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DEVELOPMENT OF VISUAL QUALITY EVALUATIVE ASSESSMENT METHOD IN CAMPUS LANDSCAPE

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Abstract: The design of campus landscape is expected to reflect the institution values, provide the character and the spirit of place to campus environment. It is highly influenced by visual experience and impression of campus environment. There are two methods in landscape visual quality assessment: descriptive assessment method and evaluative assessment method. Both assessment methods cannot be done simultaneously, but as a sequence phase. Descriptive assessment method should be done first to obtain a reference for evaluative assessment method. Landscape visual quality evaluative assessment method is used to measure the level of public assessment about visual quality and visual response. Information Processing Theory is used to develop the visual quality evaluative assessment method and to obtain unified integration between descriptive assessment and evaluative assessment. The development of evaluative assessment method includes the process of comparing, averaging, or determine the ranking of each environmental hue or landscape areas in campus, based on the public or college user community preferences.

Keywords: landscape visual quality, evaluative assessment, assessment method, campus landscape.

INTRODUCTION

Landscape Visual Quality Assessment Method is used to identify character's components and the intrinsic forms that affect public's assessment of campus landscape visual quality. There are two methods in landscape visual quality assessment method: descriptive assessment method and evaluative assessment method. Both assessment methods cannot be done simultaneously, but as a sequence phase. Descriptive assessment method is developed to reveal and describe the elements or the qualitative dimension of the landscape visual quality. Descriptive assessment method tends to be more subjective than evaluative assessment method. It's because descriptive assessment method has no basic preferences which can be explained scientifically. The evaluative assessment method is developed for the process of comparing, averaging, or determine the ranking of each environmental hue or landscape areas in campus, based on the public or college user community preferences. The advantage of evaluative assessment method is its results factors will be measurable and identifiable.

From the theoretical study of aesthetics/visual quality and campus landscape planning and design, can be found indicators, variables, and criteria for the visual quality of the campus landscape in Indonesia. Through the development of integrated assessment methods obtained stages that must be done for each method. The combination of both landscape visual quality assessment methods can be done with three condition: First, both assessment methods can't be done simultaneously but as a sequence phase with the

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descriptive should be done first before evaluative assessment. Second, both assessment should use the same sampling scene. Third, the result of each assessment cannot be used independently or separately, as both are complementary and integrated phase.

EVALUATIVE ASSESSMENT METHOD

Research about landscape visual quality assessment with evaluative assessment method (often named preferences study) has been developing since 1966. Some researchers who had been conducting preferences effectively are Gregory J. Buhyoff (19 studies), R. Bruce Hull IV (13 studies), Ervin H Zube (10 studies), Terry Daniel (10 studies), Herbert W. Schroeder (9 studies), J. Douglas Wellman (8 studies), Stephen & Rachel Kaplan (5 studies).

From those study results, several theories have been developed that can be used as a base of landscape visual quality preferences. There are four main theories that have been developed in landscape visual quality preferences study, include Habitat Theory (Orians, 1986), Prospect and refuge (Appleton, 1975), Affective theory (Ulrich, 1979), and Information Processing (Kaplan, et.al, 1989). The Information Processing theory by Kaplan was considered as the most appropriate theoretical basis to develop the visual quality evaluative assessment method in campus landscape.

Information processing theory from Kaplan is mostly used in various preferences study cases. Its results support the existence of four visual response variables. In every study cases are always found that to do balance interpretation is necessary to apply those four visual response variables. This theory has been widely developed and it is still possible to do further research on the development of the theory and its application.

By using information processing theory, then can be done the integration between descriptive assessment and evaluative assessment. Descriptive assessment results are categorization of landscape unit base on dominant landscape components and physical factors that influence it. That can be linked to campus' landscape preferences, such as observer's preference level towards visual quality response variable of campus' landscape. The integration can be done by linkages analysis between the determining factors of landscape components, and visual response variable perceived by the college user community.

Kaplan had hypothesized that "perception process involves information extracting from environment by a person". According to Kaplan, that "people tries to understand the environment and be involved in it with four visual response which are variable, namely coherence, legibility, complexity and mystery."

Table 1. Visual Response Variables of Landscape Visual Quality Preferences

	Understanding Making Sense	Exploration Being Involve
Immediate The Visual Array	COHERENCE Making sense now Orderly, 'hangs together' Repeated elements, regions	COMPLEXITY Being involved immediately Richness, intricate Many different elements
Inferred Future, promised Three-dimensional space	LEGIBILITY Expectation of making sense in future Finding one's way there & back Distinctiveness	MYSTERY Expectation of future involvement Promise of new but related information

Source: Lothian (2000)

Coherence is the ease to cognitively manage or understand scene (good gestalt). Coherence is an attempt to feel the scene by involving factors that make the scene easier to understand. The way to organize it being just a few objects and/or being a large area.

Research show that people rely an information about a scene into object/area fragments with the maximum amount that still can be stored in working memory, which are five fragments. A scene with around five main units will be seen coherent. Element repetitions and smooth texture help to facilitate scene identification. Texture or brightness changes must be accordance with an important activity in scene, if not, the scene never has coherence.

Complexity is the involvement level of component, or scene ability to maintain each object thus still look interesting in the scene, for example, by arranging objects/components so that do not look boring or unnoticeable. Complexity is often called as diversity, variety, or wealth, from the beginning it has been regarded as the most important factor in a scene.

Kaplans describe complexity as how big a condition occurs in a scene – a cornfield scene that stretched to horizon, will not have the same complexity level as the scene that featuring various vegetation on bumpy land with hedgerows and a cottage. The more complex a scene will be increasingly favored compared with the simple scene.

Legibility is the ability to predict and maintain people's view orientation when moving into particular scene. To make it happen it's necessary "A sense of security in space context" (Kaplan, 1979), which is similar, although in wider concept, with Refuge concept from Appleton (1975). Legibility is like mystery, its involves a function that someone know the space direction, to or back way of venue in the scene. Thus, legibility "associated with space structuring process, the difference is legibility more visually readable" (Kaplan, 1979). Scene which is easy to read, it would be easy to be seen as a whole, and to form a mental map. The legibility existence noticeably higher in specific elements presence, such as landmarks, smooth texture, and ease to classify a scene into pieces. If coherence focused on scene perceive effort, legibility more related to movement process in it.

Mystery is a physical condition which promised that we will get further visual information, if someone wants to go deeper inside a scene, such as pedestrian path that seems to disappear, a bend in the road, a point that is ablaze but looks half hidden from view by foliage.

The new information does not immediately present, but can only be inferred from what is in the scene, so there is a sense of continuity between what is seen and what should be anticipated. "A scene that has a high mystery is a condition where one can learn more, only if the person is willing to go further into the scene." (Kaplan, 1979). Kaplans actually reluctant to use the term "mystery" but could not find a more suitable term. Another term that may be used is the "anticipation".

In 1980s, further research conducted by Kaplans (1989), Herzog (1985), Anderson (1981), and others, have strengthened and gave unity in defining information variables. Through studies they did with more than a decade of research, it can be concluded according to Kaplans as follows:

a. A significant result is achieved by studies that combining visual information response variables
b. Complexity as a significant visual response variables, only occurs in one study, whereas in urban scene studies, complexity appears as a negative visual response variable.
c. Legibility role as a visual quality response is difficult to assess. Four of five research that included legibility as a visual response variable, proves that legibility does not have a significant role in landscape preferences. Even from Anderson's (1981) research was found evidence that legibility was a negative visual response variable.
d. Coherence proved to emerge as a significant visual response variable in majority of preferences studies, which incorporate coherence as one of visual response

variable. Even in a case study which using regression analysis, coherence becomes the only significant visual response variable.

e. "Mystery is the most consistent visual response variable which emerged as one of information factors in preferences study" (Kaplan, 1989).

DEVELOPMENT BASE OF EVALUATIVE ASSESSMENT METHOD

There are four important base in evaluative assessment method development, which are; 1) Photos as landscape preferences rating tools; 2) Observer/ respondents characteristics influence toward preferences; 3) Photo rating process for landscape preferences; and 4) Analysis for visual quality assessment result.

Photos as Landscape Preferences Rating Tools

In implementing process of evaluative assessment method, it used photographs as tools so that observers can give a visual quality assessment of landscape space. According to Lothian (2000), photographs used must represent sampling scenes and have the following standards:

a. Using the camera with a 50-mm lens - accordance with width and view point of normal human eye.
b. Photo taken at the level of the human eye is not above or below
c. Photo's formats must be horizontal (landscape), not vertical (portrait)
d. Landscape view should be comprehensive up to horizon, and not a close-up view
e. Ideally the photos were taken in bright conditions with lots of sun (ideally sunny conditions). If in cloudy sky conditions, it must be convinced that the scene still gets enough sunlight.
f. Photos have high levels of exposure, good clarity (free from dust) and not in strong lighting conditions only on one side. Avoid taking photos too early in the morning or too afternoon.

Observer/Respondents Characteristics Influence Toward Preferences

From some research results and previous evaluative assessment studies about landscapes visual quality, it was concluded by Lothian (2000), that observer's characteristics influence towards study preferences results as follows:

a. Age, gender, education, employment, and social status of observers were major observers' characteristics elements which often sought (75%) its influence on visual preference. Other considered factors were childhood environment condition, culture and ethnicity, as well as observer's expertise level.
b. Zube's (1982) findings could serve as definitive basis, that children's visual preferences, especially in group age around 6-8 years differs substantially with older age children, and different from adults too. This finding was reinforced by Balling and Falk (1982) and Lyons (1983) who stated that preference for Savanna habitat of children around 8-11 years had a very significant difference with older children and adults.
c. Related to gender, there were only two studies that found gender affected preferences, so according to Hull & Stewart (1992) and Woodcock (1982) it was too limited to conclude definitively.
d. Overall, basic character of respondents such as age, gender, education level, occupation, and socio-economic status had no effect on preferences. Some indications show that the visual preferences of children (aged less than 11 years) have a very significant difference compared with older children and adults.

e. Culture Effect to Observer, until now there are at least 11 studies have been conducted about culture influence to visual preference (Lothian, 2000). It was surprising that the culture didn't gave significant effect to landscape preferences. Cultural influences on visual preference was not as big as expected.
f. Familiarity

These findings were obtained by Lothian (2000) from 12 studies on the effect of familiarity with visual preferences. Scenes with high levels of distinctiveness and involvement were more recognizable than scenes that didn't not have special features, and its visual appeal only slightly (Hammitt, 1979). But there are also high familiarity scenes that had low-level visual preference, because 'familiarity is not enough to become a reason that show appreciation' (Hammitt, 1979).

Wellman and Buhyoff's (1980) results, about the familiarity effect on a regional landscape preferences scale, suggesting that familiarity was inherent in man, had no effect on preferences. The results showed that observers from huge differences geographical areas, when evaluating the landscape preferences, essentially the result had a lot of similarities (Hammitt, 1979).

From the previous studies, it can be concluded that in general, familiarity does not have a significant influence on landscape preferences. Familiarity does not change the basic perception of respondents, however, if a scene led to a positive response, the familiarity factor presence on scene will strengthen and increase the positive response. In conclusion, the respondent characteristics influence on landscape preferences can be explained as follows; (a) Respondent characteristics influence such as status, age, gender, education, employment and socio-economic, generally can be ignored on landscape preferences. The only exception is that children's ages preferences. (b) There are some indications that this personality structure types can affect preference options, but the evidence is limited to a few studies results. (c) Culture has a small effect on landscape preferences. The similarity between cultures seem bigger than its differences. (d) If a scene does not have a positive response, familiarity can change its response, but if the scene had a positive response, then response can be strengthened by familiarity. (e) Similarity results between laity and expert respondent on landscape preferences are bigger than the differences.

Photo Rating Process For Landscape Preferences

Photos rating process for landscapes' visual quality preferences can be done with a different approach by each researcher. One approach that can be done is perform the rating process by gather all respondents in one room in a time, and then they give ratings on images together. Referring to Lothian (2000), the photos rating process for landscape preference can be done in stages as follows: (1) Introduction and preface from researchers, (2) Serving 60 pictures that represent campus landscape condition, it can be divided into two sessions, punctuated by a few moments of rest. (3) Each photo is displayed for 10 seconds, so that the whole delivery will take approximately 10 minutes. (4) Respondents are asked to rank the scenic beauty in each photo with a scale of 1 - 10, where 1 means very poor and 10 is very high. (5) Respondents are asked to choose numbers in that range and not fixated only on midst numbers. To create rank, respondents are asked to think as if standing on the spot and ask their selves how much they like the scenery. (6) Respondents are not asked to rank the photography's quality, but rank the landscape's quality. (7) Respondents rank the scenery in accordance with their thought, not because what others will assess or should be like. (8) If the Respondent has been trained or have knowledge about life sciences such as botany, biology or land management, they are required to

override it, because what is needed is an assessment of scenic beauty quality, not its ecological significance assessment. (9) The process will begin by showing 10 photos which illustrate the scenery diversity in campus area, and this indicates a scenery quality range which will be seen.

Analysis of Visual Quality Assessment Result

Analysis of rating data collection process results performed on two things; firstly, characteristics documentation of respondents, such as gender, place of origin/birth, childhood occupancy conditions, and familiarity; Secondly, assessment of campus landscape visual quality/preferences. According to Lothian (2000), the following statistical analysis was proposed to conduct preferences study: (1) Descriptive statistics derivation (e.g., means, deviation's standard) from scene for each group and respondents. This was done on the different type of room or landscapes, and for the whole. (2) Inter-group Means was used to test the reliability and consistency. Studies by Dearinger (1979) and Herzog (1985) bisects the entire sample and analyze each sample separately as mean. In this way deserves to be considered. This method is worth considering. (3) Preference conversion process to interval scale, using either z or SBES value. (4) Analysis that compares the physical characteristics of scene (e.g. water area, vegetation, degree of naturalness, etc.) to rank preferences, and consequential derivation equation that describes relationship between the two.

Development of Campus Landscape Evaluative Assessment Method

The elaboration of landscape evaluative assessment method development is based on landscape visual quality assessment method. The steps are as follows:

Selection And Determination of Sampling Scene

In development of campus landscape evaluative assessment method used photographs rating /scoring methods. It is based on the variable of landscape visual quality preferences response. Rank's Photos are landscape scape that represent the whole landscape space. Photos selection as sampling scene aims to conduct an evaluative assessment process at each campus case study. It was based on familiarity, representation of campus landscape space type, representation of campus landscape space character, representation of campus landscape component in each campus case study, and by selecting a sampling scene photo.

By familiarity, the photos represent the most commonly landscape space used by campus residents as potential respondents, with the consideration that the campus land area is too large.

By representation of campus landscape space type, in development of integrated landscape visual quality assessment methods, the results of the descriptive assessment methods used as a basis for evaluative assessment process. One of descriptive assessment results is categorization which is based on of landscape space type. In order to relate between photo's categorization and photo rating analysis results, then the selected photos must represent all types of campus landscape space, such as Edge Space, Entry Space, Shared Space, Space Between Buildings and Circulation Space.

Representation of campus landscape space character was from the results of campus landscape visual quality descriptive assessment obtained landscape character categorizations. These categorizations are based on dominant components that shape and affect the physical and visual form of the landscape space. There are three main categories of campus landscape character: Landscape units, with dominant natural component (ND),

Landscape units with dominant natural and cultural components (NKD), Landscape units with dominant cultural component (KD).

By selecting a sampling scene photo which could represent the dominant component existence of each study case, then rating preference analysis results shall be associated with previous descriptive assessment results.

Respondents Selection

Respondents are selected based on several specific criteria. Thus, make them able to give a rating to sampling scene, that appropriate with response variable of campus landscape visual quality preferences. Moreover, respondents may represent campus population. Respondents selection by considering the following matters: (1) Students who spend all day on campus so that photos can be easily evoke their memories of campus landscape's visual and physical condition. (2) Architecture Students who capable to perform photo rating, based on response variable of landscape visual quality preference. At previous pre-survey stage (trials of photo rating process), students from other majors was getting difficult to understand and rate the photos because they were not familiar with concepts used. (3) Architecture Students are relatively homogeneous respondents group so that schedule for photos rating processes can be done as groups in one room. (4) Time that required to explain about rating process will be shorter and without fear of misunderstanding on the part of respondents so that respondent's misunderstanding will be minor. (5) Respondents equality can be maintained by their study duration, so that they relatively have same recognition of campus environment.

Materials and Equipment

There are two main equipment needed in this method which are landscape space photos and visual quality preferences rating sheets. Each landscape space is represented by two photos from different viewpoints. Photos are taken using Lothian's (2000) standard. For the visual quality preferences rating sheets, the sheets were made clear, concise and simple. The rating sheets contain: Personal data of respondents, Table rating of 12 photo which displayed exactly as listed (see Figure 1.1). The table contains a rating selection, with left and right column are adjectives or sentence of landscape variable conditions. These variables were referred to the landscape visual quality preferences response variable by Kaplan, et.al. (1989), including Coherence, Complexity, Legibility, and Mystery. Each visual response variables are elaborated into 3 derivative variables, such as an adjective or phrase that describes each visual response variable's meaning and its opposing word or phrase (Table 2).

Table 2. Rating selection using visual response variables

Visual response variables	Derivative variables	Opposing phrase
COHERENCE	Organized	Disorganized
	Unity Elements	Independent elements
	Unity Space	Separate Space
COMPLEXITY	Multiform elements	Uniform elements
	Various space pattern	Monotonous space pattern
	Wealthy views	Simple views
LEGIBILITY	Unique/special character	Typical character
	Special elements/landmarks	Ordinary elements
	Easy orientation	Difficult orientation
MYSTERY	Continuity scenery	Unrelated scenery
	Invited to come in	Not invited to come in
	Direct view	Undirected view

Rating Process Preferences

Steps of campus landscape visual quality preferences rating process are as follows: (a) Introduction, Researchers introduce themselves, explain the intention and objective of rating preference, explaining why they were selected for the study, and provide a preliminary description about campus condition. (b) Preference process explanation: Explanation that photos will be displayed for only 12 spaces that represent campus landscape. Explanation of rating preferences sheet, how to write and fill in table rating preferences. (c) Concept explanation about rating table. Primarily explanation on concepts that are considered difficult to be understood by respondents (d) Questions and answers session before rating process, especially if there are parts, words, or other sentences in sheets and tables that should be filled. (e) Rating photos process conducted by displaying photos for each space landscape. Each photo is displayed for 40 seconds, and in between there is a break for 5 seconds. (f) Collecting rating preferences result sheet of each respondent and final session of photo rating ended with saying thanks to respondents for their participation in this study.

Landscape Unit:	R-04 (Unit Numbers)										
Organized	0										Disorganized
Multiform elements	10	9	8	7	6	5	4	3	2	1	Uniform elements
Unique character	10	9	8	7	6	5	4	3	2	1	Typical
Continuity scenery	10	9	8	7	6	5	4	3	2	1	Unrelated scenery
Unity elements	10	9	8	7	6	5	4	3	2	1	Independent elements
Various space pattern	10	9	8	7	6	5	4	3	2	1	Monotonous pattern
Special elements	10	9	8	7	6	5	4	3	2	1	Ordinary elements
Invited to come in	10	9	8	7	6	5	4	3	2	1	Not invited to come in
Unity space	10	9	8	7	6	5	4	3	2	1	Separate space
Wealthy views	10	9	8	7	6	5	4	3	2	1	Simple views
Easy Orientation	10	9	8	7	6	5	4	3	2	1	Difficult orientation
Direct view to inside	10	9	8	7	6	5	4	3	2	1	Undirected view

Figure 1. Sample scene and variable's score for visual preference rating

Preferences Result Analysis

The next stage of campus landscape visual quality evaluative assessment is analysis of photo rating results by respondents. There are two steps in this preference result analysis. First, preferences rating sheet results from respondents were entered into preference data table results using software MS Office-Excel. Data sorted by column in the following order: (1) Respondents personal code that taken from student identification

number and their personal data. (2) The code for all 12 landscape space photos that R01 until R12 and landscape character categorization results obtained from physical conditions. Its refer to descriptive assessment process. Each natural component categorization includes land (shape, slope, elevation difference), water bodies (scale, configuration, material ledges), vegetation (density, height, diversity, unity, unique features) and cultural components such as building (scale, position, unique feature), infrastructure (scale, material type, position) and furniture landscape (scale, material type, position. (3) Rating results data of 12 landscape photos variable are labeled with new name. The new name consisting of one word or phrase. It aimed to easier the variable reading. The 12 variables are: Regularity, Diversity, Uniqueness, Continuity, Unity Element, Variations in Space, Landmark, Inviting, Unity Activities, Complexity and Ease Orientation. This concise labeling is to facilitate the results reading, primarily when the analysis results are displayed as diagrams.

The second step of preference result analysis is rating results analysis. JMP statistical software was used to conduct results rating analyzes. The analyzes include Multivariate analysis, ANOVA analysis, and Correspondence analysis.

The Multivariate Analysis include Factor Analysis and Rotated Factors. Through rotated factor analysis, all of 12 variables can be classified into several latent variables groups/clusters, i.e. clusters which consist of all variables combination. By doing this analysis at an early stage, then next stage is no longer required linkage variables analysis between respondent, and with physical condition characteristics of campus landscape. Furthermore, it only requires analyzing latent variables.

The ANOVA Analysis/Means Comparison was conducted to obtain means and deviations standard of each measured category. The goal is to determine and compare effect of respondent characteristics and landscape components characteristics, toward the latent variables (as visual response variable).

The Correspondence Analysis was conducted to find linkages between visual response variables and landscape physical variables. Landscape physical variables refer to its constituent components.

Interpretations and conclusions of statistical analysis results conducted to provide an explanation about respondents' characteristics, landscape space characteristics and its constituent components, and the linkage between each visual response variable; i.e. Coherence, Complexity, Legibility, Mystery; and Landscape unit, Respondent, Landscape components (landform, vegetation, buildings, infrastructure, landscape furniture).

CONCLUSION

Evaluative assessment method development begins with sampling scene selection. Sampling scene selection (photos selection) based on descriptive assessment methods results. The photos were representing spaces type, space character, landscape components and its influence factor. The next phase is to assess campus landscape visual quality based on rating and user community visual perception. The rating preference results were analyzed using three types of statistical analysis, such as Multivariate Analysis: Factor Analysis - Rotate Factor to regain latent variables as the visual response variable perceived by respondents; ANOVA Analysis - Means Comparison to compare means and deviations standard of physical factors that affect landscape visual quality, toward visual response variable; Correspondence analysis to compare the physical factors influence that affect landscape visual quality toward visual response variable perceived by respondents.

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