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USER BEHAVIOUR ON SPESIFIC ENVIRONMENT IN BOGOR BOTANICAL GARDEN[1]

Andi Gunawan[2], Prita Indah Pratiwi *[2]

Bogor Botanical Garden is one of well-known tourism destination in West Java, Indonesia, visited by various users around the world. The increase in demand for nature-based tourism also becomes a trend in urban society. People needs a comfortable, healthy, and sustainable living space to refresh from fatigue and recreate new experience relating to nature. Environmental behavior is crucial aspect raised by understanding (cognitive behavior) and assessment of physical quality of environment (affective behavior). In order to avoid environmental damage, it is necessary to observe the user behavior, to analyze the change of user behavior and formulate the guidelines for formal garden design. The study was conducted in three steps: site and behavior observation, behavior analysis, and recommendation. There was diversity of user behavior in Teysmann Garden in the morning and afternoon. This was driven by various perception and preference in the garden relating to personal and physical factors. The prominent activities in formal garden consisted of sitting, taking picture, and walking, while prominent settings intensively used were pavement lane, pergola, bench, and lawn. Abnormal action was found in lawn, monument, pergola, and bench. The prominent landscape elements or settings could be improved as main character in formal garden in achieving a good interaction between people and landscape as a basis for landscape sustainability of tourism destination area.

behaviour, landscape sustainability, setting, Teysmann Garden, tourism destination

INTRODUCTION

Bogor Botanical Gardens located in the heart of Bogor is one of the most complete tropical plant conservation in the world (Subarna, 2006) and visited by domestic and foreign tourists. Besides of being an important place for preservation of plants and botanical research, Bogor Botanical Gardens serve as educational tool and tourist attraction or recreation for the community. Bogor Botanical Gardens consist of the locations which have a concept and uniqueness. Teysmann Garden, formal garden in the western part of Bogor Botanical Gardens has more unique and different character than the other locations because this garden is the only formal garden with geometric-shape space planted with specifically formed plants (topiary) in pyramidal or round shape and Teysmann monument in the center of the garden.

The uniqueness and attractiveness of recreation object favored by users encourage the formation of perception in assessing certain aspects so that it rises to different attitude and behavior which support or not support conservation of the garden. Behavior towards the environment arises because of the understanding and assessment of the physical quality of the environment. Individual preference creates the values of adaptation to adjust the setting of landscape. Perception and preference assessment are related to the attitude and behavior of individuals playing an important role in determining human setting and supporting elements in order to create harmonious interaction between people

* Corresponding author, email: pritaindahpratiwi@ymail.com
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[2] Department of Landscape Architecture, Faculty of Agriculture, Bogor Agricultural University, Indonesia

and the landscape around it. Therefore, understanding the social-cultural aspect in tourism or recreation area needs to be considered in creating sustainable landscape (Candrea & Ispas, 2009). The purpose of this study was to observe the user behavior, to analyze the change of user behavior and to formulate the guidelines for formal garden design.

RESEARCH METHOD

Experimental Design

The study area was located in Teysmann Garden, Bogor Botanical Gardens, Bogor, Indonesia (Figure 1). In order to determine user behavior in formal garden, the users of Teysmann Garden were selected as the research object. The parameters studied were activity, setting, user, and change of user behavior. The measurement of parameters had been conducted for 1 day during the representative time of weekend, from morning until afternoon. The experiment involved 125 visitors who were not influenced by the experience of the formal garden and visiting this site for recreation. Determination of the sample size in this study was 125 people, 76 people users in the morning and 49 users in the afternoon. In terms of the sample size, the number of users was sufficient because the research object for each observation hour was more than 30 users as expressed by Gay & Diehl (1992), Roscoe (1975), and Fraenkel & Wallen (1993) in Wiyadi (2009).

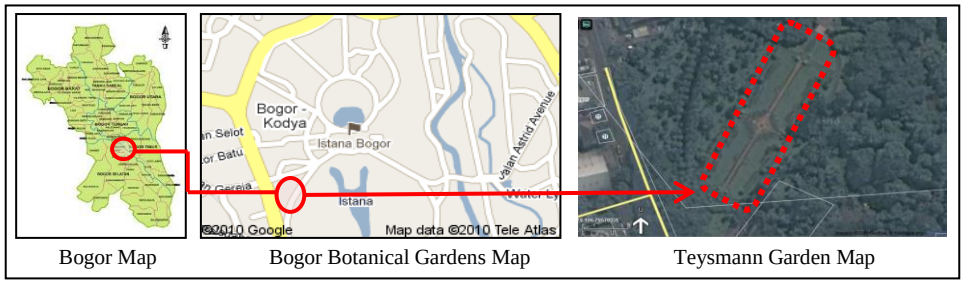

Figure 1. Location of Study

Data Analysis Procedures

The study was conducted in three steps: site and behavior observation, and behavior analysis, and recommendation.

1. Site and behavior observation

User, setting, and change of user behavior in the morning (09.30 to 11.30) and afternoon (13.30 to 15.30) were observed, captured, and tabulated. Data were obtained through a survey using a digital camera and a data table of change of user behavior. In addition, observation of site orientation and accessibility were also conducted.

2. Behavior analysis

The change of user behavior ranging from choosing a place, performing recreational activity, until performing the last activity before leaving the setting became the basis of this analysis. In order to determine the distribution of the activity, the sequence diagrams were created to show the change of user activity sequence.

After data table of change of user activity had been collected, chi-square test was applied to analyze the relationship between activitiy and setting. Type of activity found in the Teysmann Garden was divided into 15 activities, namely sleeping, sitting, standing,

viewing, browsing internet, studying, gathering, having meal, taking picture, picking flower, walking, playing traditional games, playing swing, playing ball, and chasing each other. While, type of setting consisted of under the tree, vine, lawn, pergola, pavement lane, bench, and monument. The only significant variable at $p<0.05$ was discussed to characterize main character of behavior and setting in formal garden.

3. Recommendation

From the interpretation of sequences of activity diagrams, the setting and activity patterns of users could be shown. Places which were often used repeatedly could be a prominent spot for the formal garden design considerations.

DISCUSSION

Elements of Teysmann Garden

Teysmann Garden is located in the western part of Bogor Botanical Gardens. There are Bogor Palace in the North and rattan plants collection in the South. While, there is woody plants collection in the East and West. Teysmann Garden was built in 1884 by M.Treub. This garden is a place to commemorate Johannes Elias Teysmann who had been a director of the Bogor Botanical Gardens of the years 1831 to 1867. The concept of this garden is a formal garden with symmetrical space division and elements placement. The shapes and color of element are seen on bushes formed geometrically and flowering ground cover. The trees in garden are also formed specifically (topiary), for example, a pyramid or round-shape topiary. Teysmann monument is the point of interest found in the center of the garden. In addition, Teysmann Garden has various landscape elements, such as pergola, pavement lane, flower pots, pedestrian line. Lawn, flowering ground cover, hedges, vines, flowering shrubs, small shrubs, topiary, and medium trees. For this study, the objects or elements were focused on these following setting: tree, vine, lawn, pergola, pavement lane, bench, and monument. (Figure 2). The visitors of this garden ranged from children, teenagers, and adults. They came as a group or individual which have their typical activities.

The Change of User Behavior

User behavior in the morning (09.30 to 11.30) is quite diverse (Figure 4), such as sitting, studying, walking, taking picture, playing ball, chasing each other, and picking flowers. Behavior having a high intensity in the morning was sitting (14 times), taking picture (14 times), and walking (10 times). This garden is quite open and has shade in its side so that users tend to sit on bench. Abnormal user action is detected in two young men stepped flowering ground cover while walking from the pavement lane toward the lawn. They tend to have a narrow personal space when they saw an unknown person approaching and taking a picture beside them. Other abnormal actions performed by a group of teenagers are climbing the Teysmann monument after taking pictures. They do not appreciate the monumental impression and historical value of the monument, because they might think that the monument is just a usual display. Moreover, another abnormal action performed by a small child is picking flowers. The child has not understood and learned about nature yet (Figure 3). This response is determined by personal characteristics including status and specific work and living situation (Katteler *et al*, 1975). Users who have many change of behavior are a group of users, such as a group of children, youth and families who have a specific purpose in visiting Bogor Botanical Gardens, especially Teysmann Garden.

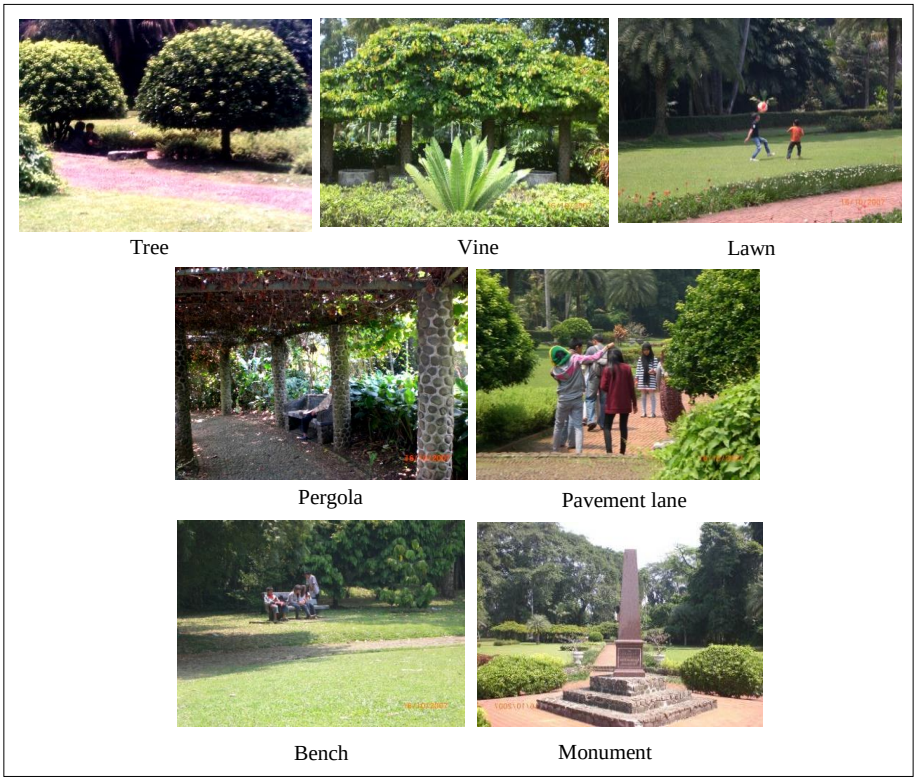

Figure 2. Setting

Figure 3. Abnormal Action

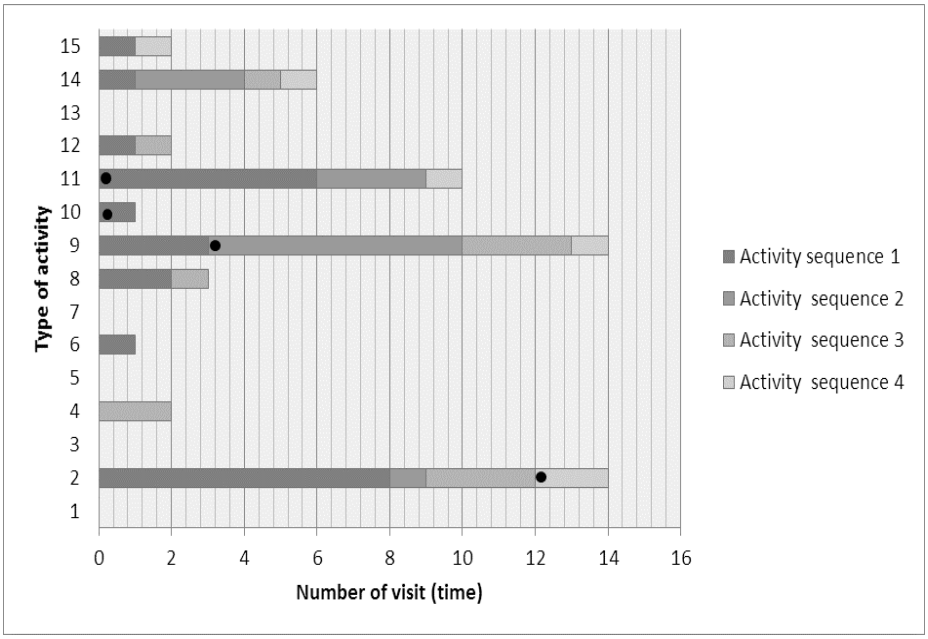

Figure 4. Activity Sequence in the Morning (09.30 - 11.30)

1. sleeping, 2. sitting, 3. standing, 4. viewing, 5. browsing internet, 6. studying, 7. gathering, 8. having meal, 9. taking picture, 10. picking flower, 11. walking, 12. playing traditional games, 13. playing swing, 14. playing ball, and 15. chasing each other. Note ● : abnormal action

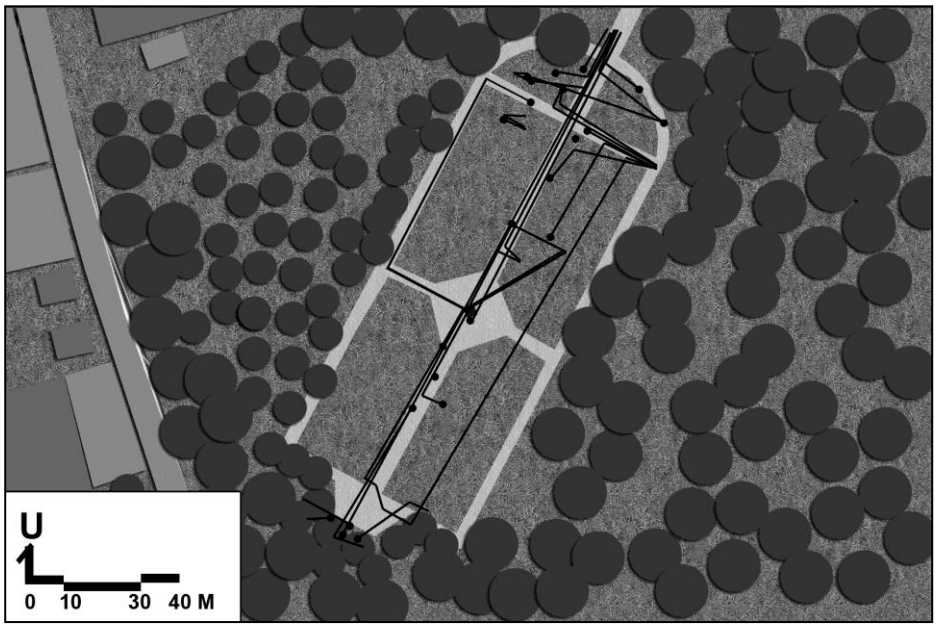

Figure 5. User Movement in the Morning (09.30-11.30)

The number of user behavior in the afternoon (13.30 - 15.30) is less than in the morning, such as taking picture (11 times), sitting (4 times), and playing swing (3 times) using branch of vine (Figure 6). The number of visitors increases in the morning and at noon, while it decreases after 13.30 o'clock. It shows that the impression of congestion increased slowly related to the number of visitor, and it decreased rapidly after 14.00 o'clock (Aoki, *et al*. 2012). In contrast, Sumiyoshi and Uchiyama (2002) reinforce that the level of satisfaction decreased at the weak congestion. The highest satisfaction is observed at 15% of the congestion ratio. This suggests that some visitors are seeking tranquillity and relaxation, and some are enjoying a crowd. Afternoon activity consists of semi-active and passive activity. This type of activity tends to have relaxation after having a set of activities in the morning which is more active so that they need a break, having meal, and so on.

User performing activities in the garden consists of group of teenagers and families, while elder people do not visit this garden. They are not visible in the afternoon because they tend to have physical limitations than children, teenagers, or adults. Abnormal action is found at the same object, but it is performed by different users, such as branch of vine planted on the pergola. The branch falling down is used as a swing by a group of children and teenagers. This vine with aesthetic shape serving as a shade is not used properly. The repetition of using branch as a swing is caused by watching examples of previous behavior performed many times so that the other users assumed that this branch served as a swing. In addition, orientation of the site influences the user activity in the morning and afternoon. In the morning, most of users tend to move actively from the entrance in the Northeast until the entrance in the Southwest (Figure 5). While, in the afternoon most of users tend to move passively in the side of garden because they avoid sunlight and look for shaded convenient space to perform relaxation activities (Figure 7).

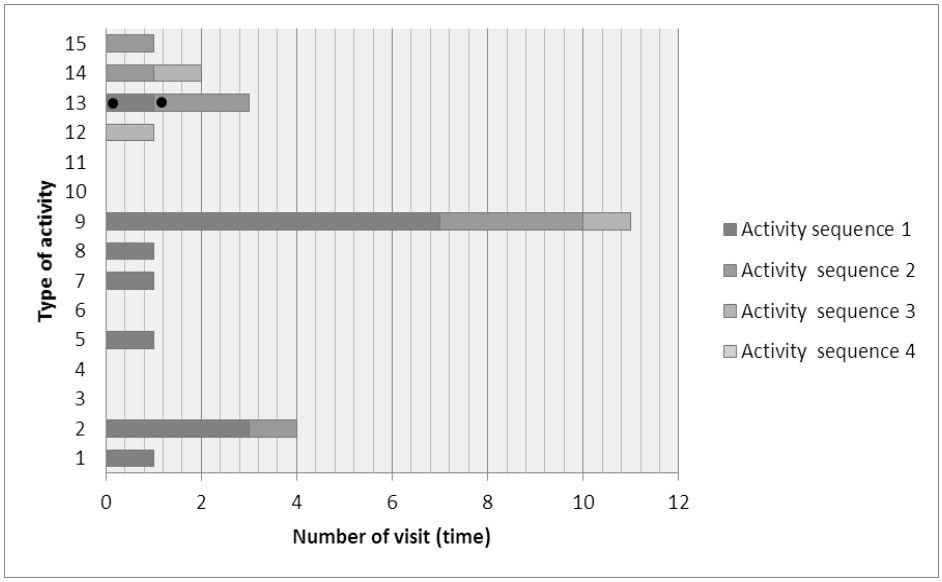

Figure 6. Activity Sequence in the Afternoon (13.30 - 15.30)

1. sleeping, 2. sitting, 3. standing, 4. viewing, 5. browsing internet, 6. studying, 7. gathering, 8. having meal, 9. taking picture, 10. picking flower, 11. walking, 12. playing traditional games, 13. playing swing, 14. playing ball, and 15. chasing each other. Note ● : abnormal action

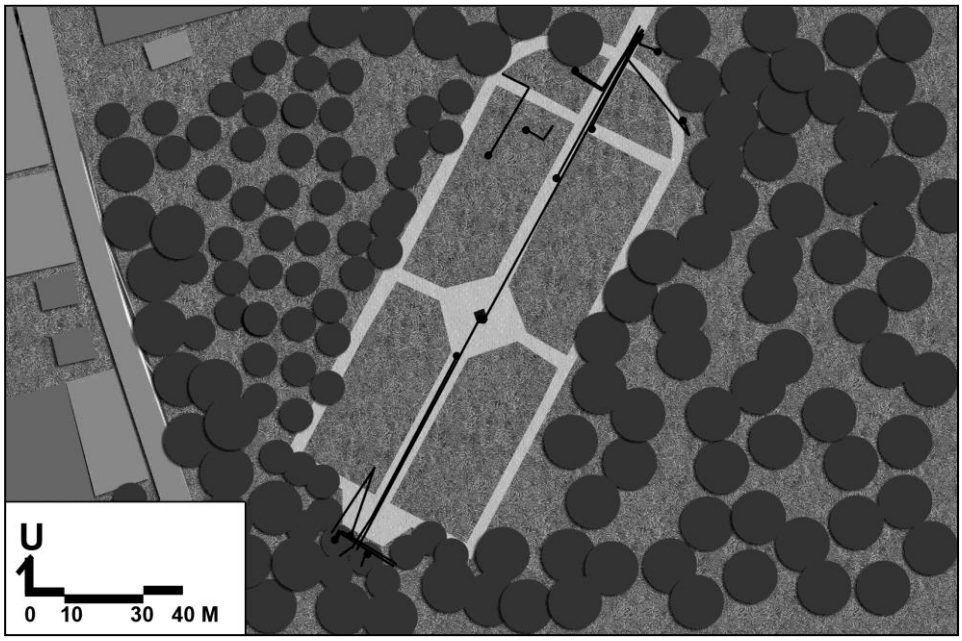

Figure 7. User Movement in the Afternoon (13.30-15.30)

Prominent Activity and Setting in Formal Garden

There is a relationship between the first activity sequence and its setting. Sitting (11 times) and taking picture (10 times) are the most active activities performed in formal garden. Performing recreative activities in forest area can reduce fatigue and confusion, while performing that activities in urban areas can increase tension and anxiety (Park *et. al* 2011). It is remarkable that 64% of all respondents in forest recreation study consider their outdoor activity as being important for their health (Kaplan & Kaplan 1989).

The users sit under the tree canopy, pergola, and bench, while they take picture under the tree, pergola, pavement lane, and near monument (Figure 8). There is a relationship between user activity and setting described by Kaplan & Kaplan (1987) that human preferences make the values of adaptation to adjust the settings of a landscape. There are four viewpoints of garden users in the selection of setting and activity, namely coherency, complexity, legibility, and mystery. Based on coherency, users choose the most convenient place to sit around, take picture, play, have a meal, and so on. Most of users choose setting with shaded area, aesthetically interesting, and has historical values. Complexity shows that there was no over crowding occured in garden so that users could perform sequence of recreational activities. Legibility shows further that variety of user behavior in the garden do not consist of deep exploration of objects, new things, and science, but it was only limited to recreational activities. Mystery creates personal creative activities such as most of users explore their surrounding, at last they take picture of their observed object.

There was no relationship between the next activity sequence and its setting. The accumulation of activity in a number of setting is not found, users tend to move in every setting. Moreover, most of abnormal activities were found in second and forth activity sequence. This is initiated by the failure to capture and obtain knowledge or facts and different assessment of each individual or group in nearby location (Blake & Sekuler,

2006). Gifford (1997) explains that factors influencing individual's readiness for performing action and behavior consist of personal and physical factors. Personal influence is reflected in gender, education, training, and familiarity. In this case, level of education also affects the formation of perception of users which is seen in children and teenagers performing abnormal action in the garden. They tend to not take care of the environment because they could not understand and assess the nearby object well. In opposite, user familiarity of the site will form a strong perception by understanding and assessing the environment. This is caused by the repetition of the visit focusing their interest on a particular type of event, place, and participation in more activities (Lehto *et al.,* 2004). Physical influences are reflected in the elements and design of the garden. Teysmann Garden has fence plants (shrubs) planted in geometric and symmetrical pattern. In general, the impression of users to this garden is open, bright, and formal. However, when the preception process comes in the formation of attitudes and behavior, some differences might occur, such as abnormal action. This is influenced by total information about the garden, emotions/psychological response, and assessment of object while visiting the garden. The psychological responses of humans to environments, especially forest and urban areas show significant difference. Forest settings are perceived as being very enjoyable and friendly and as very natural and enchanted place. Forest settings are capable of enhancing positive mood states and reducing negative mood states. Another psychological studies also described that viewing forest landscapes (such as those found in an urban park in Paris) can increase the incidence of positive emotions and can decrease blood pressure and prefrontal activity in the brain (Suda *et al.* 2001). Air temperature, radiant heat, wind velocity and PPD in forest settings are significantly lower than that found in an urban setting. Whereas, the relative humidity found in a forest setting is significantly higher than in urban areas (Park *et al.* 2011).

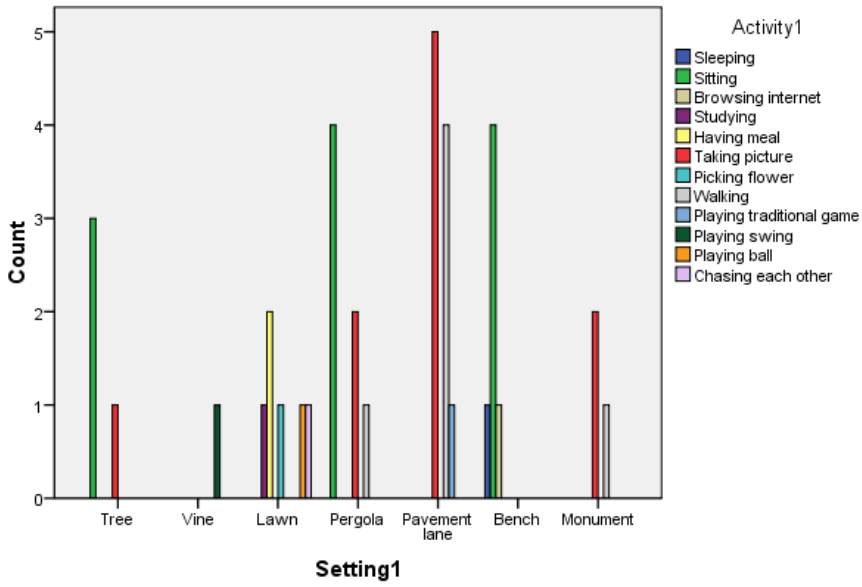

Figure 8. Type of Activity on its Setting

The Guidelines for Formal Garden Design

There is diversity and change of user behavior on setting which play an important role in realizing the goals of sustainable tourism destination. The success of a garden as a

pleasure tourism is not just limited to the presence of a variety of user behavior, but also the desired user information, objects and attractions, special characteristics (Um & Crompton (1990), facilities, and garden design (Reynolds & Braithwaite, 2001). For developing Teysmann Garden as a sustainable tourism destination, it is necessary to improve the clarity of concept, public services, and facilities which support user activities (Plog, 1974). Setting used intensively by user in Teysmann Garden is pavement lane, pergola, lawn, and bench. These prominent landscape elements or setting could be improved as main character in formal garden for supporting the activities and providing new experiences for user. As described by Wight (1996), the interpretation and eco-experience program is an important factor for user satisfaction.

According to Van Der Zanden & Rodie (2008), seven landscape design principles represent the primary concepts that influence landscape design: order, repetition, rhytm, unity, balance, proportion and scale, and emphasis. The guidelines for behavior-based garden design could become important goal for formulating sustainable tourism destination. (Table 1).

Table 1. Formal Design Guidelines

Setting	Landscape Design Principles (VanDerZanden and Rodie, 2008)						
	Order	Repetition	Rhythm	Unity	Balance	Proportion & Scale	Emphasis
Pavement lane	Strong path lines and plant masses	-	edge or outline of elements	line up edged between pattern and spaces	symmetrical walkways, planters, and other hardscape	small trees in entrance	-
Pergola	-	-	-	-	symmetrical space	-	Unique color and form
Lawn	open and uncluttered	same groundcover at all entrance	varying widths of ground features	-	-	-	-
Bench	-	-	-	similar color	symmetrical placement	-	-
Tree	grouping plants together in massess around the garden	similar herb or groundcover in the edge of pavement lane	Low plants in front of taller plants	-	symmetrical topiary placement	Plants at garden boundary should be 2/3 to 1 times the height, small trees in entrance	-
Monument	-	-	-	-	-	-	Unique color, shape, and form
Vine	well-managed plants	-	-	-	-	-	

CONCLUSION

There is diversity of user behavior in Teysmann Garden in the morning and afternoon. This is driven by various perception and preference in the garden relating to personal and physical factors. The prominent activities in formal garden consist of sitting, taking picture, and walking, while prominent settings intensively used are pavement lane, pergola, lawn, and bench. Abnormal action is found in lawn, monument, pergola, and bench. The prominent landscape elements or settings could be improved as main character in formal garden in achieving a good interaction between people and landscape as a basis for landscape sustainability of tourism destination area.

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