



**ESTABLISHING MALAYSIA QUALITY ASSESSMENT  
ELEMENTS FOR SINGLE TRUNK PALM IN  
LANDSCAPE CONSTRUCTION**

**BY**

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**A thesis submitted in fulfilment of the requirement for the  
degree of Master of Science (Built Environment)**

**Kulliyyah of Architecture and Environmental Design  
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## ABSTRACT

Landscape development is one of the most critical fields in the construction industry. Nowadays, the quality of construction in the built environment is a significant issue that is commonly discussed by related professionals. Each of the projects aims to deliver the final product that free of defects and in high quality. Landscape construction as part of overall construction works also need to be delivered in the same manners to ensure the quality of the whole construction development can be achieved. In the action of ensuring the quality of construction in Malaysia, Construction Industry Development Board Malaysia (CIDB) in 2006 had developed the Quality Assessment System in Construction (QLASSIC). QLASSIC is a tool to assess the quality of workmanship for building construction work in accordance with quality standards stipulated in the Construction Industry Standard (CIS 7). QLASSIC in overall is used to measure the quality of workmanship on building construction based on several construction components such as structures works, architectural works, mechanical and electrical works and external works. However, landscape construction works in not included as part of the construction components to be assessed. This study was designed to develop quality assessment elements to be used in a measurement tool for landscape component in construction works. This study also focused on developing the assessment elements for single trunk palm (STP) as one of the important soft-scape material in landscape development. The study aimed to establish a set of reliable weighted assessment elements for STP in planting works. The objectives of this study are (i) to identify the elements of STP, (ii) to examine the critical level of STP for quality assessment, and (iii) to establish the weightage for STP in planting works. This research used a mixed-method approach to produces a reliable result. There are four stages in the data collection process in this research, which are, (i) Identifying guideline and specification available in Malaysia. (ii) Comparison analysis has been used to produce initial list of assessment elements for STP, (iii) Establishment of a list of assessment elements for STP by survey question, (iv) Establishment of weighted assessment elements for STP using Contribution Weightage Formula (CWF). Establishment of an initial list of assessment elements and weighted assessment elements for STP was carried out through survey questionnaires on 272 respondents among Landscape Architect in Malaysia. Landscape Architects are chosen as respondents to the survey due to their academic qualification and experience. The IBM SPSS statistics version 24 was used to analyse the data from the questionnaire survey. Analysis has been conducted to find out the Critical Success Factor (CSF) and contribution weightage of assessment elements of STP. As a result, the critical success factor and contribution weightage of assessment elements of STP has revealed. In this study, there are ten elements for STP listed which are leaves or frond, root ball, trunk diameter, trunk height, overall height, soil mixture, staking, planting hole, finishing & treatment and mulching. The findings reveal that the leaves or frond, root ball and trunk diameter are the most significant element in planting works. Meanwhile, the three lowest critical elements are planting hole, staking and mulching for STP planting work. Finally, the study produced the quality assessment table for STP planting works to be used in the quality assessment system for soft-scape.

## خلاصة البحث

إن تطوير المناظر الطبيعية واحدة من أهم المجالات في صناعة البناء والتشييد. وفي الوقت الحاضر، تعد جودة البناء في البيئة العمرانية مشكلة مهمة يتم مناقشتها بشكل عام من قبل المتخصصين ذوي الصلة. يهدف كل مشروع إلى تقديم المنتج النهائي الخالي من العيوب والجودة العالية، ويلزم أيضًا تسليم هندسة المناظر الطبيعية كجزء من أعمال الإنشاء الشاملة بنفس الأساليب لضمان جودة تطوير البناء بالكامل. في محاولة لضمان جودة البناء في ماليزيا، لقد قام مجلس تنمية صناعة البناء في ماليزيا (CIDB) في عام 2006 بتطوير نظام تقييم الجودة في البناء (QLASSIC) وهي أداة لتقييم جودة الصنعة لأعمال تشييد المباني وفقًا لمعايير الجودة المنصوص عليها في معيار صناعة التشييد (CIS 7). تستخدم QLASSIC بشكل عام لقياس جودة الصنعة في تشييد المباني استنادًا إلى العديد من مكونات البناء مثل أعمال الإنشاءات والأعمال المعمارية والأعمال الميكانيكية والكهربائية والأعمال الخارجية. ومع ذلك، تبقى أعمال البناء في المناظر الطبيعية غير المدرجة كجزء من مكونات البناء التي سيتم تقييمها. لقد تم تصميم هذه الدراسة لتطوير عناصر تقييم الجودة لاستخدامها في أداة قياس لمكونات المناظر الطبيعية في أعمال البناء. وركزت هذه الدراسة أيضًا على تطوير عناصر التقييم لنخيل جذع واحد (STP) كأحد المواد اللينة ذات المقواة اللينة في تنمية المناظر الطبيعية. تهدف الدراسة إلى إنشاء مجموعة من عناصر التقييم الموثوقة لـ STP في أعمال الزراعة، حيث تتكون أهداف هذه الدراسة من: (1) تحديد عناصر STP ، (2) فحص المستوى الحرج من STP لتقييم الجودة ، و(3) تحديد وزن STP في أعمال الزراعة. لقد استخدم هذا البحث أسلوبًا مختلفًا لإنتاج نتيجة موثوقة. هناك أربع مراحل في عملية جمع البيانات في هذا البحث ، وهي: (1) تحديد المبادئ التوجيهية والمواصفات المتاحة في ماليزيا. (2) استخدام تحليل المقارنة لإنتاج قائمة أولية بعناصر التقييم الخاصة بـ STP ، (3) إنشاء قائمة بعناصر التقييم الخاصة بـ STP عن طريق سؤال المسح ، (4) إنشاء عناصر تقييم موزعة لـ STP باستخدام صيغة وزن المساهمة (CWF)

. لقد تم إجراء قائمة مبدئية بعناصر التقييم وعناصر التقييم الموزونة ل STP من خلال استبيانات استقصائية على 272 مستجيباً بين مهندسي المناظر الطبيعية في ماليزيا. ويتم اختيار مهندسي المناظر الطبيعية كمستجيبين للمسح بسبب مؤهلاتهم وخبراتهم الأكاديمية. تم استخدام إحصائيات SPSS الخاصة ب IBM SPSS لتحليل البيانات من استبيان الاستبيان، وتم إجراء تحليل لمعرفة عامل النجاح الحاسم (CSF) ووزن مساهمة عناصر التقييم في STP . ونتيجة لذلك، كشف عامل النجاح الحاسم ووزن مساهمة عناصر التقييم في STP . في هذه الدراسة، هناك عشرة عناصر مدرجة في قائمة STP وهي الأوراق أو أوراق الشجر، وكرة الجذر، وقطر الجذع، وارتفاع الجذع، والارتفاع الكلي، وخليط التربة، والسقطة، وثقب الزراعة، والتشطيب والمعالجة والتطهير. تكشف النتائج أن الأوراق أو أوراق الشجر، وكرة الجذر وقطر الجذع هي أهم عناصر في أعمال الزراعة. وفي الوقت نفسه، فإن العناصر الثلاثة الأقل أهمية هي زراعة الثقب، والطحن والمهاد لأعمال زرع STP . وأخيراً ، أنتجت الدراسة جدول تقييم الجودة لأعمال زرع STP ليتم استخدامها في نظام تقييم الجودة للمادة اللينة.

## APPROVAL PAGE

I certify that I have supervised and read this study and that in my opinion, it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a thesis for the degree of Master of Science (Built Environment)

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## DECLARATION

I hereby declare that this thesis is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

Nur Athirah Binti Ahmad Sharip

Signature .....  .....

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## LIST OF ABBREVIATIONS

AHP	Analytical Hierarchy Process
ALAM	Angkatan Landskap Malaysia
ANSI	American National Standard Institute
BCA	Building and Construction Authority
CCC	Certificate of Completion and Compliance
CIDB	Construction Industry Development Board
CII	Construction Industry Institute
CIS	Construction Industry Standard
CMGD	Certificate of Making Good Defects
CONQUAS	Construction Quality Assessment System
CPC	Certificate of Practical Completion
CPMM	Construction Productivity Measurement Model
CPPMM	Construction Project Performance Measurement Model
CONQUAS	Construction Quality Assessment System
CSF	Critical Success Factor
CWF	Contribution Weightage Formula
DLP	Defects Liability Period
DSM	Department of Standard Malaysia
EPC	Engineer-Procure Construct
EPU	Economic Planning Unit
GPLN	Garis Panduan LANDSKAP Negara
IUM	International Islamic University Malaysia
ILAM	Institute of Landscape Architect Malaysia
IPI	Integrated Performance Index
ISO	International Organization for Standardization
IUKL	Infrastructure Universiti Kuala Lumpur
JKR	Jabatan Kerja Raya
JPA	Malaysia Public Service Department
KPI	Key Performance Indicator
KPKT	Kementerian Perumahan dan Kerajaan Tempatan
MFYP	Malaysia Five Year Plan
NLD	National Landscape Department
NLG	National Landscape Guideline
NLP	National Landscape Policy
PDCA	Plan, Do, Check, Act
PMM	Performance Measurement Model
PQMM	Project Quality Measurement Model
PQP	Project Plan Quality
PQPM	Project Quality Performance Model
PVMM	Project Viability Measurement Model
PWD	Public Work Department
QAS	Quality Assessment System
QC	Quality Control
QLASSIC	Quality Assessment System in Construction

QMS	Quality Management System
QPMTF	Quality Performance Measurement Task Force
SERQUAL	Service Quality
SIRIM	Standard and Industrial Research Institute of Malaysia
SPSS	Statistical Packaging for Social Science
STP	Single Trunk Palm
TQM	Total Quality Management
UITM	Universiti Teknologi Mara
UK	United Kingdom
UPM	Universiti Putra Malaysia
US	United State
USM	Universiti Sains Malaysia

# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1 INTRODUCTION**

The research is conducted to study on the Quality Measurement System (QMS) for Single Trunk Palm (STP) in construction works. In this chapter is an overall of the study that comprises of eight subsections. The flow starts from identifying issues of the topic, which later on come out with the aim and objective of the research. Consequent, addresses the background of the study, which provides a brief of significant topics related to the study inclusive of landscape construction quality, landscape organisation in Malaysia and planting works. Also, elaborates the scope and the significance of the study in the following subsections. Lastly, explains the organisation of the study.

### **1.2 BACKGROUND OF THE STUDY**

Malaysia is committed to the protection and conservation of natural resources in contemplation of having quality and comprehensive landscape development towards making a “Garden Nation” (KPKT, 2017). The Malaysian government supported all laws, policies and agenda regarding environmental issues. In October 1989, a collective agreement was achieved by the leaders of the Commonwealth in the Langkawi Declaration. In the declaration, all policies and development programs in each country were drawn up for sustainable development and controls on activities that endanger nature (Abdullah, 2015). In 1992, an international conference on the environment (Earth Summit) organized by the Commonwealth Heads of Government

Meeting (Subasinghe, Kodituwakku, & Perera, 2014). The conference had outlined the Agenda 21 on sustainable development intention to protect the environment, maintain the ecosystem and to preserve resources for the next generation (Stakeholder Forum for a Sustainable Future, 2011).

### 1.2.1 Malaysia as a “Garden Nation”

The concept of a “Garden Nation” defined as a balance development between the social, economic and environment (NLD, 2011). National Landscape Policy (NLP) emphasises the vision of Malaysian Beautiful Garden Nation to make Malaysia a nation that makes progress towards balance in physical development. To boost the progression making a "Garden Nation", National Landscape Department (NLD) was established in 1996. In 1997, national landscape conference was held to discuss the whole aspect of the landscape industry from the policies, planning, design, implementation and management of landscape, research and education. The programmes were part of a movement to amplify the continuation of making a “Garden Nation”.

Putrajaya is a successful project implemented the concept of Garden Nation transformation following the National Landscape Guidelines (NLG). Siong (2006) claims that Putrajaya is present the garden city concept by having almost 40% of the entire city covered by green area and open spaces. The green areas can improve the environment and reduce pollution, but also give advantages for social and economic purposes. By having attractive and accessible green open spaces, it creates opportunities for the community to enhance an everyday life.

Furthermore, the number of new parks and gardens keep increase year by year. The park and garden were enriched to accomplish a garden identity as a vision for the

country. Perdana Botanical Garden which is situated in Kuala Lumpur as a recreational area and green area (Perdana Botanical Garden Kuala Lumpur, 2017). There are new parks which will be set up in five states, namely Sungai Petani at Kedah, Proton City at Perak, Tanjung Agas and Tasik Tenggara at Johor and kota Belud at Sabah by 2020 (the sun daily, 2015). The parks and garden will encourage the process of making more green area.

Programmes related to adopting or planting trees has become more active since the government launched a campaign to plant trees in the whole country on 3<sup>rd</sup> March 1997 by targeting 3 million trees on 2000 and 20 million trees by 2020. The campaign is successfully carried out by the private, government, NGO agencies and Malaysian citizen (Utusan online, 2012; Arkib, 2013; Berita Harian, 2016; News, 2016; Journalist Sinar Harian, 2017; Lah, 2017; Anantan, 2017). 29th SEA Games and 9th Asian Para Games 2017 organised by Malaysia leave a legacy that 5,249 trees planted according to the total number of gold, silver and bronze medals offered. The medal from tree would undoubtedly contribute to public awareness. It give a message to the community about the necessary of rehabilitation and restoration of degraded forests as well as conservation of biodiversity, which are priceless national treasures (Nation, 2017; Rosly, 2017).

### 1.2.2 Quality in landscape work

To achieve the Garden Nation, quality of landscape development in all aspects regarding planning, design, implementation and maintenance should be excellent. In achieving the goal, Ismail Ngah suggested twenty strategies. Part of the strategy is to produce landscape standard and ensure the quality of landscape (Ngah, 1999). Bakar (1999) concurs that the establishment of proper policy and design guideline will assist

to improve the quality of design and product that are expected by the client. It also helps Landscape Architect to meet the standard and requirements without much uncertainty.

Based on the strategies regarding landscape standard, National landscape Department reproduced the National Landscape Guideline (NLG) as a comprehensive set of landscape design guidelines for landscape works (NLD, 2008). The objectives of the guideline are to consummate entire landscape qualities as well as to assisting local authorities in maintaining and controlling the landscape design. Besides that, NLP is a comprehensive guideline produces by NLD which is defines the direction of the landscape development and preservation in Malaysia (NLD, 2008). There are three standard related to landscape architecture which are (i) MS 2603:2015 landscape planting material for trees specification (DSM, 2015), (ii) MS 2671:2017 specification of vegetation propagated turfgrass planting materials, and (iii) MS 2677:2017 specification for palm of landscape planting materials (DSM, 2017).

Recently, in any development project will promoting sustainable living and quality of life by landscape design. Ngah (1999) also highlighted that landscape as a selling point and added advantage to the developer. A recent study reported that landscape design as main reasons in purchasing or lease a home (Hussain et al., 2014). Therefore, the study revealed that more than 90% respondents' admitted that landscape design could boost the price of a house. It shows that landscape design is a crucial factor which can determine the house costs and the quality of a development especially in residential projects.

### 1.2.3 Quality Assessment System (QAS) in construction

The Quality Assessment System (QAS) is tools that can facilitate the evaluation of quality. The measurement of quality level reflects the degree of conformity, especially for specification or sampling inspection purposes, can be expressed numerically. R. Abdullah et al., (2010) claims that quality of construction works can be measured effectively using QAS. Even though, the improvement in identifying the quality of construction project by measures that take on items with high and poor scores. It is a tool to achieve a better quality of construction project. A study by Willar (2017) has indicated that the availability of quality assessment system has been demonstrated as a method to increase the construction quality. As a result, it will probably have high business competitiveness among the contractors.

The effort of the government to enhance the quality of construction is by imposing the quality assessment system to make sure the project meets the standard. Construction Quality Assessment System (CONQUAS) was established in Singapore. CONQUAS act as a tool to evaluate the level of quality for projects. As this point, CONQUAS have been used for numerous construction projects in Malaysia, Thailand, Vietnam, China, Hong Kong, and India (Ahmad et al., 2014).

Likewise, CIDB which has establishes QLASSIC as a mechanism to assess the construction work based on CIS in Malaysia (CIDB., 2006). There are four main components to be assessing through inspection, field testing and sampling. QLASSIC at certain degrees achieve the desired results which enable all organization that involve in the project to commit more effectively and conveniently Kam, Hilmy, & Hamid (2010).