

## Biophilic Design Approach in Yogyakarta Digital Art Design

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### ABSTRAK

In creating a national creative industry, every region in Indonesia is required to create space for creative industry players. The Digital Art Center is a building typology that can accommodate digital creative industry players to carry out all their activities. In the midst of the significant development of the creative industry, a healthy psychological and physical condition is needed to increase the creativity and productivity of industry players. The lack of means to develop creative industries is what underlies this research. Biophilic Design can help humans achieve prosperity and comfort, as well as increase the creativity and productivity of creative industry players by shaping the built environment by creating human interaction with the surrounding natural elements. In addition, creating a space for interaction between humans can increase the sense of kinship and shape the user's psychology to be more positive. This study uses observation methods and literature studies so as to be able to produce research results based on the results of comparative studies of several objects. Therefore, the design of the Yogyakarta Digital Art Center is expected to create human interaction with nature and human interaction that can increase the productivity and creativity of its users.

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### 1. Introduction

The creative economy is the fourth wave of the wave stages of economic civilization after agriculture, industry, and information (Toffler, 1987). The third wave of economics, namely the information economy, became the basis of the fourth wave of the economy based on ideas and ideas, which became known as the creative economy. The creative economy, which includes the creative industry, emerges as a solution and is believed to be a prospective future industry. There are two types of creative industries, namely digital and non-digital. Based on the scheme used by MIKTI (Information and Communication Technology Creative Industry Society), the digital creative sector or digital company (DiCo) is divided into five groups: Animation Industry, Game Industry, Digital Music Industry, Education

Software Industry, and Software & Application Industry.

Yogyakarta is one of the alternative cities for digital creative industry activists to develop their work besides Jakarta and Bandung. The Yogyakarta Creative Digital Association (ADITIF) stated that the growth of the digital creative industry in Yogyakarta has been visible in the last decade. In 2012, the Ministry of Tourism and Creative Economy proposed five creative cities in Indonesia be recognized as part of the UNESCO Creative Cities Network, one of which is Yogyakarta. The investment development in Yogyakarta showed positive growth from 2010 to 2014, both domestic and foreign investment, and continues to increase yearly. This shows that Yogyakarta is considered to have met the requirements and indicators as a creative city center in Indonesia by the Creative Economy Agency. However,

the digital innovative industry development ecosystem in Yogyakarta still encounters several obstacles even though it has enormous potential. Based on the census conducted by Jogja Digital Valley in collaboration with the Merah Institute, the main challenge in this digital creative industry business is the availability of quality human resources. Putra Dia, Human Resources Country Manager of PT Gameloft Indonesia, said that the lack of HR competence was due to new graduates' lack of development and training activities. Another obstacle is the limited availability of integrated digital creative industry development infrastructure that can become a forum for expression and experimentation and facilitate interaction between industry players, consumers, and the government. In addition, in the midst of significant creative industry development, a healthy psychological and physical condition is needed to increase the creativity and productivity of industry players. Workers in a work environment with natural elements such as reforestation of indoor plants, natural views (parks around buildings), and getting sunlight are reported to be 15% more prosperous, 6% more productive, and 15% more creative. (Browning & Cooper, 2016)

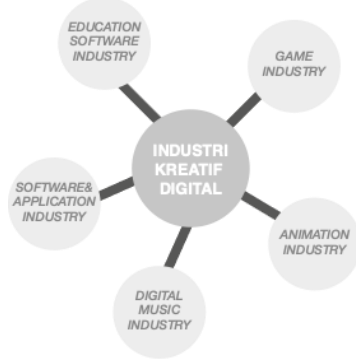
Seeing the existing problems, it is necessary to have a space that can accommodate the development activities of the digital creative industry in Yogyakarta and provide a supportive environment for the psychological and physical health conditions of industry players. This space is in the form of the Yogyakarta Digital Art Center, which is mutually integrated between sectors and is intended for components involved in digital creative industry activities to interact and collaborate and can accommodate educational, production, promotion, and exhibition activities.

Responding to the psychological and physical health problems of creative economy actors, the Biophilic Design approach is applied to

building design. The purpose of Biophilic is to help humans achieve a sense of well-being and comfort and to improve their quality of life. Several studies have also proven that humans are at their optimal ability when they are in a natural environment (Kellert & Calabrese, 2015). Therefore, the biophilic approach is expected to be an alternative to fulfill psychological and physical health in order to increase the creativity and productivity of creative industry players in Yogyakarta.

## 2. Material and Methods

The Digital Art Center (DAC), as a starting point for creative things, covers not only the physical aspect but also the terms of the creative community network formed by creative actors and the activities they carry out. From a physical point of view, DAC provides a place with spaces to work for creative communities and a business incubator for the digital creative industry. Physically, the DAC only covers one place according to its essence as a center. However, activities within DAC bring together the talents, skills, and disciplines of creative actors in a local creative community. DAC forms a network that drives the growth of the digital creative industry at the local level, which then continues to the regional level. DAC is a dynamic space that provides more employment opportunities, expands educational services, networking opportunities, and business development, and creates innovation more intensively in the digital creative industry. This DAC is a new way to organize innovation and creative industry development.



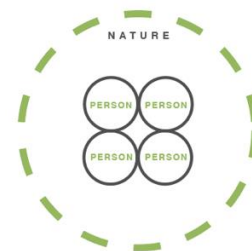
Source: Personal Documentation, 2021  
Figure 1: Digital Creative Industry Classification

In general, in a creative zone, there are facilities or infrastructure to support the creative industry. The supporting infrastructure for the creative industry acts as an enabler that drives the process of creative activities as well as a network collaborator. This is based on its primary function, namely initiating collaboration between individuals and communities across sectors and regions (Siregar & Sudrajat, 2017). Based on its function, the British Council categorizes creative industry supporting infrastructure into three groups: creative space, co-working space, and maker space.

Biophilic Design is a design theory that examines the phenomenon that humans essentially love the natural environment. Several studies have also proven that humans are at their optimal ability when they are in a natural environment (Kellert & Calabrese, 2015). The purpose of biophilia is to help humans achieve a sense of well-being and comfort and to improve their quality of life. "Biophilic Design" is a design that provides opportunities for humans to live and work in a healthy place with minimum stress levels and create a prosperous life by integrating nature, both natural materials and natural forms, into the design (Browning, 2010). Ryan & Clancy, 2014).

The application of the biophilic concept does not only make a "green" building, which generally only gives the concept of plants to the building. From the explanation above, biophilic is a design theory that focuses more on the comfort and health of building users integrated with nature to increase creativity, productivity, and welfare of users of the Yogyakarta Digital Art Center. Using the concept of biophilic design, it is hoped that it will be able to harmonize the activities contained in the building with nature. Besides that, it also has an essential role from the psychological aspect of building users.




The central concept of the Yogyakarta Digital Art Center design is how to create interaction between humans and nature and interactions between humans in nature in the built environment. The idea is created based on users' needs in creating an idea that is influenced by the surrounding environment, both in the form of relationships between humans and relationships with the ecological environment. The two interactions/relationships have been shown to have a positive impact on the activities carried out by users..



Source: Personal Documentation, 2021  
Figure 2: Biophilic Concept

So that the design will create the impetus to form relationships in several forms, which are in the following table:

Table 1: Concept

Indirect Natural Interaction	Direct Natural Interaction	Human Interaction
		
The indirect relationship between humans and natural elements is interactions that cannot be felt directly, such as sight, hearing and smell.	The direct relationship between humans and natural elements is the interaction that can be felt by the touch.	Direct relationships between humans are interactions that are created between 2 or more humans.

Source: Author, 2021

Biophilic Design has principles in its approach. Among them are Nature in The Space and Natural Analogues. Nature in The Space, This principle contains several main points that need to be considered in its application to design. These points are a non-visual relationship with nature, a brief

connection with nature, temperature regulation and airflow in the room/building, water elements in the design, lighting arrangements and the relationship between buildings, and natural systems.

Table 2: Pattern of Biophilic Design (Nature in The Space)

<i>Nature in The Space</i>			
Patterns	Stress Reduction	Cognitive Performance	Emotion, Mood and Preference
Visual Connection with Nature	Lowered blood pressure and heart rate	Improved mental engagement/attentiveness	Positively impacted attitude and overall happiness
Non-Visual Connection with Nature	Reduced systolic blood pressure and stress hormones	Positively impacted cognitive performance	Perceived improvements in mental health and tranquility
Thermal & Airflow Variability	Positively impacted comfort, well-being and productivity	Positively impacted concentration	Improved perception of temporal and spatial pleasure (alliesthesia)
Presence of Water	Reduced stress, increased feelings of tranquility, lower heart rate and blood pressure	Improved concentration and memory restoration Enhanced perception and psychological responsiveness	Observed preferences and positive emotional responses

Source: Terrapin Bright Green, 2014

Natural Analogues are available natural elements that can be leveraged to be adapted into designs. One of them is by using natural materials.



Table 3: Pattern of Biophilic Design (Natural Analogues)

<i>Natural Analogues</i>			
Patterns	Stress Reduction	Cognitive Performance	Emotion, Mood and Preference
Material Connection with Nature		Decreased diastolic blood pressure Improved creative performance	Improved comfort

Source: Terrapin Bright Green, 2014


### 3. Results and Discussions

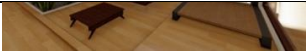


Table 4: Visual Connection with Nature

No.	Picture	Description
1.		Naturally occurring connection to nature: Outward view (surrounding environment, external vegetation at ground level). Access to naturally occurring phenomena such as wildlife, weather changes, etc.
2.		Simulation connection to nature: Indoor plants with biodiversity, as well as the ability to interact with the landscape..

Source: Author, 2021

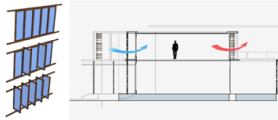
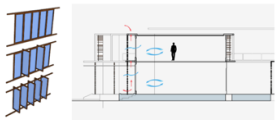
Table 5: Non - Visual Connection with Nature

No.	Picture	Description
1.		<p>Sound is one that has an impact on our comfort at work.</p> <p>Therefore, as much as possible we reduce urban noises such as the sound of motorized vehicles.</p> <p>This noise can be minimized by using vegetation and wind. So that the placement of vegetation needs to be considered to be a barrier and direct the wind to reduce the impact of city noise.</p>
2.		The presence of nature can be formed by creating green space in the building environment by adding natural

		elements such as plants.
3.		The act of touching natural materials such as wood on a table can also cause relaxation through changes in the rate of cerebral blood flow.
4.		In addition to planting vegetation around the building, it is necessary to pay attention to the placement of the building mass where the building mass is placed far from sound sources such as from arterial roads, especially in semi-private and private zones.

Source: Source: Author, 2021

Table 6: Thermal & Airflow Variability

No.	Picture	Description
1.		From the existing airflow system, looking at the needs of the Yogyakarta Digital Art Center building, it is necessary to use a cross ventilation system (1) and stack ventilation (2).
2.		The facade of this building is dominated by operable windows with pivot hinges in the middle. Intended so that the flow of air can enter the maximum into the space. To overcome the thermal problem on the west side, secondary skin




	and glass with low SHGC are given.
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Source: Source: Author, 2021

	with a ratio of 45% is highly recommended because it has the highest score in terms of calming and comfortable nature presence.
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Source: Source: Author, 2021

Table 7: Presence of Water

No.	Picture	Description
1.		The concept of presence of water can be applied in an outdoor environment as well as in an office space.
2.		The sound of splashing water will make people more relaxed.
3.		

Source: Source: Author, 2021

Table 8: Material Connection with Nature

No.	Picture	Description
1.		In research conducted by (Lichtenfeld, Elliot, Maier, & Pekun, 2012), states that the use of green in creative facilities has a higher level than other colors in stimulating creative performance.
2.		In addition to the use of color, the use of natural materials also has an impact on human physiology. in an article by (Tsunetsugu, Miyazaki, & Sato, 2007) which examines the impact of the ratio of the use of wood materials in space. The use of wood

#### 4. Conclusion

Based on the discussion above, it can be concluded that the design of the Yogyakarta Digital Art Center with a Biophilic design approach can be done by applying some of the existing biophilic principles. These principles are:

1. Visual Connection with Nature
2. Non-Visual Connection with Nature
3. Thermal & Airflow Variability
4. Presence of Water
5. Material Connection with Nature

These principles have their respective functions, such as reducing stress levels, increasing cognitive performance, and managing emotions and moods better. So, it can be concluded that this approach is able to make the lives of building users healthier psychologically and physically and can increase the productivity and creativity of building users.

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