university need to consider more on aesthetic pleasing, outdoor spaces and activity, these can inspire the campus communities to spend time outdoors and connect with nature. The criteria with 25% weighting are defined with several indicator for social concern are aesthetic consideration, outdoor education/outdoor study, outdoor activity, health and wellness spot and The Campus Program. The aim is to improve the quality of the campus communities' life.

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8	Linkages	Pathway/wayway Cycle Track/Path				
9	Landscape Irrigation	Rain Harvesting System Reuse/recycle water from storm or gray water Rain Garden				
10	Waste Water Management	Retention Pond Food/Water Management Storm Water Management Gray Water Management Sealing and Benches Direct Drainage				
11	Hardscape Element/Streetscape	Grass Lighting Sculpture Sollare		/12	20%	
12	Landscape Management Plan & Maintenance Plan	Maintenance Schedule Management Plan				
B	SOCIAL			12	20%	
1	Aesthetic consideration	An aesthetically pleasing campus garden and landscape		/12		
2	Outdoor education/outdoor study	Garden Pocket garden				
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5	Campus Program & Activity	Tree planting Program Earth Hour Campaign				
C	ECONOMIC			13	25%	
1	Amenities for campus communities	Bank Food/Kiosk Cafe Convenience Shop Recycle Disposal Station		/13		
2	Recycling Facilities	A Recycling Program Cool the campus area bring shade to the people/users (student, staff and maintenance workers)				
3	Shade Provided by Trees	Reduce carbon emissions Protect the environment from pollution				
4	Promote walk able and cycling to campus communities	Compost dry leaves can return to soil nutrient				
5	Best Practice for Landscape resources/Landscape waste disposal	Reuse coverage water treatment for landscape purposes and for other purposes				
6	Research and development	Serve as living lab for collaborative research by student, staff and faculty				
TOTAL POINT				/65	100%	

Table 1 : Sustainable Campus Landscape Criteria (Rosa Malinda 2014)



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Kampus Sultan Abdul Jalil Shah

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2.3 Case Study: Sultan Abdul Jalil Shah Campus, Universiti Pendidikan Sultan Idris

2.3.1 Background Campus

Campus Sultan Abdul Jalil Shah, UPSI is located at Tanjong Malim, Perak. It is approximately 70 km from Kuala Lumpur. The university was set up in 1922 as Sultan Idris Teaching College (SITC). The area of the campus is 323,748.5 m² (80 acre), built up area & road is about 186,155.39m² (46 acre) and green area is 137,593.11m² (34 acre). The Campus Landscape had been developing since 1922, the campus canopy had been cover with the matured trees. The university still remain the English Planting concept, as we can seen lawn or green field from the main entrance of the campus.



Figure 3 : Sultan Abdul Jalil Shah Campus, UPSI (photo Personal collection)



2.3.2 Issues and Problem

The campus addresses an issues , unappreciated the environment as we known it will bring conducive spaces and give healthy living. The problem in the first instance there is less information and effort on sustainable. Secondly lack of a long term institutional planning and implementing Best Management Practice on Sustainable Campus Landscape





3.0 METHODOLOGY

In addition to precedence from literature reviews, a checklist on Sustainable Campus Landscape criteria was created in the study to discover the Green Campus. By using the evaluate checklist and site observation the result can be accumulate using points for all criteria and percentage. The study involves the following steps.

3.1 Research Design

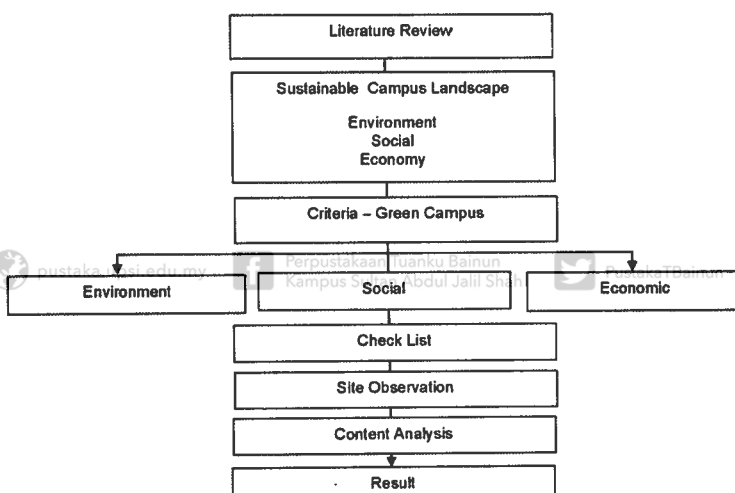


Figure 4 : Research Design Chart

3.2 Sustainable Campus Landscape (SCL) Criteria

The Sustainable Campus Landscape criteria that are generally thought to be importance by universities concerned with sustainability. Environment, Social and Economic (ESEC) are a main subject to create the criteria. By putting the high weightage on environment criteria are 50%, social criteria are 25% and economic criteria are 25%. The theory of the weightage are considering more on campus landscape. The development of criteria checklist to provide point and percentage to identify and evaluate UPSI meets the criteria needs.





Every criteria and indicators, SCL checklist will evaluates the site performances and get score. The value of certain percentages for the areas mean the site is SCL within which percentage category.

3.3 Check List, Observation & SCL Percentage Category

The check list is a tool to assist on site. It's state specific criteria and allow to observe and gather information or data to made judgements about what can we do with the outcomes. The quality of information acquired through the use of checklists, is highly dependent on the quality of the indicator chosen. Their benefit is also dependent on observers and understanding of the research study. It's offer systematic ways of collecting data about specific knowledge. The purpose of checklist is to:

- Provide tools for systematic recording of observation
- Provide tools for self assessment

Sustainable Campus Landscape Percentage category is a chart to rectify the Sultan Abdul Jalil Shah, Campus ranking.

	100% - 80%	
Gold		
Silver	79% - 50%	
Certified	49% - 30%	

Table 2 : Sustainable Campus Landscape Category

3.4 Content Analysis

A SWOT analysis is a type of content analysis. A procedure to be used to analysis strengths, weakness, opportunity and threats of a site.

- **Strengths:** Site characteristics that give it an advantage over others.
- **Weakness:** Site characteristics that give disadvantage relative to others
- **Opportunities:** Elements can be highlight could exploit to its advantage
- **Threats:** Elements can be highlight against environment could cause trouble for the site

