The influence of biophilic design applications to visitor’s duration of stay in café

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Abstract. Physical urban conditions are interrelated with urban individuals in urban’s life. If the urban’s condition is out of tolerance, individuals in urban areas can feel stressed (Rishi and Khuntia, 2012). Facing that, humans need a place to reduce stressful feelings –by doing activities in the café as a third place (Oldenburg, 1989). “Experienced Selling” is the priority in creating cafes with specific design, it can provide customer satisfaction (Agarwal, 2009). Psychologically humans have a strong tendency towards nature according to the concept of Biophilia (Wilson, 1984). In response to these human needs, Kellert (2013) introduced biophilic design as an application of the concept of biophilia in design. Biophilic design is an attempt to understand the understanding of human interest inherent in dealing with natural systems and processes into the design of the built environment (Heerwagen, et al., 2013). With the application of biophilic designs in cafes, it is assumed that the café’s visitors will stay longer. This research aims to determine the influence of biophilic design applications to visitor’s duration of stay in café by examining biophilic patterns applied, type of activity and visitor’s duration of stay in Semusim coffee garden and Brownstones coffee in Bintaro.

1. Introduction
In theory, cities with high population densities offer many opportunities for sustainability, such as reducing private vehicle use, increasing resource efficiency, accessibility, and economic feasibility [1]. However, in practice, opportunities for sustainability in urban areas are difficult to realize [2]. Crowd, density and noisy traffic, air pollution due to a large number of vehicles, or endless urban routines, motivate people to look for greener places on the edge of the city [3]. Physical urban conditions (population density, pollution, extreme temperatures, excessive solid waste, landscape degradation, etc.) is interrelated with urban individuals in urban life. If these urban conditions exceed their tolerance, individuals in the city can feel stressed [4].

Humans need a place that can make them relax and reduce stress or fatigue, one of them by doing activities in a café. Based on the Great Dictionary of Indonesian Language (KBBI), a cafe is a coffee place where visitors are entertained with music. Cafes can be a third place for humans to spend time socializing and taking a break from their daily routine for a moment [5]. Nowadays, cafes are becoming popular among the public with a variety of unique and interesting design concepts. The term "experience selling" becomes a priority where a specific design can give special satisfaction to cafe visitors, more than the cafe product itself [6], so the cafe design has an important role associated with the choices made by an individual before visiting a cafe.
In essence, psychologically humans have a strong tendency to be bound by nature, according to the concept of Biophilia [7]. In response to this trend, Kellert introduced biophilic designs to understand the human interest in dealing with natural systems and processes, into the design of the built environment [8]. Biophilic design is a depiction in the form of architecture from the concept of biophilia [8]. The aim of the biophilic design itself is to translate the understanding of biophilia into the design of the built environment, so that the beneficial relations between humans and nature in buildings and modern landscapes can be realized [8]. Based on the biophilic design patterns expressed by Kellert with Calabrese and Browning, there are several patterns with similarities in them so that these patterns can collaborate into 16 biophilic design patterns. Pattern 1: visual connection with nature, pattern 2: non-visual connection with nature, pattern 3: non-rhythmic sensor stimuli, pattern 4: thermal or airflow variability, pattern 5: water, pattern 6: fire, pattern 7: dynamic and diffused light, pattern 8: natural landscape and ecosystem, pattern 9: biomorphic / biomimicry forms, pattern 10: material connection with nature, pattern 11: complexity or order, pattern 12: prospect, pattern 13: refuge, pattern 14: mystery, pattern 15: risk, pattern 16: cultural and ecological in place [9].

With this design method in the cafe, it is expected that sustainability between humans and nature will be maintained. Cafe is a limited service restaurant where visitors usually order and pay before eating at the cafe [10]. Cafe is a social space to gather, socialize and build a community. Cafe visitors gather to play chess, cards, or chat just to ‘kill time’ [11]. Cafe is a place to gather and socialize so that when we are in the cafe it is expected to feel comfortable and relax that we will spend longer hours in the cafe instead. Visitor’s generally spend 2½ hours in a cafe [12]. In cafes, time is money where people will pay to stay in the cafe to enjoy the cafe’s atmosphere [13]. The study of Ardahan show that there is an increase of cafe visitors on holidays compared to weekdays, in contrary, the number of time spent by cafe visitors increased on weekdays compared to holidays [14].

From the 16 biophilic design patterns, we can see that all of those patterns are connected to human senses. When humans ‘experiencing’ space, they utilizing their senses. For example, when humans see something beautiful, it will affect their mood, while seeing an eyesore will make them feel sad, upset, etc. [15]. In ‘experiencing’ space, it can also influence the duration of a person to stop at that place. For example, if a room has good airflow and natural scenery that can make people feel relaxed, the human will stay longer in that space. Another example is if there is harmony in the selection of natural material in a room, it will give a good picture of the human visual so that the human will stay longer in the space. Conversely, if a room has poor airflow (damp, heat, etc.), the view is not impressive, and the choice of material is not harmonious, these all will cause the human to leave such space. This proves the link among biophilic design patterns that use human senses to experience space and influence human activities which can ultimately affect the duration of a person stopping at a place, in this case, is a cafe.

Through this study, the author would like to discuss biophilic design on the duration of visitors spent and discuss various activities carried out in the cafe that located in Bintaro. The results are expected to supply the necessary information in the development of a friendly city.

2. Method

Architecture is closely related to design and space, where we have to understand the space first ahead of its design. Meanwhile, we need our senses to understand the space. Humans can use their senses to feel the space, so that they can decide whether to stay longer or briefly stop in that space. This paper discusses how biophilic designs can influence the duration of visitors in a cafe.

| Patterns | Variables on Biophilic Patterns |
|----------|---------------------------------|
| 1        | Visual connection with nature    |

Table 1. Biophilic Design Patterns and their Parameters.
a group of trees (> 1 tree), flowering plants, tame animals, plants both indoors and outdoors, natural paintings [16]

2 Non-visual connection with nature
sun patches, bird/animal sounds, natural aroma (flowers, plants) [17]

3 Non-rhythmic sensor stimuli
Cloud, shadows [17]

4 Thermal or airflow variability
The temperature range received is 2 °C above and below the conventional parameters for thermal comfort (19-24 °C). [18]
Thermal comfort standards for eating in cold climates are 69-72 °F (21-22 °C) [19]
The thermal comfort temperature in the Southeast Asia region is 24.5-30 °C [20]

5 Water
Fountain, water walls, river, pool [17]
Water must be clean [16]
Fluctuating natural water priority priorities compared to stagnant or predictable water movements [21]

6 Fire
fireplace construction, a variety of materials that deliver heat [10]

7 Dynamic and diffused light
Light from different angles [17]

9 Biomorphic / biomimicry forms
Symbolic nature (contours, patterns, textured) [22]

10 Material connection with nature
Organic material (wood, stone, rubber, etc.) [17]

11 Complexity or order
Color, fractal pattern, material texture [17]

12 Prospect
Length of visibility ≥ 6 meters [22]
The height of opaque partition or barrier ≤ 1 meter [23]
Minimum viewing distance ≥ 6 meters, 30 meters better (100 feet) [22]

13 Refuge
the canopy above the head, lowered ceiling protected from the weather and gives a separate impression, but still united with the environment

**Mystery**
Greater visual access, with medium field depth (≥ 6 meters) to height (≥ 30 meters) a winding road, flowing shapes and lines

**Risk**
water walks, high footpath

**Cultural and ecological in place.**
has a culturally relevant design

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The methods used in this paper is based on theories from the study literature on various matters related to biophilic design, patterns of biophilic design, café, café’s activities, and visitor’s duration of stay in café. Field research at Semusim Coffee Garden and Brownstones Coffee in Bintaro was also conducted as a case study to find out the pattern of biophilic design and various activities in café, that drives visitor’s duration of stay in both cafes. In identifying biophilic design patterns available in the café, several parameters must be considered (Table 1).

![Figure 1. Scheme of Research Methodology](image)

Figure 1 shows the scheme of research methodology by identifying the biophilic design pattern first. Subsequently, the next step is to identify various activities that occur in both cafes by comparing them. Identifying the duration of visitors in spending their time in both cafes is done by comparing the duration of visitors with the standard duration stated by Soh and his friends, which is 2½ hours.

3. **Results and Discussions**
3.1. Biophilic Design Patterns, Kinds of Activities, and Visitors Duration at Café in Bintaro

From the case studies of cafes in Bintaro, namely Semusim cafe and Brownstones café, Semusim café was the café equipped with biophilic design pattern and more activities. It was found also in this café, that visitors stayed longer than in Brownstones cafe.

![Figure 2. Comparison of Semusim Cafe and Brownstones Cafe](image_url)

Figure 2 shows that in Semusim cafe there were 10 biophilic design patterns, namely pattern 1: visual connection with nature; pattern 2: non-visual connection with nature; pattern 3: non-rhythmic sensory stimuli; pattern 4: thermal and variations in airflow; pattern 7: light dynamic and diffuse; pattern 10: material connection with nature; pattern 11: complexity and order; pattern 12: prospect; pattern 13: refuge; and pattern 14: mystery. A large number of biophilic design patterns in Semusim cafe has an effect on the type of activity in this cafe, which are more than Brownstones cafe which only had six biophilic design patterns. In Semusim café, 14 kinds of activities were found, including group learning, self-study, coffee drinking, eating and drinking, hanging out with friends, me time, reading their books, playing (playing cards, chess, etc.), listening to music, taking a nap / short break, meeting with clients, taking selfies, taking pictures with friends, bridal showers, or gathering with the community. A large number of biophilic design patterns in Semusim café has increased the type of activity in these cafe which in turn affected the visitors’ length of stay. In this case, visitors spend their time in Semusim cafe for 4 hours which, based on the theory in chapter 2, that café visitors generally stay for 2½ hours in a café (Soh et al., 2017). Considering the duration of visitors to stay at Semusim cafe which was 1½ hours longer than the standard duration in general, shows the influence of biophilic design on the visitor’s duration at Semusim café.

In Brownstones cafe only six biophilic design patterns were found, including pattern 1: visual connection with nature; pattern 3: sensor non-rhythmic stimuli; pattern 4: thermal and variations in airflow; pattern 7: dynamic and diffuse light; pattern 10: material connection with nature; and pattern 12: prospects. At least the biophilic design patterns found in the Brownstones cafe showed the least amount of activity that occurs in this cafe when compared to Semusim cafe. The kinds of activities in Brownstones cafe include group learning, self-study, coffee drinking, eating and drinking, hanging out with friends, reading their own books, doing office work, taking selfies and taking pictures in groups. The less activities occurred in the cafe drove visitors to avoid staying too long in Brownstones cafe. Visitors who hang out in this cafe spent 3 hours at max or ½ hour longer than the standard duration in general.
4. Conclusions
High-level stress experienced by urban population proves that humans need a place that can make them feel relaxed and reduce their stress level, one of them are cafes that use biophilic design. Biophilic design which connects human to the nature can make every individual feel relax.

From a case study of cafes in Bintaro, Semusim cafe and Brownstones cafe, shows that Semusim cafe has more biophilic design patterns than Brownstones cafe. Semusim cafe has ten biophilic design patterns while only six biophilic design patterns found in Brownstones cafe. The number of biophilic design pattern applications in Semusim cafe has increased the number of activities that occur in this cafe. There are 14 types of activities in Semusim cafe, while there are only 9 types in Brownstones cafes. Semusim cafe's visitors stay for up to 4 hours compared to standard time that the visitors generally stay at the cafe, which is 2 ½ hours. On the contrary, at the Brownstones cafe, it was found that visitors stay for up to 3 hours.

Based on the research question, the influence of biophilic design applications to visitor’s duration of stay is obvious. More biophilic design patterns found in this cafe clearly increase the variety of activities that occur in this cafe, which in turn also affect the duration of the visitors stay: longer than a cafe with a few biophilic design patterns. The author hopes that this paper will drive other cafes in many cities to make use the application of biophilic design in that the urban society will feel more relax and reduce the level of human stress in the city.

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