

## Biophilic Design as A Strategy for Increasing The Quality of Spaces in Offices

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**Abstract.** This study aims to describe the application of Biophilic Design Concept that can be applied in offices. A design based on the concept of biophilia, is called a biophilic design by presenting a green space to improve the quality of life that affects human health and physiological and psychological well-being. Biophilic design has had many positive outcomes, namely trying to reconnect humans and nature by providing all kinds of behavioral, mental, and physical benefits. This study aims to determine how appropriate the design criteria for designing offices with biophilic design theory are used. The method used is a qualitative descriptive method. First of all, the biophilic design concept will be explained. Then will be analysed the possible patterns that can be used in office design. Biophilic design has 14 patterns that can be realized through a direct or indirect relationship with nature. The essence of this biophilic design is to create a space in which there is interaction with nature which is a basic human need. Office areas can apply these 14 patterns into the design concept. Three basics concepts of Biophilic Design: nature in spaces, analogues of nature, and Nature of space can be applied to office design.

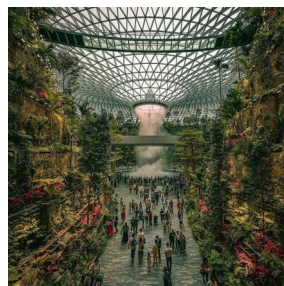
### 1. Introduction

Since the outbreak from China at the end of 2019, Covid-19 has continued to expand until the World Health Organization (WHO) officially calls it a global pandemic. Indonesia is also one of the countries affected by the pandemic. The Covid-19 pandemic occurs because it exists discoveries and new mutations of viruses SARS –CoV became highly infectious and high virulence [1]. Various strategies have been carried out to break the chain of the virus, one of which is the new normal strategy with new habits. Normal life had stopped. Schools were closed, religious and commercial facilities were closed, people were not allowed to leave their homes if it was not important, and offices were closed. Then the new normal strategy emerged, the community was introduced to new habits to support health and immunity (Tim COVID-19 IDAI). Public and commercial spaces and offices have re-opened. But various concerns arise from the psychological side of the user. A pandemic has not only attacked humans physically, but has been detected to cause panic and mental stress. In this study, what will be discussed is a design strategy for office facilities so that users can work comfortably physically and mentally during the pandemic era.

Architecture and interior have an important role in conditioning the user's human work environment [2]. Good design will have an impact on the activities that occur within a facility. Humans live in an environment that can affect their physical and mental conditions. In addition, the

activities carried out by humans on a daily basis are also a key factor in the condition of their bodies. Consciously or unconsciously, external factors influence the mental condition of humans themselves [3]. Human mental condition will produce a response, one of which is emotion which is closely related to productivity. The existence of this phenomenon is then described as a user's ability to translate the space around it.

Biophilic design is expected to be able to answer the needs of the user's mental and physical health [4]. This research will describe what biophilic pattern designs can be applied to office designs. Biophilic or Biophilia developed from the fields of biology and psychology, which is the study of human desire to be affiliated with natural forms in life. The term 'biophilia' was first coined by psychologist Eric Fromm. This term has developed and is already used in architecture and interiors. In architecture, this is known as biophilic design or it is the development of biophilia in the field of environmentally friendly design, providing opportunities for humans to have a relationship with nature. With the emergence of a biophilia theory, in the 1990s, various studies appeared on the relationship between improving environmental quality and worker productivity. Productivity is identified as a place for health and well-being, which has a broader impact [5]. Nature referred to in biophilic design theory is divided into two things, namely a connotation of nature and nature is living organisms and non-living components of ecosystems (such as sun, water, and so on). One example of interior architecture that uses the Biophilic Design concept (Figure 1) :



**Figure 1.** Changi Airport – Singapore

Quite a few studies have discussed about biophilic design. Among them are Azkiawati (2020) who discusses the biophilic concept in vertical buildings, and Hadny (2017) discusses biophilic design in schools. Then there is also research on biophilic design in public facilities conducted by Magdalena, Kalonica and Karima in 2020. For this research, we will try to discuss the concept of biophilic design in public facilities which also aims to create a sense of comfort for its users. Office was chosen as a case study because work comfort will affect work results.

The development of better and more comfortable technology to meet human needs, but it keeps the psychological environment away. Therefore, the term biophilia was formed, which states that humans will be healthier in the natural environment physically and psychologically. Biophilic design itself can be organized into three categories namely Nature in Space, Analogues of Nature, and Nature of Space [6].

## **2. Methods**

The method used in this research is descriptive qualitative method. For data collection using the literature study method regarding biophilic design, the notion of offices, existing facilities in the office and literature that supports the benefits of the relationship between people and nature for the human body. The collected literature was analyzed using descriptive qualitative methods by describing 14 patterns in the Biophilic design. First of all, the biophilic design concept will be explained. Then will be analysed the possible patterns that can be used in office design

### 3. Results and Discussion

Etymologically, the office comes from the Dutch word "kantoor" which means the working room, the place where the leadership is, the agency offices and so on. Office is a place where people work together to achieve a goal that has been set together. Office is a place for information handling activities, starting from receiving, collecting, processing, storing and distributing information [7]. One of the factors affecting employee productivity at work is the layout of the office space. Every worker wants a work space that can provide security, convenience, and comfort to him while working. The objectives of office space arrangement are as follows:

1. Prevent wasting of workers' labor and time
2. Ensure the smooth running of the work process concerned
3. Allows efficient use of work space
4. Prevent workers from being disturbed by circulation and noise
5. Creating work comfort
6. Giving a good impression to visitors

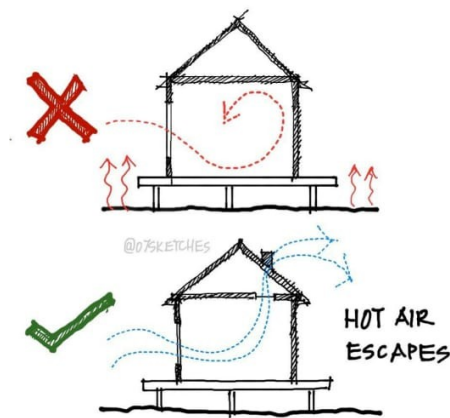
There are two types of office space arrangement, namely Open Plan Spaces and Closed Plan Spaces [8]. The office space can be divided into three main rooms, namely work space, meeting room and support room. The following is a further explanation:

1) Workspace Space for working in a conventional office building is usually used for activities such as reading, writing, and computer work. In a workspace, in general, there are several types of room arrangement, including the Open Space Office, which is an open workspace that usually contains more than ten workers. This type of arrangement is suitable for activities that require a lot of communication or routine traffic activities and do not require concentration. In addition, there is also a room containing about two to eight people, this room is usually limited by a temporary partition, this room is used by workers who are in a team or group who need moderate concentration. The last type of spatial arrangement is Cubicle, which is a room used by individuals that is limited by a dividing divider that requires a large enough concentration.

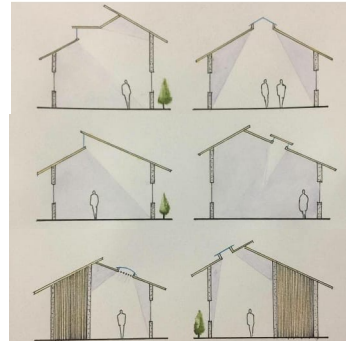
2) Meeting Room The meeting room in an office is used as a place for interaction processes such as brief announcements delivered by high-ranking officials or brainstorming processes with employees. Usually there are meeting rooms that are large to small. Large meeting rooms can accommodate up to twelve people and the smallest can only accommodate two to four people.

3) Supporting Space Support space in the office is used as a secondary activity such as compiling documents, photocopying or taking a short break. These supporting rooms include an archive room, warehouse, print and photocopy room, kitchen, break room, smoking room, and library. The break room is an example of a leisure facility at the office. According to AJ Veal, leisure means leisure activities as a situation and conditions experienced by a person without any demands to work and free from all existing tasks. Activities or leisure activities carried out in general are resting, recreation, sports, and so on.

Biophilic Design has done and applied it to residential facilities [9]. This trend is expanding to office facilities. Design problems in office facilities usually consist of determining architectural and interior branding, the flow of relationships between spaces (related to flow documents), and ergonomic standards for work comfort. With the pandemic conditions that hit the world today, there are additional design problems for office facilities. We have to think about how to make a work space besides being comfortable, but also healthy, which will affect the physical and psychological aspects of workers. Covid 19 transmission has a very big chance of occurring in public facilities with poor ventilation, long meeting duration, and distance (see Figures 2 and 3).



**Figure 2.** Air Circulation



**Figure 3.** Lighting

Figure 2 and 3 are examples of the application of good ventilation and lighting systems to spaces. Buildings are ventilated to provide outdoor air into a building or a room and distribute within it for the purpose of maintaining occupant health. The three basic elements of building ventilation are the outdoor air ventilation rate, the airflow direction, and the air distribution or airflow pattern in the space [10]. Biophilic design strategy parameters that can be applied to offices based on 14 patterns Biophilic Design [6].

**Table 1.** Illustrates the function of each of the 14 patterns in supporting stress reduction, cognitive performance, emotional and mood enhancement and the human body

	Classified	14 pattern Biophilic Design	Strategy Design for Office
1	Nature in the space	Visual Connection to nature	Psychologically and physically, humans should be able to see what is happening in nature. Connecting humans with nature. The work area is brought closer to openings such as windows

Example :



Non- visual  
Connection to nature

Make use of a multy sensory system. In office design, you can apply natural materials that are emphasized by the original texture. Like woods, metal, rattan, etc.



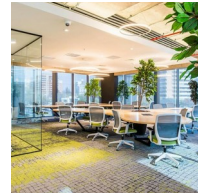
Non Rhythmic Sencory Stimuli

Create a treatment that involves interaction between products and humans.



Thermal and air flow

This principle suggests that people want to feel refreshed and invigorated. In the office work area, you can design an opening system that can be maximally used.



Presence of Water

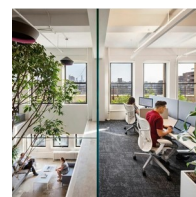
Water is one of nature's elements that is soothing to touch and hear. In office design, we can apply a waterfall or vertical pool in the lobby or commons room area.

Dynamic and Diffuse light

Make a large scale of space, maximize the opening, enter a lot of light and air

Connection with natural systems

Adding vegetation to the space can provide a stimulus for a natural atmosphere in space. Natural vegetation can be added to the office area. Relaxation will occur when natural vegetation develops in a cycle.



2 Natural Analogs and Patterns

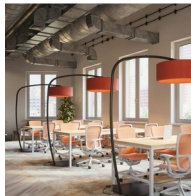

Biomorphic forms and patterns

We recommend using a pattern that comes from nature. In the office area, it can be applied to interior elements such as walls, floor and ceiling patterns, and textile patterns.

Material connection with nature

Using natural materials that are local and reflect the original ecology



		Complexity and order	Exposes the spatial infrastructure or the elements that make up space.	
3	Nature of the space	Prospect	Prioritizes the concept of open space, reducing solid and massive partitions.	
		Refuge	Playing space scale, providing open space without reducing the personal needs of the user.	
		Mystery	Presenting a room that is a surprise, not directly open from the main entrance.	
		Risk and peril	When traveling in nature, not all conditions are smooth. In the concept of space, the same thing will be presented but there is still an element of safety, such as providing stepping stones in the water garden, fences on the balcony, and so on.	

After seeing the existing patterns in the biophilic design concept, it can be concluded that the office can follow these 14 patterns.

#### 4. Conclusion

The existence of a bond with nature is a human need, where basically humans always depend directly on nature for their survival. A design based on the concept of biophilia, is called a biophilic design by presenting a green space to improve the quality of life that affects human health and physiological and psychological well-being. In addition, biophilics see humans as living things that must be treated humanely and proportionally. Biophilic design prioritizes the feelings, desires and ideals of its inhabitants through understanding and awareness. Various studies have shown that biophilic design improves human well-being as well as increases productivity. The application of biophilic design to space can be demonstrated by creating natural lighting and ventilation and the presence of water and plants in the room. The application of natural elements can be applied through the use of natural materials and replicas of natural forms through designs, ornamental patterns and interior finishing. The essence of this biophilic design is to create a space in which there is interaction with nature which is a basic human need. Office design can use 14 Biophilic Design patterns so that a sense of comfort will be created.

#### 5. Acknowledgement

Thank you to those who have helped in writing this article, especially UNIKOM who has provided a place to publish this research. There are many deficiencies in this research, hopefully further in-depth

research can be carried out on biophilic design. Hopefully this pandemic will end soon and we can do our activities as before.

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