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Model of the Influence of Sensory Formal Aesthetics in Encouraging Ecological Behavior Case Study: Sky Garden Mall PVJ, Bandung

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Abstract. This research aims to determine the influence of formal sensory aesthetics in encouraging ecological behavior among visitors at PVJ Sky Garden mall, Bandung, in the form of a model. Environmental damage is becoming increasingly uncontrollable due to human behavior that is not environmentally friendly, one of which is in the city of Bandung. Therefore, efforts are needed to encourage the community to adopt ecological behaviors through intensive green roof facilities. In addition to the ecological role of green roofs, aesthetics plays an important role in influencing behavior. This occurs through the reciprocal relationship between aesthetics and behavior. The theory of aesthetics and ecological behavior is analyzed into a proposition model, then used as the basis for the research framework and tested on mall visitors. Mixed research methods with a case study approach by Robert K. Yin, through direct observation to observe aesthetics and behavior, questionnaire surveys on mall visitors and experts, interviews, and expert validation to deepen and develop data on the model. The findings of this study support and develop the proposition, in the form of a sensory formal aesthetic model that can influence the ecological behavior of visitors. The aesthetic aspect consists of the experience and feeling of being connected to nature and the attachment of the locality through cultural gathering spaces and material, a feeling of leisure through a design that resembles nature, knowledge from environmental education that has a positive impact on the ecological behavior. Visitor characteristics, duration, and frequency of visits also influence ecological behavior.

Keywords: model, aesthetic influences, ecological behavior, sky garden, PVJ mall

1. Introduction

The global ecological crisis due to human behavior is also happening in Bandung, West Java. Governor Ridwan Kamil noted the reduction of green spaces, daily waste of 1,500–1,600 tons, and the decline in air quality due to emissions and industrial pollution. The solution is to encourage ecological behavior among the community (Bagaskara, 2024). Ecological behavior makes the largest contribution to saving the ecological crisis (Fauzie et al., 2016). Amidst land limitations, green roofs become an alternative sustainable space. PVJ Mall Bandung, through its Sky Garden, has built an intensive green roof as a form of awareness to support environmental quality improvement and an educational facility that attracts visitors (Widiarko, 2023).

Intensive green roofs not only have an ecological role but also an aesthetic role. Hangrove also argues that the history of environmental protection began with aesthetics. Other research from Callicott also shows that environmental protection decisions are dominated by aesthetic motivations rather than obligations or duties (Mikkonen & Raatikainen, 2024). Flowering roofs, low vegetation, meadows, water, and lush trees have their own appeal to the community (Stoltz & Grahn, 2021). The aesthetics of roofs and green spaces encompass all the senses and body movements of their users, so that they can be understood and utilized to behave and feel something.

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Aesthetics is the understanding through sensory observation of the appeal of aesthetic elements such as color, shape, texture, which is referred to as formal sensory aesthetics (Suryasari et al., 2022). Aesthetics is formed through three aspects, namely the subject that evokes aesthetic experience, the object that embodies aesthetic qualities, and values that have aesthetic parameters (Junaedi, 2021).

The aspect of the subject is the individual who enjoys and understands the object. After that, the object is perceived by the subject until it produces an aesthetic experience. This experience arises when the object possesses qualities and values that align with those of the subject (Paris, 2024). Aesthetic experience is formed through cognition (logic), which is recognition; conation (energetic), which is the drive to act; and emotion (emotional), which involves feelings (Junaedi, 2021). The aspect of objects in the form of aesthetic properties is divided into two, namely "culture" which has undergone human intervention and "nature" through the Creator. Aesthetic properties can take the form of material objects, activities, and language (Junaedi, 2021). The aspect of value has aesthetic parameters, which emerge when the subject experiences an aesthetic encounter with an object determined by subjective and objective beauty (Brady & Prior, 2020). Aesthetic parameters are divided into order, chaos, grandeur, and deception (Folkmann, 2023). Order is divided into canon (guidelines in the creation of works), harmony (consonance in a composition), mimesis (imitation), and masterly (creator's skill) (Folkmann, 2023). Chaos is divided into creativity, disharmony (incongruity), deformation (change of form), and anti-originality (rejection of originality) to evoke appeal (Junaedi, 2021). Each object can contain more than one type of aesthetic value.

Aesthetics has a reciprocal relationship with human behavior. The relationship consists of an object perceived by the senses, with the perceiver being the subject, referred to as secondary qualities in aesthetics (Stoltz & Grahn, 2021). Research from Parsons and Carlson (2024) also shows that it is easier to mobilize the need for environmental protection through the appeal of aesthetics, through aesthetic compatibility and moral goodness.

Ecological behavior has 4 formative aspects, including environmental knowledge, environmental responsibility, habit changes, and social interaction (Fauzie et al., 2016). All these aspects aim for the community to engage in activities that protect the environment. These activities are divided into three basic behavioral points: the preservation of natural resources through water, air, and soil, the reduction of electricity, gas, and oil consumption, and the conservation of plant and animal life (Hastuti et al., 2024). These activities occur in the form of saving energy, using/recycling recycled materials, green consumerism, planting trees, sorting waste, using less plastic, and reducing carbon emissions (Hastuti et al., 2024). Environmental awareness regarding the introduction of environmental issues and their solutions is the starting point before the formation of ecological behavior (Fettahlıoğlu & Aydoğdu, 2020). Another study by Otto and Pensini (2021) also shows that feeling connected to nature is an important internal driver in efforts to increase environmental protection behavior.

Research from Rim et al., (2025) also shows that connections with nature are created by individuals when interacting with nature, through experiences, emotions and cognitions between humans and the aesthetics of their environment, this formulation is an accurate predictor of environmental behavior. Aesthetic experts also argue that aesthetic experiences derived from nature are the basis for influencing ecological behavior (Zhou et al., 2021). Rolston also stated that aesthetic perception and perspective must be expanded with environmental knowledge, cognition in the form of environmental education has been repeatedly confirmed to play an important role in influencing ecological behavioral intentions (Wu et al., 2022).

Aesthetic theory (Junaedi, 2021) in the environment has a reciprocal relationship with three fundamental points of human behavior (Fauzie et al., 2016). This will serve as the foundation for this research framework, with the proposed model created and tested on visitors of the PVJ mall (Figure 1.1). Green spaces, through their aesthetics, serve as a context for regulating behavior patterns, through the experiences generated and the sense of attachment visitors feel towards the space (Zhafran et al., 2023).

Based on previous theories and research, the researchers propose an initial proposition that formal sensory aesthetics can influence ecological behavior through sensory perception of natural stimuli, creating a reciprocal relationship between aesthetics and behavior. Sensory perception is formed when individuals perceive aesthetics, resulting in experiences, feelings, and environmental knowledge provided within formal sensory aesthetics.

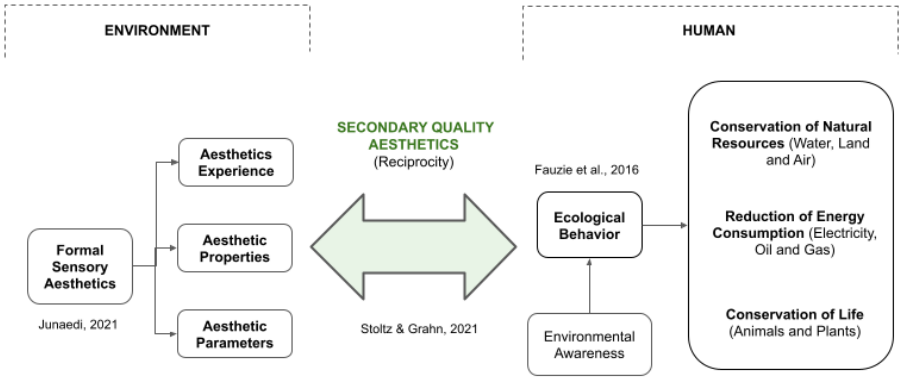

Figure 1.1. Aesthetic Proposition Model for Ecological Behavior (Author, 2025)

The purpose of this research is 1) to identify the sensory formal aesthetics at Sky Garden PVJ using Junaedi's theory (2021), 2) to examine the relationship between aesthetics and ecological behavior, 3) to explore the model of aesthetic influence that can encourage the ecological behavior of visitors at Sky Garden PVJ.

Mix research method with Robert K. Yin's case study method and survey with questionnaire to strengthen and support observation and interview data. The creation of a proposition model (Figure 1.1) in the Robert K. Yin case study method is used as a framework and direction of research focus when conducting observations, surveys, interviews and expert validation.

Research on green roofs and their impact on humans and sustainability is rapidly advancing. Several studies from, Benz Kotzen (2018) explored the social and aesthetic aspects of green roofs, which are gaining recognition despite often being overlooked. As ground-level green spaces decline, green roofs become increasingly valuable as aesthetic and social spaces to experience architecture, wellbeing, nature, and wildlife. Other researchers explored green roofs' ecological and aesthetic aspects in commercial buildings (Zhdanova et al., 2019), noting their role in enhancing perception, urban comfort, and sustainable recreation. Mesimaki et al., (2019) examined green roofs' potential to create visual and sensory experiences, beauty, joy, and safety.

Based on the literature and previous research, there is a consensus on the aesthetics of green roofs, which play an important role in providing comfort, sustainable recreational activities, social spaces, education, visual and sensory experiences, and a feeling of connection with nature. However, there are differences in the approach and focus of aesthetic testing results. For example, Benz Kotzen (2018) emphasizes the aesthetic and social benefits in

accommodating culture, the practice of growing vegetables and fruits to achieve well-being, and the experience of interacting with nature and buildings. These benefits highlight the contribution of green roofs to a positive attitude towards the environment and the potential for changing perceptions of nature. Zhdanova et al., (2019) emphasize the ecological and aesthetic aspects through perception, recreational activities, and comfort, which indirectly influence human interaction with nature and sustainable practices through the application of green roofs. Mesimaki et al., (2019) who emphasize sensory aesthetic experiences and feelings, which enhance recovery and have a positive impact on attitudes towards the environment. These experiences and feelings enhance environmental awareness and eco-friendly behavior.

This difference indicates that aesthetic aspects for sustainability purposes, one of which is influencing ecological behavior, are still not fully integrated into the green roof design framework. Researchers indicate that there is still not much research that explicitly takes an approach focused on the aesthetics of green roofs in influencing ecological behavior. The focus of research on the formal sensory aesthetics of green roofs has also not yet been found.

Furthermore, a model that connects the influence of sensory formal aesthetic aspects in a gradual and detailed manner to ecological behavior in the context of green roofs has not yet been found. Therefore, this study proposes a sensory formal aesthetic model that can influence ecological behavior in the PVJ sky garden, as a new contribution to strengthen the theory and empirical data on the role of aesthetics in the ecological behavior of green roofs.

2. Methods

Mixed-method research design with case study method by Robert K. Yin and survey with questionnaires to strengthen and support the data (Yin, 2009). The consideration for choosing the case study method by Robert K. Yin is because it uses existing theoretical foundations to determine the direction and focus of the research. Robert K. Yin's case study method has 5 components of research design, including research questions, propositions, units of analysis, logic connecting data to propositions, and criteria for interpreting findings.

The first component is the research questions in the form of "how" and "why" to study the case in more depth. The researcher poses three main questions in this study, namely 1) how to identify the formal sensory aesthetics in the PVJ sky garden using Junaedi's theory (2021)?, 2) why can formal sensory aesthetics influence ecological behavior in the PVJ sky garden?, 3) how can the aesthetic influence model encourage the ecological behavior of visitors in the PVJ sky garden?.

The second component is the proposition made by the researcher (Figure 1.1) in the form of a model. This proposition is used as the basis for the framework to conduct direct observations, interviews, surveys through questionnaires, and expert validation. The proposition model uses the aesthetic theory from (Junaedi, 2021) which has a reciprocal relationship with the three basic points of human ecological behavior (Fauzie et al., 2016) in the PVJ sky garden environment. Therefore, this research starts from the proposition that the formal sensory aesthetics of the PVJ sky garden can influence the ecological behavior of visitors.

The third component is the unit of analysis with a single case of the PVJ sky garden, embedded unit analysis, and an exploratory case study. The main unit of analysis is the PVJ sky garden, with sub-units of analysis including formal sensory aesthetics, ecological behavior, and the relationship between aesthetics and ecological behavior.

The fourth component is the logic that connects data with propositions using explanation building analysis to systematically construct detailed step-by-step explanations from the results of observation data, interviews, questionnaires, and expert validation to prove the proposition. The explanation begins with the identification of formal sensory aesthetics through three formative aspects and ecological behavior through observation and interviews, followed by an explanation of the results of the aesthetic and behavioral questionnaire survey to support and strengthen the observation and interview data. Then, the results of the observation, interviews, and survey are analyzed to produce an aesthetic and behavioral model based on the proposition model. This is followed by an explanation of expert validation input on the model, and finally, the final results of the revised model from expert validation are explained to strengthen and prove the proposition.

The fifth component is the criteria for interpreting findings, which support the proposition model that aesthetics influence behavior, connected to the explanation of explanation building analysis and the results of method triangulation between observation, interviews, and questionnaires.

Data collection techniques in Robert K. Yin's case study include semi-structured interviews, direct observation, documentation in the form of photographs, surveys in the form of questionnaires, and expert validation. Data collection is guided by literature, proposition models, through observation and documentation to observe the aesthetics and behavior of visitors, surveys of 110 mall visitors and 5 architecture and landscape experts through online questionnaires using google forms, as well as semi-structured interviews with 3 staff members and 7 visitors. The questionnaire aims to support and strengthen the data from observations and interviews, as well as to better understand the ecological and aesthetic behaviors of the visitors. Assessment through a 1-5 Likert scale and open-ended questions so they can freely express their opinions. The sampling technique used is convenience sampling because the mall visitors are always changing (Sukabumi, 2022). The questions posed include the frequency of visits, duration, activities, the most frequently visited areas, three basic points of behavior, aesthetic theory with three formative aspects (experience, property, and aesthetic parameters), opinions on the search for similar designs, and the sky garden's aesthetics that encourage ecological behavior among the local community.

Primary data through observation & documentation, surveys, interviews, and expert validation. Secondary data through journals and books related to formal sensory aesthetics, ecological behavior, and the relationship between aesthetics and behavior on intensive green roofs.

The results of the literature study, observations, questionnaires, and interviews were analyzed using the explanation building technique by Robert K. Yin. This aims to analyze case study data by providing an explanation of aesthetics, behavior, and their relationship in influencing ecological behavior gradually and in detail. A good explanatory element should have its case study reflect a proposition that is theoretically significant.

The analysis results in a behavioral aesthetic model that will be validated by 5 experts, consisting of 2 IALI members and 3 professional architects and landscape designers, who were previously asked to fill out a questionnaire and participate in the continuation of this research. Expert validation by presenting the model and asking several in-depth questions to identify which parts need to be improved, deepened, and developed. The results of this validation analysis will be used to obtain the final output in the form of an aesthetic influence model that can encourage behavior.

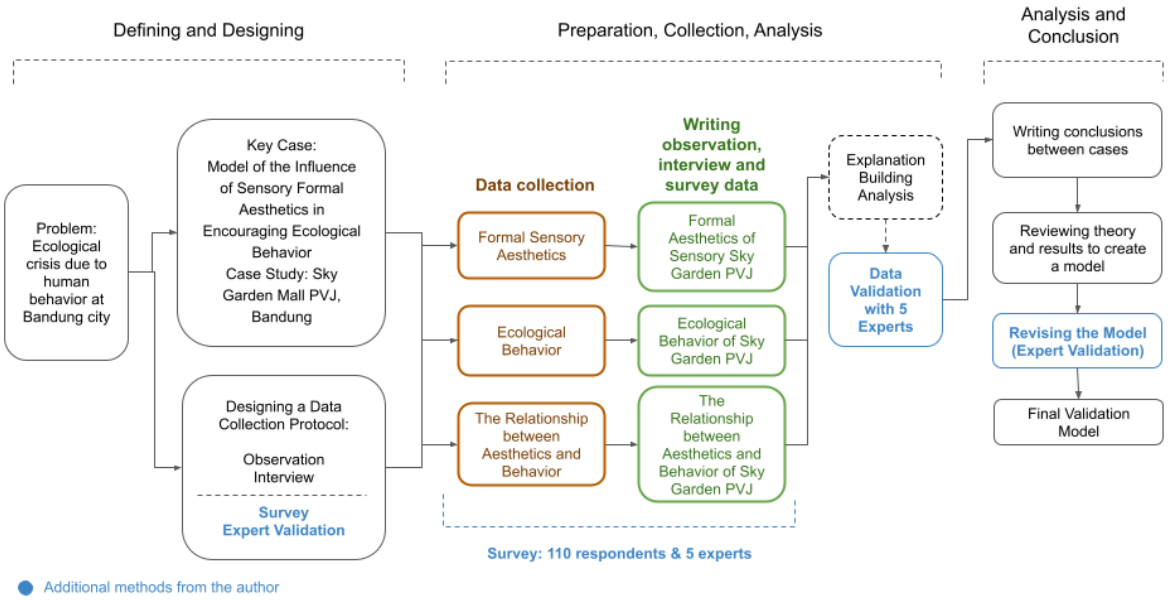

Figure 2.1. Research Flow of Robert K Yin Case Study (Author, 2025)

2.1. Sky Garden PVJ Mall Case Study

Sky Garden PVJ Mall (Paris Van Java), located on Jalan Sukajadi No. 131-139, Cipedes, Sukajadi District, Bandung City, West Java 40162. The consideration for choosing this case study is because it is always frequently visited by visitors and has educational facilities.

This sky garden has a Locality and European concept that presents a natural outdoor atmosphere. The local concept is evident in the selection of materials such as wood, natural stone, and bamboo construction. The European concept is reflected in the garden design, which resembles the conditions in Paris with rows of shops along the pedestrian walkway (Natalia, 2020).

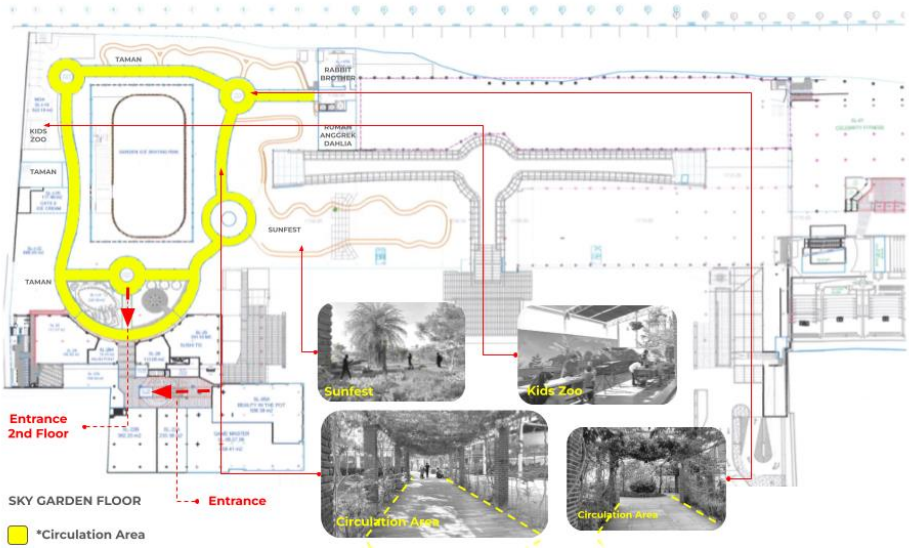

Figure 2.2. Sky Garden Floor Plan (Author, 2025)

This sky garden has a garden area of 2,000 square meters (Widiarko, 2023) (Figure 2.1, 2.2). This shopping center contributes to improving environmental quality (Seputar Bandung. 2024). Access to the sky garden is via the main lobby on the 1st floor, then up the escalator, making it easy to access. This Sky Garden provides facilities for education include, Rabbit Brother , Cats and Ice Cream Café, Kids Zoo, and Sunfest flower garden. This Sky Garden is well-known for its 15-meter-tall man-made waterfall, which is encircled by vertical gardens that give the mall a natural feel and ecosystem (7SUMMITSTRAVEL, 2024).

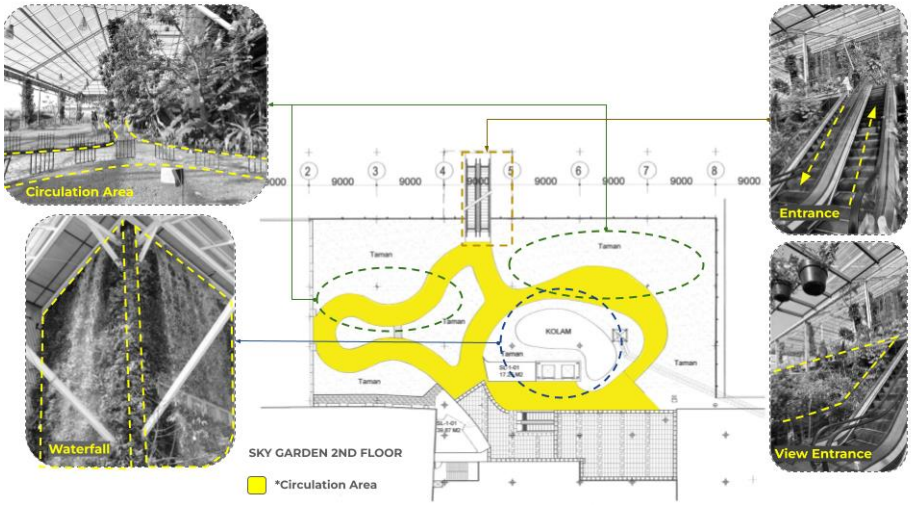

Figure 2.3. Second Floor Sky Garden Plan (Author, 2025)

3. Discussion

3.1. Identification of the Formal Sensory Aesthetics of Sky Garden PVJ

The stages and analysis process during the research are based on Robert K. Yin's case study procedure, starting from data collection and documentation. The first stage involves the identification of formal sensory aesthetics through Junaedi's theory (2021), which will be presented in the form of a table based on the results of observations, interviews, and literature studies (Table 3.1). This stage aims to gain a deeper understanding of the formal sensory aesthetics in the PVJ sky garden to test and develop the proposition.

Identification is divided into 3 formative aspects, namely the aesthetic experience of visitors in terms of cognition, conation, and emotion; aesthetic properties in the form of the Sky Garden as a material object and activity; and aesthetic parameters in the form of order and chaos adjusted to the values upheld by PVJ sky garden.

Based on the results of observations and interviews, visitors experience an aesthetic experience that is received and perceived by the senses through an interest in the aesthetic elements of the design. Cognitive aspects include education and environmental discussions in the Kids Zoo area (Figure 3.1), Sunfest flower garden, Dahlia Orchid house, Cat and Ice cream, its landscape design, and objects inspired by nature. Education in the form of knowledge about types of animals and plants, how to care for them and their benefits, how to treat animals properly, etc. Each design element and facility has a cognitive aspect in the form of environmental education that involves all the senses. Like the use of materials, its structure, how the roof can be designed without causing leaks, maintenance, and management costs. Through sensory observation and discussion, visitors learn that green roofs are not only about aesthetics but also about the application of technology and meticulous planning.

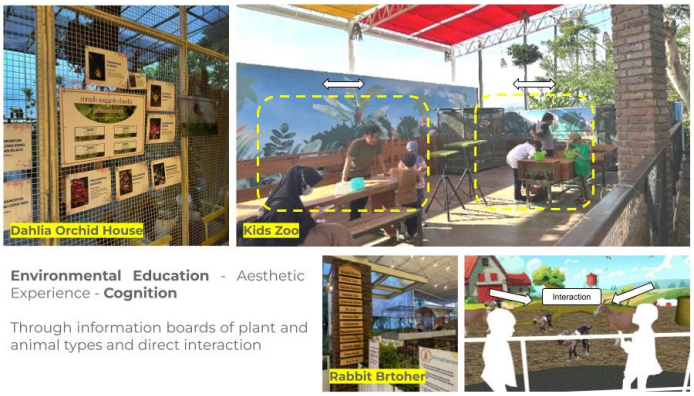

Figure 3.1. Environmental Education – Aesthetic Experience – Cognition (Author, 2025)

Conative aspects through visitor activities that involve visual, auditory, tactile, and olfactory senses (Figure 3.2). Interacting with animals and nature, direct contact, observing and listening to animal sounds, the sound of flowing water (visual, tactile, and auditory), leisurely walking through the beauty of the sky garden (visual and kinesthetic), discussing the beauty of the sky garden landscape, taking photos, visiting the waterfall to observe each element (visual, auditory, olfactory, kinesthetic), enjoying the cool and cold temperature of the waterfall flow and smelling the natural wet aroma of water combined with plants and falling onto the damp ground (visual, tactile, auditory, olfactory), etc. Visitors can eat the fruits directly from the plants available there (gustatory, visual, tactile).

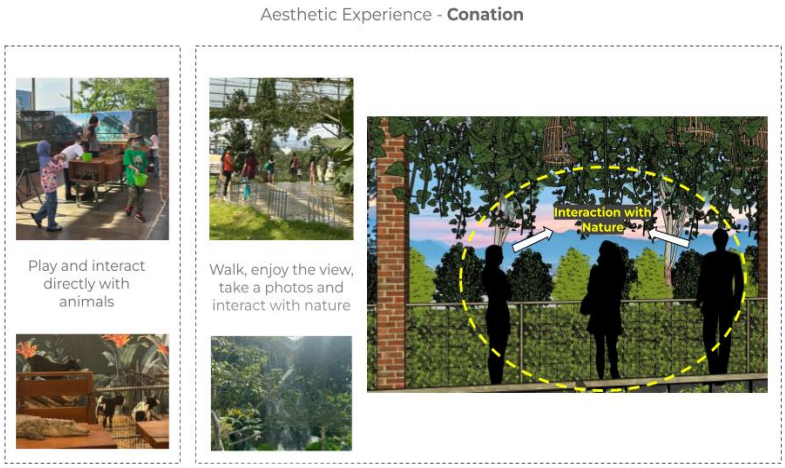

Figure 3.2. Aesthetic Experience – Conation (Author, 2025)

Emotional aspects through aesthetics that influence user feelings through the attraction of form composition (Robinson, 2020). The combination of local and European concepts creates a connection for visitors through the reflection of regional identity. Local elements are evident in the bamboo armature of the hanging lamps, exposed brick on the columns and café, natural stone floors, circulation areas with ulin wood, thatched roofs, and bamboo construction in the tenants (Figure 3.3). The European concept through the garden design surrounded by shops along the circulation area attracts workers, young people, and families to return. Interview results show that visitors feel happy, comfortable, and refreshed with the combination of both local and familiar concepts, which also align with market preferences. The organic circulation area with geometric access creates a dynamic and non-monotonous impression. This organic

form resembles natural patterns (Pratiwi et al., 2024) and encourages visitors to walk slowly, explore more deeply, and cultivate curiosity behind each curve (Naghibi et al., 2024).

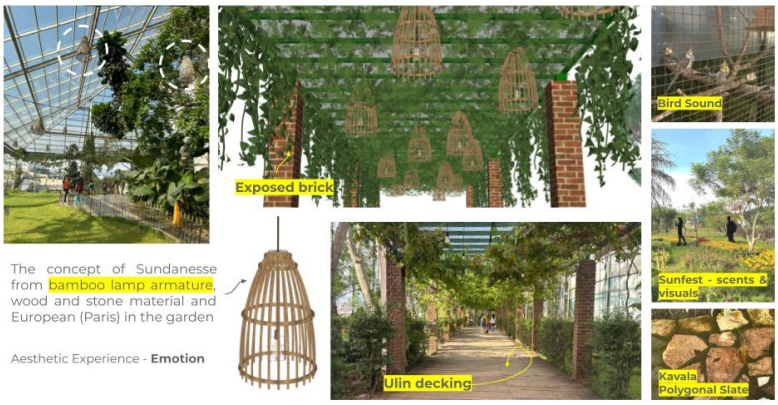

Figure 3.3. Aesthetic Experience – Emotion (Author, 2025)

The sound of waterfalls, wind, and animals provides relaxation, enhances mood, and fosters a connection with nature (Witten et al., 2023). Birds and butterflies flying among the flowers evoke feelings of happiness and tranquility (Butler et al., 2024). The aroma of flowers, trees, and waterfalls provides peace and reminds us of the importance of caring for the environment (Kennedy, 2024). The rough texture of ulin wood, rectangular cobblestones, Kavala polygonal slate, and exposed brick creates a warm and homey feel (Amalina & Marlina, 2024), while the terrazzo floor, fine gravel, and Japanese grass provide freshness. Elegant Zinnia flowers as the focal point with winding patterns following natural patterns, enhancing the mood and pleasing the eye (Nadeem et al., 2024).

Table 3.1. Identification of the Formal Sensory Aesthetics of Sky Garden PVJ (Author, 2025)

Formative Aspects			**Formal Sensory Aesthetics**
Subject	Aesthetic Experiences	Cognition (Logical Effect)	Environmental Education
(Sky Garden PVJ Mall Visitors)		Conation (Energetic Effect)	- Playing and interacting with animals - Walking exploring the landscape design - Taking a photos
		Emotion (Emotional Effect)	Local concept and Parisian European accents
			The combination of straight and curved lines in landscape layout → natural pattern, slow walking, foster curiosity
			The sound of waterfalls, animals, trees → relaxation, mood enhancement & connection with nature
			Birds and butterflies fly around the flowering plants → a feeling of happiness, peace, and connection with nature
			The scent of flowers, trees, waterfalls → relaxation, close to nature, delightful, peaceful
			Combination of local materials like the rough texture of Ulin decking, rectangular cobblestones, and Kavala polygonal slate → homey, warm, blending with nature Exposed brick, terrazzo flooring, Japanese grass, fine gravel with a smooth texture → grounding effect, fresh, calming
			The combination of the colors of Zinia Anggun flowers as a visual and physical divider arranged in a winding manner → a fragrant aroma that improves mood, focal points & pampers the eyes, connecting with the beauty of nature
Object	Aesthetic Properties	Object/ Materials	Waterfall (Object)

	Cultural		
			Kids Zoo, Sunfest, Rabbit Brother, Dahlia Orchid House, Cats and Ice Cream (Object)
			Exposed brick, ulin decking, bamboo, rectangular cobblestones, and Kavala polygonal slate, terrazzo flooring (Materials)
		Activity	Environmental Education
			Interact directly with animals and nature
			Take a leisurely walk exploring the beauty of the garden
Value	Aesthetic Parameters	Harmony	Organic and geometric forms, animal husbandry concepts, water elements, rough textures combining exposed brick and Ulin wood
	Order	Mimesis	Butterfly sitting area, house facade backdrop, animal husbandry concept for animal area
		Masterly	Repetition of animal husbandry concepts, house facade backdrop, wall murals of flora and fauna in escalator, geometric and organic layout of passive garden areas, composition of vertical gardens, wooden seating areas
	Chaos	Creativity	The concept of animal husbandry in animal facilities
			Waterfall feature
			Butterfly Bench & Hand pattern stepping stones

Aesthetic properties such as waterfalls, Kids Zoo, Sunfest flower garden, Rabbit Brother, Orchid Dahlia House, and Cats and Ice Cream, support sustainability through environment and behavior. Animal facilities with a farm concept and a Paris-themed garden encourage fun environmental education. Visitors explore the park, enjoy the atmosphere, and experience the stimulation of nature through their senses.

The aesthetic parameters of the PVJ sky garden consist of order and chaos according to its values, with order derived from harmony, mimesis, and mastery, and chaos expressed through design creativity (Figure 3.4). Harmony is seen in the alignment of local and European concepts, layout, organic circulation, and the farming concept in the animal facilities that blend with the environment. Bright colors (purple, blue, yellow, green, red) create a cheerful impression and attract visitors (Enwin et al., 2023). Exposed brick material, textured ulin wood flooring, blend seamlessly with all the aesthetic elements within. Mimesis is seen in the design of the seating area, which imitates the stylized shape of a butterfly in front of Sunfest, becoming a focal point and educating the positive relationship between butterflies and flowers that must be protected (Bashan et al., 2021). The backdrop of the house facade with hanging plant accents becomes a focal point and balances the proportions in the waterfall design.

Masterfully evident from the distinctive farm concept, the backdrop of the house's facade aligns with the waterfall design as a focal point, the vertical garden that cools the area, and provides a habitat for fauna. Flora and fauna murals behind the escalator support the sustainability concept, with organic circulation patterns and solid wood seating areas emphasizing a natural atmosphere.

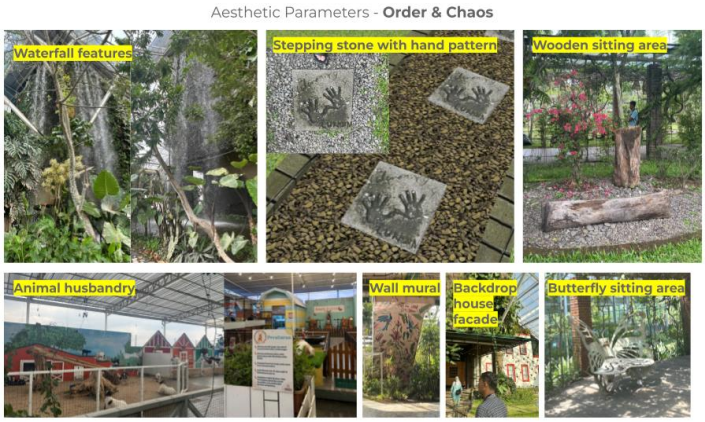

Figure 3.4. Aesthetic Parameters – Order & Chaos (Author, 2025)

The second parameter, chaos through creativity in the concept of farming at each animal facility. Bright colors (red, blue, yellow) evoke a spirit of adventure (Steinhaeusser et al., 2022). Elements of bamboo lights, natural stone, fences, and wooden furniture reinforce the farming concept. Education is supported by species information boards at the entrance. The seating area is shaped like stylized butterflies, the artificial waterfall creates a natural atmosphere (Oduntan, 2021), and the stepping stones with palm patterns give a friendly and inviting impression.

Based on the findings from aesthetic observations and interviews, it shows that aesthetics derived from and connected to nature serve as a foundation for influencing ecological behavior, through experiences, knowledge, feelings, and activities of individuals who are constantly in touch with nature through sensory perception in aesthetics. Through three aspects that form aesthetics, namely experiences derived from nature and local elements that influence feelings, aesthetic properties in the form of designs and facilities that provide environmental education, and aesthetic values inspired by the characteristics and forms of nature, this affects attention and appreciation for the beauty of the environment, which in turn influences the ecological behavior of visitors.

These data findings align with the initial proposition model that explains how formal sensory aesthetics can influence ecological behavior through the involvement of sensory perception in experience, knowledge, and feelings within aesthetics. However, from the data of observations and interviews, locality through its concepts and materials was found to also play a role in shaping aesthetic experiences that provide a sense of familiarity and connection to the local identity, thereby influencing the ecological behavior of visitors. Thus, the initial proposition has been developed, indicating that there is an element of locality in the aesthetics of the PVJ sky garden that also influences the ecological behavior of visitors through their experiences and feelings in the aesthetics.

3.2. Identification of Ecological and Aesthetic Behaviors of Visitors at Sky Garden PVJ

The second stage is the identification of the ecological and aesthetic behavior of visitors to the PVJ sky park through questionnaires and interviews (Table 3.2) based on the identification of aesthetics and propositional models (Figure 1.1) from the analyzed literature. This questionnaire and interview stage is carried out to prove, support and strengthen the data and propositions.

Based on the results of the questionnaire, the majority of visitors to the sky garden are aged 26 - 30 years, with 55 people (48%) being family workers. For workers, they need a place to

take a break due to their heavy workload. For those with families, they take their children to recreate and refresh, enjoying the aesthetics and facilities provided. This age affects the frequency and duration. The frequency of visits is conducted once a month on weekends, as weekdays are working days. The frequency of visits influences ecological behavior, as it helps visitors better understand and appreciate natural ecosystems, environmental benefits, and biodiversity (Hayyun & Susanti, 2024). People who frequently visit green spaces influence their environmental awareness to behave ecologically, such as maintaining cleanliness, waste segregation, conservation activities, and supporting the use of green spaces (Teixeira et al, 2023). This is in line with field data that will be discussed in the ecological behavior section.

The duration of time most visitors engage in activities is 1-2 hours, with 61 people (53%). This affects behavior in enhancing interaction with nature and the experiences received (DeVille et al., 2021). The duration is influenced by visual comfort and the atmosphere when exploring the beauty and facilities provided (Bachtiar & Kusuma, 2019).

Frequency, age, and duration affect which facilities are most frequently visited. The waterfall facility is the most sought after, with 82 people (71.3%) admiring the natural beauty. Dahlia Orchid House was visited by 37 people (32.2%), especially by orchid enthusiasts; Kids Zoo was visited by 28.7% 33 people were visited by families who brought their children to play and for environmental education; Cats and Ice Cream, with 32 people (27.8%), were often visited by children to play and by workers to unwind; and Sunfest Flower Garden, with 26 people (22.6%), was visited to see various types of flowers and for photography. The waterfall facility creates a strong connection with visitors, resulting in an aesthetic experience from the sound of water gurgling, natural visuals, a calm atmosphere, and relaxation (Oduntan, 2021). Based on interviews, visitors feel comfortable spending a long time at the waterfall because of the cool, fresh air and the absence of pollution.

Table 3.2. Identification of Ecological and Aesthetic Behavior of Visitors at Sky Garden PVJ (Author, 2025)

No	Characteristics		N(%)
1	Age	16 – 20 years	14 (12%)
		21 – 25 years	34 (29,6%)
		26 - 30 years	55 (48%)
		31 – 35 years	12 (10,4%)
2	Visit Frequency	1 month 1 time	90 (78,3%)
		1 month 2 times	18 (15,7%)
		1 month 3 times	7 (6,1%)
3	Visit Duration	30 minutes	6 (5,2 %)
		1 – 2 hours	61 (53 %)
		2 – 3 hours	48 (41,7 %)
4	The facility is frequently visited	Waterfall	82 (71,3%)
		Kids Zoo	34 (29 %)
		Sunfest	26 (22,6%)
		Cats and Ice Cream	32 (27,8%)
		Dahlia Orchid House	37 (32,2%)
	3 Basic Points of Behavior		
5	Conservation of natural resources	The use of recycled goods	85 (74%)
		Waste sorting & maintaining cleanliness	91 (79%)
6	Reduction of energy consumption	Aware and practice saving electricity, gas, oil	82 (71%)
7	Conservation of life (Plants and Animals)	Inspired to plant trees after visiting the PVJ sky garden	75 (65%)

	Caring for and protecting plants and animals	79 (69%)
	Aesthetic	
8	Aesthetic Experience	85 (74%)
9	Environmental education through sky garden facilities (Cognition)	86 (75%)
10	Interacting with animals and nature (Conation)	92 (80%)
11	Walking and exploring to enjoy the view (Conation)	100 (87%)
12	Visual & tactile, made from wood, exposed brick, natural stone The aroma, the sound of the waterfall, animals, and the damp earth provide a feeling of tranquility, pleasure, and connection with nature (Emotion).	93 (81%)
13	The local concept and European accent create a feeling of attachment (Emotion)	82 (71%)
14	Looking for a similar design	86 (75%)
15	Aesthetic Elements of the Sky Garden PVJ supports and encourages ecological behavior.	92 (80%)

The next questionnaire asks about the 3 basic points of ecological behavior from Hastuti et al (2024). First, the point of natural resource sustainability in the form of using recycled materials, 85 people (74%) do this. Sorting waste and maintaining the cleanliness of the sky garden environment, 91 people (79%) do. This is supported by interview data indicating that visitors' awareness is stimulated when they see the garden's design with an attractive composition, a pristine natural atmosphere, and cleanliness that is rarely found in the city. Therefore, this data shows that visitors adhere to the existing rules and do not want to damage the beauty and natural atmosphere of the PVJ sky garden.

The second point is about reducing electricity, oil, and gas. Based on the results of the questionnaire, 82 people (71%) practiced energy conservation. This is supported by interview data, which shows that visitors are educated when they see the design of green spaces that utilize natural lighting and ventilation. This data shows that visitors are inspired and educated to utilize natural resources from nature by reducing the use of electricity and gas, thereby saving the environment.

Point three, the sustainability of plants and animals in the form of visitors being moved to plant trees, with 75 people (65%). Concern for protecting plants and animals was shown by 79 people (69%). This is supported by interview data, which shows that visitors who are already families bring their children to play in the Kids Zoo & explore the sky garden to educate them about different types of plants and animals and how to care for them. They also added that they want to have the same design at home and are inspired to plant plants at home. This data shows that the landscape design and the presence of animals within it inspire visitors to want to have plants at home and increase their concern for animals.

The final questionnaire asked about the aesthetics from Junaedi (2021), to support aesthetic identification data and conduct interviews with PVJ mall visitors. Visitors experienced their aesthetic experience with 85 people (74%), through perception when sensing the natural beauty of the sky garden, which is divided into 3 forming aspects within it. The first aspect, cognition in the form of environmental education through its facilities and design, was engaged in by 86 people (75%). This is supported by interview data, where child visitors play while asking about the types of plants and animals there. The conative aspect in the form of interacting with animals and nature was observed in 92 people (80%) and exploring every corner of the sky garden was observed in 100 people (87%). The emotional aspect is triggered through formal sensory aesthetics such as the visual of the waterfall, the texture of exposed brick, ulin wood, and natural stone; the aroma of flowers and damp soil touched by the waterfall's spray, the sounds of birds and horses, which provide tranquility and relaxation connected to nature. As many as 93 people (81%) perceive the natural aesthetics of the sky

garden through their senses. This shows that aesthetic experiences are formed through education, interaction with animals and nature, exploration in the sky garden, sounds, visuals, aromas, and natural textures that reconnect them with nature.

The combination of local concepts and European accents creates a sense of attachment for 82 people (71%), because the aesthetics express the local culture within them. The expression is through the use of local materials and lamp armature designs. The design of the green space with its cultural characteristics reminds visitors of their local identity and forms a positive emotional bond between the visitors and the space. Aesthetics with a touch of local character encourage visitors to protect and feel responsible for those spaces (Kruize et al., 2019). This is in line with field data, which shows that visitors manage their environment through behavioral dimensions, such as properly disposing of waste according to its category, not stressing animals and treating them correctly, and engaging in activities without damaging the environment.

Visitors were also inspired to look for designs similar to the PVJ sky garden, with 86 people (75%) doing so. This data shows that visitors feel comfortable being and engaging in activities in green spaces like the PVJ sky garden.

The last question on the questionnaire is whether the aesthetic elements of the PVJ sky garden can influence and encourage visitors to behave more ecologically. As many as 92 people (80%) agree that aesthetics play an important role in influencing and directing positive behavior towards the environment, through space design, facilities, materials, and layout.

Therefore, based on data from interviews and questionnaires, age, duration, and frequency of visits influence visitors' perception of aesthetics through sensory perception and behavior. These three formative aspects of aesthetics influence the ecological behavior of visitors. Both through facilities and designs that support environmental education, the sky garden design that presents real nature, locality through materials, the presence of animals, and stimuli from nature to be perceived sensorially by visitors.

These data findings align with the proposition of the influence of formal sensory aesthetics on ecological behavior, with an extension of the proposition that local elements, age, duration, and frequency of visits also affect sensory perception and the resulting behavior.

3.3. The Relationship Between Aesthetics and Ecological Behavior

The next stage is to find the relationship between aesthetics and ecological behavior through the literature, model proportional, results of aesthetic identification (Table 3.1) and identification of ecological behavior and aesthetics from visitors (Table 3.2). The results of the correlation between the two are presented in the form of a model (Figure 3.5). The first part explains the environment of the PVJ sky garden, which has a formal sensory aesthetic within it. The aesthetics are formed through three aspects: experience, property, and aesthetic value. Aesthetic experience is formed through cognition in the form of environmental education; emotions that create feelings of relaxation, calmness, mood enhancement, and attachment; and conation in the form of playing and interacting with nature and animals, as well as walking to explore the views of every corner of the garden.

Environmental education occurs through the design of the sky garden landscape and its facilities. Feelings of relaxation and tranquility through the sound of waterfalls and animals, the sight of butterflies and birds fluttering around flower plants, the aroma and visuals of flower

gardens that enhance mood. The attachment felt by visitors through the use of local materials such as bamboo, wood, and natural stone. The three points in this aesthetic experience influence each other in determining the ecological behavior of visitors, through environmental education, a sense of comfort and attachment to the sky garden space, and direct interaction with animals and nature, thereby fostering environmental awareness and concern. Aesthetic properties in the form of spaces that accommodate visitors to conduct environmental education in each of their designs and facilities. This space influences the occurrence of ecological behavior through its educational function.

The aesthetic value in the PVJ sky garden is that each object is inspired by the forms, patterns, and characteristics of nature. The shapes in the circulation area are dominated by organic forms following natural patterns with geometric accents to create balance and connect with nature. The design of the PVJ sky garden uses natural colors, such as wood brown, natural stone, bamboo color, and green from plants, which refresh, warm, and bring visitors closer to nature. Animal areas that are always present in certain corners such as Kids Zoo, Rabbit Brother, bird sanctuary, Cats and Ice Cream. The presence of these animals enhances interaction, knowledge, and concern among visitors. Water features in the form of waterfalls enhance visitor interaction with nature and encourage them to appreciate the existence of nature more.

Therefore, this aesthetic value influences the ecological behavior of visitors. This is seen from the efforts to provide a true depiction of nature through the presence of waterfalls, clean and fresh air, natural patterns in circulation, the beauty of lush vegetation, the presence of animals, and the natural colors of organic materials, making visitors reconnect and appreciate the existence of nature. So therefore, these three aspects that form aesthetics have experience, knowledge and feelings of being connected to nature which create a reciprocal relationship with behavior through sensory perception.

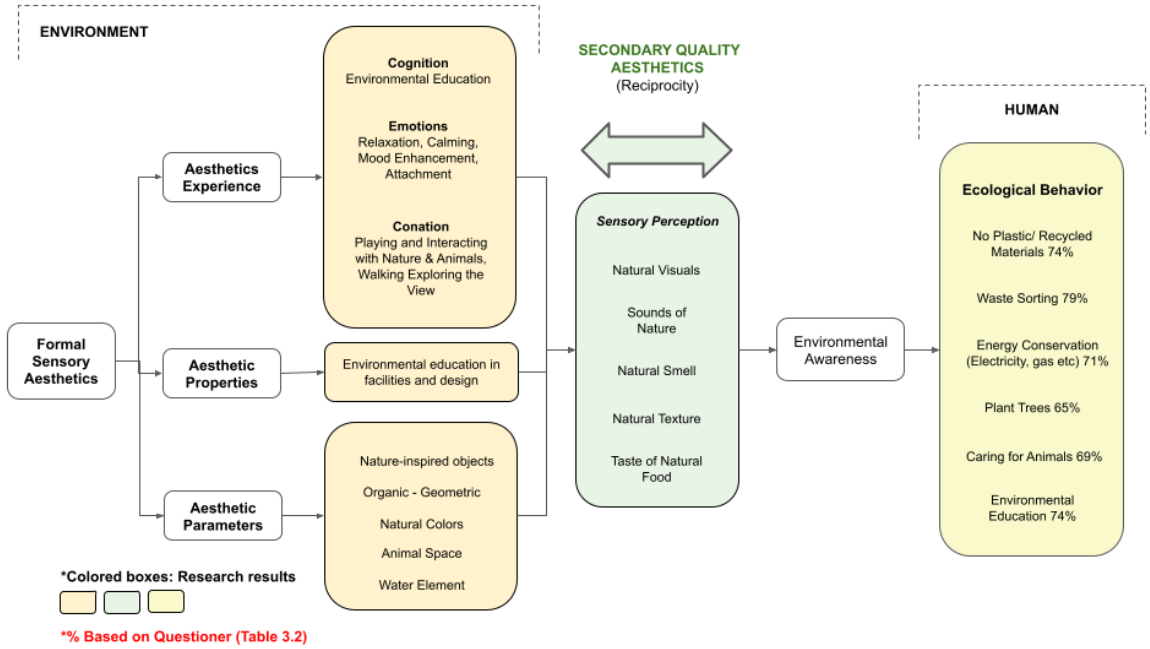

Figure 3.5. Model of Aesthetic Influence on Ecological Behavior (Author, 2025)

These three aspects of aesthetics then create a reciprocal relationship from the stimulation of nature perceived through the senses. This reciprocal relationship is called secondary quality

in aesthetics, which occurs between aesthetics and humans through sensory perception of natural stimuli. The aesthetics of the sky garden are perceived through the senses, which consist of visual, auditory, olfactory, tactile, and gustatory elements from nature. This sensory perception generates environmental awareness that comes from the visitors' closeness to nature, which has been discussed in the three aspects that form aesthetics. Especially in the cognitive aspect, namely environmental education, which is supported by its design, space, and facilities. These three aspects of aesthetics have elements of environmental education through the feelings of relaxation and happiness triggered when visitors interact with animals and nature, or when they stroll leisurely observing the details of plants, seating areas, pathways, materials, and spaces in the sky garden. Thus, environmental awareness through the formal sensory aesthetics of nature is received and sensed, thereby influencing the intention to act and behave towards the environment.

Through a high level of environmental awareness, an ecological behavior is formed, which is the result of the reciprocal relationship between formal sensory aesthetics and humans. This ecological behavior consists of three basic points of behavior that are analyzed into ecological activities. These activities include not using plastic, using recycled materials, sorting waste by category, reducing electricity and gas consumption, planting trees, caring for and nurturing animals, and environmental education, with the percentage of people engaging in these behaviors recorded in a questionnaire.

Thus, this model shows that aesthetics has experiences, knowledge, and feelings connected to nature in all three aspects of aesthetic formation, creating a reciprocal relationship through sensory perception of aesthetics that influences environmental awareness to encourage ecological behavior. This model aligns with the initial proposition model presented, with more detailed explanations within it that elucidate the influence of formal sensory aesthetics on the ecological behavior of the PVJ sky garden. This model was then validated by 5 experts to obtain suggestions and feedback on whether it is appropriate or if there are aspects that need to be improved and further developed in this model.

3.4. Explanation Building

Based on the literature review and the initial proposition model (Figure 1.1), the researchers propose a proposition in the form of formal sensory aesthetics that has a relationship with behavior, thereby influencing ecological behavior. Where aesthetics can regulate behavior patterns through 3 aspects of aesthetic formation, namely experience (cognition, conation, emotion), property, and parameters. The entire three aspects of aesthetic formation possess experiences, knowledge, and feelings that connect humans with their environment. Field findings support and simultaneously develop this proposition.

Field findings through observation and interviews (Table 3.1) indicate that the sensory formal aesthetics of the PVJ sky garden encompass experiences derived from nature and locality, environmental knowledge in the form of environmental education through facilities and design, as well as a feeling of connection to nature when perceiving objects resembling nature and directly interacting with animals and the environment. These three elements are created through the identification of three aspects that form the aesthetics within, which influence environmental awareness and the intention to engage in ecological behavior. Findings from the questionnaire (Table 3.2) and interviews also indicate that the local elements of materials and concepts, as well as the age of visitors who are workers and already have families, influence the duration and frequency of visits, as well as the sensory perceptions and ecological behaviors produced.
These three types of data consistently show that the formal sensory aesthetics of the PVJ sky garden can influence visitors' ecological behavior through elements of environmental

education, design resembling the natural environment, and locality, thereby evoking experiences and feelings of attachment and connection to nature. Through this data triangulation, the explanation further strengthens the proposition with empirical data, and there is an addition of local elements, age, frequency, and duration that also influence the resulting ecological behavior.

3.5. Model Validation

The final stage in this research's explanation building is to carry out expert validation to strengthen, support and prove the propositional model and field data that have been analyzed. Based on expert validation results, the sensory formal aesthetics of the PVJ sky garden have a locality within them that plays an important role in influencing ecological behavior (Figure 3.6). In addition to its local materials, the locality is manifested in open spaces that accommodate the *"Ngariung"* culture, which is the culture of the people of Bandung gathering to chat, drink coffee, and listen to music. Gathering spaces that blend with nature are available at every point of the PVJ sky garden facilities (Natalia, 2025). This space can be seen from the seating area in front of Kids Zoo, Sunfest, circulation areas, garden areas, and several cafés. Thus, there is an addition to the conative aspect, namely the gathering culture accommodated by each space and facility of the PVJ sky garden.

The addition of aesthetic parameters in the form of local Sundanese materials needs to be emphasized because it also influences behavioral patterns. Through the visitors' sense of attachment to the space, it makes them feel ownership and willing to preserve the natural environment (Kruize et al., 2019).

The enhancement of environmental awareness is also shaped through the feeling of leisure, in addition to the elements of environmental education in the three aspects that form aesthetics. Feeling the difference and being aware of something new and not found elsewhere, thus that awareness is formed gradually.

Additions occurred in the aspect of ecological behavior, regarding the intention to participate in environmentally friendly workshops such as pottery workshops, creative workshops by Vans on upcycling and recycling to reduce plastic use, etc. Children play more ecologically through the presence of animals and landscape design. Supporting the existence of local products that prioritize sustainability and the eco-friendly movement. Respect and adhere to the regulations in place to preserve the existing vegetation and facilities.

Therefore, the results of this study indicate that sensory formal aesthetics that prioritize sustainability can influence visitors' behavior to act ecologically. The locality within the aesthetics provides a positive relationship between the involvement and attachment of the local community through three aspects that form the aesthetics within it. Locality that can be read based on formal and sensory aesthetics, in the form of local Sundanese materials and cultural gathering spaces, influences the occurrence of ecological behavior. The feeling of relaxation, breaks, and leisure through the presence of trees, animals, and waterfalls, whose aesthetics resemble the true depiction of nature, influence the behavior and feelings experienced by visitors. Ecological activities are influenced by the characteristics of visitors who are workers and families, duration of time, frequency of visits, and three aspects that form aesthetics (experience, property, and aesthetic value), resulting in behaviors such as children playing while learning about the environment, actively participating in workshops, supporting local eco-friendly products, adhering to rules in the green roof, and engaging in activities that do not harm nature.

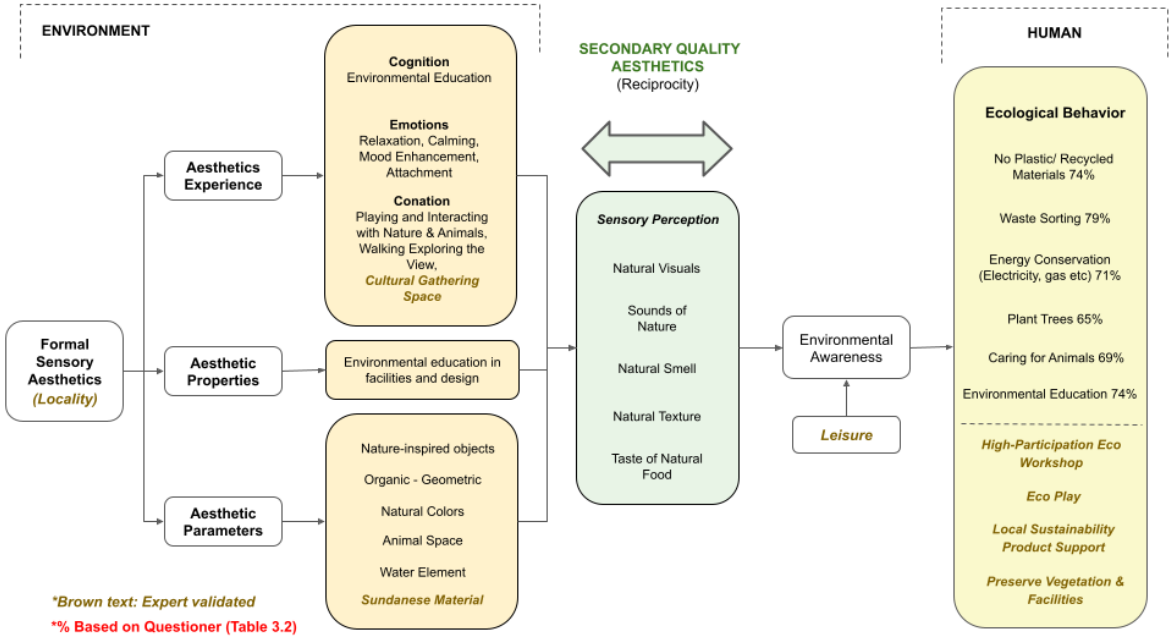

Figure 3.6. Validation of the Aesthetic Influence Model on Ecological Behavior (Author, 2025)

4. Conclusion

The results of this study support and align with the proposed hypothesis that the formal sensory aesthetics of the PVJ sky park can influence visitors to engage in ecological behavior, as demonstrated through the model. The development of the proposition occurs with the addition of elements of locality, visitor characteristics, duration and frequency of visits, which also influence environmental awareness and ecological behavior.

Aesthetics that combines elements of environmental education, spaces that accommodate the gathering culture of the Bandung community, designs resembling the original natural environment to evoke a sense of relaxation, and the use of local materials play an important role in influencing the ecological behavior of visitors. This shows that aesthetics has an experience and a feeling of connection to nature through the locality demonstrated by the design of spaces for the gathering culture of the Bandung community and its materials, a feeling of relaxation amidst the hustle and bustle, and knowledge through environmental education that positively impacts human ecological behavior towards nature.

The important role of aesthetics in this context creates attachment and engagement among visitors through sensory perception that arises from the reciprocal relationship between aesthetics and visitors. This reciprocal relationship creates environmental awareness derived from a sense of relaxation, rest, and environmental education in three aspects that form aesthetics. That awareness then influences visitors' behavior to be more ecological in engaging in activities that protect and are responsible towards nature. The resulting behavior is certainly influenced by visitor characteristics, duration and frequency, local aesthetics, and the three aesthetic-forming aspects possessed by the PVJ sky park. This research adds new insights in the context of the PVJ sky garden, where the aesthetics of green spaces can influence visitors' ecological behavior patterns through sensory perception and spatial attachment rooted in aesthetics. The findings from the PVJ sky garden can be used to strengthen the theory regarding the influence of formal sensory aesthetics on ecological behavior in green roofs.

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