

## RELATIONSHIP BETWEEN GROUP OF ORGANIZATION AND CRITICAL SUCCESS FACTORS (CSF) OF TREE PLANTING WORKS

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### ABSTRACT

*Abdul Rahman (2010) stated that there are many researchers had done a study on the issues of managing construction quality. However, the researchers covered the issues of construction as a whole. Landscape construction, in general, is part of the total construction and is not exempted from the similar problem. Based on personal communication with Siti Zakiah on April 24, 2012 she concluded that landscape quality, in general, is referring to the quality of plants and in overall, landscape quality control in Malaysia cannot be considered failed but not up to satisfactory level. A thorough study of critical success factor of tree planting work needs to be carried out as to control planting work quality in Malaysia. From various types of organizations or occupations that related to planting works, the research has grouped the respondents into three groups i.e. government, private and educational. The study aimed to investigate the relationship between groups of organizations with their response to critical success factor of tree planting work. There are 225 Landscape Architects listed in ILAM directory 2009 that successfully responded to the survey conducted. Then, for the data analysis, One-way ANOVA was performed to identify the significant level of relationship between respondents from different organization group with Critical success factors of tree planting work. Pos-hoc comparison was performed to study more detail on the relationship from the above finding. The result of the study indicates that there is no significant association between groups of organizations and respondents' feedback on trunk height, trunk diameter, and staking.*

Keywords: Critical Success Factor, tree planting, group of organizations

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### INTRODUCTION

In producing an excellence construction of planting work, the issues of quality control must be highlighted. In line with the vision of Malaysia beautiful garden nation by 2020. According to Minister of Housing and Local Government in National Landscape Policy (NLP) "... The Beautiful Garden Nation by 2020 was prepared as a comprehensive operational guide to improve the quality of living environment" (National Landscape Policy). This vision will lead to create a country with a balanced physical development by a green, well-managed, clean and beauty landscape.

Abdul Rahman (2010) mentioned that there are many researchers had done a study on the issues of managing construction quality. However, the researchers covered the issues of construction as a whole. Landscape construction, in general, is part of the total construction and is not exempted from the similar problem. Based on personal communication with Siti Zakiah on April 24, 2012 she concluded that landscape quality, in general, is referring to the quality of plants and in overall, landscape quality control in Malaysia cannot be considered failed but not up to satisfactory level. A thorough study of critical success factor of tree planting work needs to be carried out as to control planting work quality in Malaysia.

From various types of organizations or occupations that related to planting works, the research has grouped the respondents into three groups i.e. government, private and educational. The study aimed to investigate the relationship between groups of organizations with their response to critical success factor of planting work. There are 225 Landscape Architects listed in ILAM directory 2009 that successfully responded to the survey conducted. Then, for the data analysis, One-way ANOVA was performed to identify the significant level of relationship between respondents from different organization group with Critical success factors of tree planting work. Pos-hoc comparison was performed to study more detail on the relationship from the above finding. The result of the study indicates that there is no significant association between groups of organizations and respondents' feedback on trunk height, trunk diameter, and staking.

### CRITICAL SUCCESS FACTORS IN CONSTRUCTION

Quality Control played huge roles in producing an excellence construction work. Most of the research study construction quality control as a whole, the more specific study must be developed to improvise construction quality. The critical success factor is developed to make an organization successful. (Afshin and Gholamreza, 2012) mentioned "*the organization should concentrate on the more efficient factors the critical success factor considering their restrictions.*" There are seven critical success factors for projects that had been listed by Ashley (1986) which are:

- i. Construction activities programming
- ii. Design planning
- iii. Project manager commitment the goals
- iv. Project team motivation
- v. Project manager technical capability
- vi. Control system
- vii. Definition of work and its field

Besides, Afshin and Gholamreza (2012) in their study found that the critical success factors in construction projects have different priorities and weight. In 2006, Construction Industry Development Board (CIDB) has established the Quality Assessment System in Construction (QLASSIC) as a tool to measure the quality of construction work. QLASSIC is a method to measure the quality of workmanship of a construction work according to the relevant approved standard Mukhtar (2009). Based on the increase scoring mark for the project that have gone through the process of QLASSIC assessment, it can be concluded that QLASSIC method improves construction work quality. According to several experts' opinion, it is recommended that to associate landscape work with the same process or method in order to improve landscape quality work as a whole.

In producing the weightage based on critical level of every element in ensuring quality for tree planting works, it is important to identify the relationship between groups of organizations with their response to critical success factor of tree planting work.

### QUALITY IN CONSTRUCTION

In the early study Line and Tone (2011) CC stated that "quality becomes a concept that does not yield to their deal of precision and the demand for an essence." Furthermore, quality also known as "meeting the legal, aesthetic and functional requirement of a project", (Arditi & Gunaydin, 1997). Basically, the requirements can be complex or simple, or it maybe stated in term according to the end result required or as a detailed information of what is to be done. Based on some design professional, they believe that quality is measured by the aesthetics of the facilities that they had been designed. According to Stasiowski and Burstein (1994), "quality is based on suc issues as how well a building blends into its surroundings, a building's psychological impact on its inhabitants, the ability of a landscaping design to match the theme of adjacent structures, and the use of bold new design concepts that capture people's imaginations". The easthetic definitions of quality are very subjective, as the quality can not be measured according to the aesthetic value.

In the construction industry, quality defined as meeting or fulfil the requirements of the designer, contractor and regulatory agencies as well as the client. According to American Society of Civil Engineers (ASCE) study, (1988), quality can be describe as follow:

- i. Meeting the requirements of the owner as to functional adequacy; completion on time and within budget; lifecycle costs; and operation and maintenance.
- ii. Meeting the requirements of the design professional as to provision of well-defined scope of work; budget to assemble and use a qualified, trained and experienced staff; budget to obtain adequate field information prior to design; provisions for timely decisions by owner and design professional; and contract to perform necessary work at a fair fee with adequate time allowance.
- iii. Meeting the requirements of the contractor as to provision of contract plans, specifications, and other documents prepared in sufficient detail to permit the contractor to prepare priced proposal or competitive bid; timely decision by the owner and design professional on authorization and processing of change orders; fair and timely interpretation of contract requirements from field design and inspection staff; and contract for performance of work on a reasonable schedule which permits a reasonable profit.
- iv. Meeting the requirements of regulatory agencies (the public) as to public safety and health; environmental consideration; protection of public property including utilities; and conformance with applicable laws, regulation, codes and policies

### QUALITY STANDARD

Wan Mahmood et.al (2006) mentioned that "many critic had been pointed to the construction environment due to the workmanship performance, construction processes, the organizations involved, the materials, etc". To be involve in today's market, a construction companies need to provide consistent quality of work value. "To satisfy the quality, it implementation must start at the beginning (input stage), during (in process) and at the end (finished goods) of the process" (Ab. Wahid, 2006).

**Table 1: Type of Standard**

Type of Standard	Purpose	Example
<b>International Standard</b>	Basic for international conformance	ISO
<b>Regional Standard</b>	Standard for Specific region conformance	European Standard
<b>National Standard</b>	Standard for Specific country conformance	SIRIM/ANSI/BSI

(Source: Jasadikin 2015)

Standard can be achieved with consensus by organized body that provides for more common and repeated use, guideline, or characteristic for activities, aimed at the goal of the optimum degree of order in a given contact, definition of standard stated in British Standard (BS 0: Part 1 1991). According to table 1, the standard had been divided into three type which is international standard, regional standard and national standard. International standard such as the ISO standard, that signify for such activities to obtain competitiveness and to be recognized at international level. For example, Ofori (2002) made clear that in era of borderless trade, the important for achievement competitiveness and access to the global markets is through international

standard. Besides, regional standard refers to the standards that developed for specific geographic region. Meantime, national standards are developed for the agreement of specific nation. Badiru (1995) see in Jasasikin (2015) mentioned that standard had to be divided into two categories, "the 'consensus standard' and the 'regulatory standard'; and most international standard fall under the consensus standard".

In Malaysian construction environment that related to its performance, as well as construction final products the effective quality implementation has become an issues. Unlike ANSI in USA and BSI in UK, SIRIM in Malaysia have never established any landscape standard as there is no application from interest parties. Landscape construction activities in Malaysia generally executed based on the specifications tabled through contract document for every specific project. There are two types of landscape projects in Malaysia; government projects and private projects. As the contract of government projects awarded to contractor through government's contract documents, the execution of all work are bond to the conformance of the Standard Specification stipulated in related contract documents. Unlike Government's projects, private project are not obligated to follow government's standard specification in their contract documents. Private projects owners in Malaysia normally produce their independent sets of contract document for their projects.

#### **SPECIFICATION FOR LANDSCAPE CONSTRUCTION**

There is two type of landscape project in Malaysia which are government project and private project. Jasasikin and Noriah (2011) mentioned, "Government's project will be awarded to the contractor through the facilitation of government contract document" whereas "private project are not obligated to follow government standard specification in their contract management." Moreover, landscape standard specification had been divided into two categories which are standard specification produced by Public Works Department (PWD) and standard specification distilled from National Landscape guideline produced by National Landscape Department (NLD). According to Jasasikin & Noriah (2011), there had been a comparison of the set of content based on the consideration of NLD and PWD, this is the list of content that had be tested which are general requirement, "soil sample, soil preparation, planting method, natural vegetation, turfing, pest control management, maintenance, relocation and protection of existing tree, football and playing field and earthwork and grading".

#### **LANDSCAPE CONSTRUCTION**

Motloch (2000) stated that "Landscape construction is part of the scope of work in landscape architecture field beside planning, designing and facilities operation." Landscape construction can be separated into two types which are hard-scape and soft-scape. In an earlier study by Ambrose and Brandow (1992) mentioned: "that soft-scape works consist of reshaping the ground surface, replacing some surface materials, and introducing new plantings." For hard-scape it involves structure.

This research will emphasize more on soft-scape material that is tree planting. Trees also plays as an important element in the construction of garden and landscape area. National Landscape Guideline had been produced by National Landscape Department as to define soft-scape material such as trees, shrubs, ground cover and another plant that had to be provided by the contractor...

#### **PLANTING WORK PROCEDURE**

Planting work will be applied based on guidelines or specification provided as part of contract document in landscape project. As stated in National Landscape Guideline from NLD in section four which provides guidelines for soft-scape for every category. Jasasikin Ab Sani (2014) stated the NLG "is divided into nine subtitles according to a parameter of planting works and category of plant materials." There are several categories of the specification for soft-scape construction that had been used for landscape project in Malaysia. This research will deeply study on the tree as a soft-scape element. This is the tree planting procedure list which are:

- i. Plant Selection
- ii. Transporting the Plant
- iii. Site Nursery
- iv. Receiving Plant on Site
- v. Select Location
- vi. Preparation of Planting Hole
- vii. Planting the Shrub
- viii. Watering
- ix. Mulching
- x. Site Management for Shrub Planting

#### **TREE ANATOMY**

The growth of tree is complicated as it works as an operating machine that grows, take nutrients, breathe, recover from disease and injury and finally reproduce and die. In an earlier study, Dean and Long (1986) reported "the size of the stem at any point varies so that the bending stress due to the wind remains constant". From the previous study indicates that plant needs to regulate itself by spreading the mechanical stress evenly throughout the structural bodies. According to Jasasikin (2015), "the understanding of the ability of the plant to adapt to surrounding force and mechanical stress will determine the importance level of the supportive element in tree planting work". This explains the natural defence ability of each plant toward their mechanical pressure. This are the basic anatomy for tree:

#### **Formation of crown**

The crown is "the leaves and branches of a tree measured from the lowest branches on the trunk to the top of the tree" (Gilman and Lily, 2002). This statement clearly explain about the differences between crown and canopy. Canopy can be assign to the part of the crown with its twigs and leaves.

a) Shoots

The shoot is one part of the tree that proposed the growth of stems, flowers, leaves and buds. To be clearly stated it is initiated by a small part of the shoot that known as the apical meristem of the shoot. A shoot apical meristem activity will control the development of higher plants. According to Ulrike et al. (2001), “organ are formed on the flanks of the meristem, while pluripotent stem cell are found in a separate domain in the meristem center”.

b) Buds

Buds is called when a flower or a shoot not yet expanded. The extension of a shoot is depend to its growing terminal bud. It is a stem’s primary growing point. Bud can be either flower buds (reproductive) or leaf buds (vegetative). David (2011) stated that, these both buds “can be very similar in appearance, but flower buds tend to be plumper than leaf buds”.

For tree planting works, the formation crown of the tree will be inspected when receiving the tree on the site. All element of trees crown formation will determine the condition of tree to be accepted.

### Leaf

Leaves are the engine converting energy in plant. Cecie and Ralph (2008) mentioned that “the chloroplasts within the leaves have the ability to convert sunlight or other sources of light energy into chemical energy that can be utilised by the plant to live and grow. The condition of leaves will be inspected upon receiving the tree on site or at nursery, regarding to tree planting work. As the quality of tree will be accepted based on the physical condition of leaves.

### Crown

A tree can be divided into its trunk and its crown. There are four criteria to determine the overall form or shape of a tree which are: a) the position if its terminal or lateral buds, b) the bud break pattern on the trunk and many branches, c) the angle of branches origin and d) the growth of buds and branches. A good example was state by Richard et al. (2004), “the absence of lateral buds in most of the arborescent monocots (e.g., palms), lead to a columnar growth habit in which an unbranched trunk ends in a tuft and leaves.”

Generally, the crown shape will tell the quality and the stability of trees. All tree will have their own natural shape of crown. Sometime, the abnormality of crown shape indicates the inappropriateness of the surrounding environment throughout the growing process and affects the quality of tree to be accepted for tree planting work.

### Root

Root is important element of tree because they function as the anchor to hold the tree strongly on the ground. In reality, the root hold several functions in sustaining the tree externally as well as internally. Normally, root grow based on the genetic of the plant species, the roots form, function, size and development of a tree are also effected by its surrounding environment and condition (Richard et al., 2004). The growth of root is irregular and unpredictable. It is difference from the shoot tip that has no sort of protection. Benfey and Scheres (2000) mentioned that “the root tip is protected by a layer of root cap that may also help to lubricate the penetration of the root into the ground as the old cells on the root tip die off. Similar to shoot tip, the root tip also possess the apical meristem”. In general, for tree planting operation, root ball size, soil organism of root ball, root growth pattern, root network and overall root condition need to be monitored to ensure the quality of tree to be planted.

### Trunk

According to Jennifer (2010), trunk can be described as branches and roots in conifers and dicots as tree components that being reinforced by the presence of secondary growth of vascular cambium. Monocots such as palm trees may develop big stems through the active special thickening meristemic tissues right below the upper part of the tree to accomplish stable root system with a larger number of roots without increasing the size of the roots. For woody plants, the vascular cambium growth will affect the radial growth of shoots. According to Jasasikin (2015), “the vascular cambium consists of rapidly dividing and expanding cells that is located along the tree trunk from its base all the way to the shoot tips”. The differences of cambium occur based on seasonal process. It is influenced by plant growth regulators that affected by climatic conditions or temperature.

### Branch attachment

The major progress of tree development is the attachment of branch to stems and it can be seen from mechanical and biological perspective. The connection of trunk and brunch must allow a two-route exchange of materials, water, and other organic compound. Besides, the connection must supply mechanical support to a continually extending beam. Jennifer (2010) mentioned that “the structure of the branch attachment then become both as transport and support system”. Normally, there are three process that involve in this element which are photosynthesis, respiration and transpiration.

### Growth factor

The growth characteristic of tree is complex as tree do not develop arbitrarily and in foreseeable manner by following strict principle. It can be explained by a number of processes determine tree growth, which are controlled by an epigenetic and genetic factors that react dynamically to environmental condition. Bittebiere (2014) illustrated the factors that influences the tree growth, which are genetic control, environmental control, time and plant growth regulators.

### METHODOLOGY

This study used a qualitative method in the survey. There are 225 Landscape Architects listed in ILAM directory 2009 that successfully responded to the survey conducted. All of respondent are from several group of organization which are from private, government and educational. The survey was mainly conducted through the mail. It will be mailed to the respondent based on address stated in ILAM directory. Before sending the survey, the confirmation of respondent's address has been made through a

telephone call. Besides, some of the respondents that reachable by the researcher, the survey form was given by hand and the respondents will answer the survey immediately or return it via mail.

The questionnaire was designed to gather the experts' opinions on the relationship between group of organizations and critical success factors of tree planting work. It consists of a list of assessment element to be ranked by respondents based on critical success factors using Likert-Scale 1 to 5. The number illustrates the critical level of every element in soft-scape work. Then, for the data analysis, One-way ANOVA was performed to identify the significant level of relationship between respondents from different organization group with Critical success factors of tree planting work. Pos-hoc comparison was performed to study more detail on the relationship from the above finding.

**FINDING AND DISCUSSION**

From types of organizations or occupation, the research has grouped the respondents into three groups i.e. government, private and educational. The study has gone to further analysis to see the relationship between these three groups with their response on CSF of planting work. The one-way ANOVA was used to look into the relationship between group of organizations and critical success factors of tree planting works. The result of the study indicate there is no significant association between group of organizations and respondent's feedback on root ball ( $p < 0.05$ ). Furthermore, it is indicated that there is no remarkable relationship between groups of organization and respondents' feedback on trunk diameter. In addition, its illustrate that groups of organizations did not influence respondents' feedback on trunk height. The finding also point to the significant influence on respondents' feedback on soil mixture, root ball, planting hole and mulching ( $p < 0.05$ ). Refer to table 2.

**Table 2: Relationship between group of organizations and critical success factors of tree planting work- One way ANOVA**

Elements	Organizations	Mean	Sig.
Trunk height	government	3.72	.470
	Private	3.87	
	educational	4.03	
Trunk diameter	government	3.88	.157
	Private	3.88	
	educational	4.29	
Root ball	government	4.34	.000
	Private	3.53	
	educational	4.16	
Soil mixture	government	4.50	.009
	Private	4.02	
	educational	4.39	
Planting hole	government	4.44	.004
	Private	3.91	
	educational	4.24	
Staking	government	3.48	.133
	Private	3.53	
	educational	3.87	
Mulching	government	3.56	.010
	Private	3.18	
	educational	4.79	
Finishing & treatment	government	4.04	.05
	Private	3.74	
	educational	4.16	

A pos-hoc analysis was performed to identify which group of organizations contribute to the overall significant results. Moreover, pos-hoc comparison was employed to explore deeper. Root ball is found to have significant association with groups of organization ( $p < 0.05$ ). It is stated that respondents from private group has significant different on feedback related to root ball size compared to respondents from government agency and educational institution. It can be concluded that, respondents from private sectors put less concern on root ball size as compared to respondents from government agencies and educational institutions. Refer table 3.

**Table 3: Pos-hoc comparison on groups of organizations against root ball size**

	<b>Dependent</b>	<b>Variable</b>	<b>Sig.</b>
Root ball	government	<b>private</b>	<b>.000</b>
		Educationa	1.000
	private	<b>government</b>	<b>.000</b>
		<b>educational</b>	<b>.002</b>
	educational	government	1.000
		<b>private</b>	<b>.002</b>

According to table 4, it shows that there is significant mean different contributed by respondents from private sector as compared to government agencies on critical level of soil mixture ( $p < 0.05$ ). Meanwhile, government respondents (mean = 4.50) found that soil mixture is more critical as compared to respondent from private sectors (mean = 4.02).

**Table 4: Pos-hoc comparison on groups of organizations against soil mixture**

	<b>Dependent</b>	<b>Variable</b>	<b>Sig.</b>
Soil mixture	government	<b>private</b>	<b>.017</b>
		Educationa	1.000
	private	<b>government</b>	<b>.017</b>
		educational	.150
	educational	government	1.000
		private	.150

Based on the table 5, the study indicates that there is significant mean different contributed by respondents from private sectors as compared to government agencies on critical level of planting hole ( $p < 0.05$ ). Besides, government respondents (mean = 4.44) found that planting hole is more critical as compared to respondents from private sectors (mean = 3.91).

**Table 5: Pos-hoc comparison on groups of organizations against planting hole**

	<b>Dependent</b>	<b>Variable</b>	<b>Sig.</b>
Planting hole	government	<b>private</b>	<b>.004</b>
		Educationa	1.000
	private	<b>government</b>	<b>.004</b>
		educational	.223
	educational	government	1.000
		private	.223

The study illustrated that there is significant mean different contributed by respondents from private sector as compared to educational institutions on critical level of mulching ( $p < 0.05$ ). Respondents from educational institutions (mean = 3.56) found that mulching is more critical as compared to respondents from private sector (mean = 3.18). Refer to table 6.

**Table 6: Pos-hoc comparison on groups of organizations against mulching**

	<b>Dependent</b>	<b>Variable</b>	<b>Sig.</b>
Mulching	government	private	1.000
		Educationa	.145
	private	government	1.000
		<b>educational</b>	<b>.007</b>
	educational	government	.145
		<b>private</b>	<b>.007</b>

## CONCLUSION

In relation with the aim of the study which is to investigate the relationship between groups of organizations with their response to critical success factor of planting work. In overall, the study concluded that respondent from different groups of organizations may differ in their opinion on critical level of planting element especially on the important element i.e. soil mixture, planting hole and root ball size. There is a need to continue this study, as tree quality in Malaysia can be rank according to quality assessment element for tree planting works. These will facilitate or monitor the total quality management for planting construction of tree in Malaysia.

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