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A STUDY OF BIOPHILIC ARCHITECTURE PRINCIPLES FOR WELLNESS CENTER DEVELOPMENT IN MEDAN

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Abstract

A healthy lifestyle that integrates physical activity and mental balance has become an essential need in modern society, particularly amid increasing work pressure and intensive daily routines. This condition is further exacerbated by the limited availability of green open spaces and facilities that adequately accommodate fitness and relaxation needs in the city of Medan. To address this issue, the provision of public facilities capable of supporting both physical and mental well-being is required. One potential solution is the development of a Wellness Center, defined as an integrated health and fitness facility that combines services such as gym activities, yoga, spa, fitness programs, relaxation therapy, meditation, and other health-related activities within a single environment. This study adopts a biophilic architecture approach, which integrates natural elements into the built environment to create an optimal atmosphere for relaxation and psychological restoration. The results indicate that the development of a medium- to large-scale Wellness Center in Medan is highly relevant. The proposed facility is designed to integrate fitness, relaxation, and holistic health services in a comprehensive manner, particularly in response to the dominance of the productive-age population, which accounts for approximately 67% of the total population, while also addressing the growing healthy lifestyle trends in the city of Medan.

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Wellness Center, Urban Stress, Mental Health, Biophilic Architecture, Medan City

1. Introduction

The development of urban areas in metropolitan cities has brought significant changes to the quality of the built environment. Rapid population growth, increasing building density, and the limited availability of green open spaces have become common challenges faced by many cities in Indonesia, including Medan City. These conditions not only contribute to environmental degradation but also intensify physical fatigue and psychological stress among urban communities.

As one of the major metropolitan cities on the island of Sumatra, Medan City recorded a population of approximately 2.49 million in 2025, with a demographic structure dominated by the productive-age group (15–64 years), accounting for around 67% of the total population. This demographic segment plays a crucial role in sustaining the city's economic activities while simultaneously experiencing high work demands, time pressure, and continuous exposure to urban environmental stressors. Consequently, maintaining a balance between productivity and mental recovery (work–life balance) has become an essential aspect of improving urban quality of life.

The health and fitness facilities currently available in Medan City generally operate in a fragmented manner and tend to focus primarily on physical activities, such as commercial fitness centers or individually operated healthcare services. This condition results in an inadequate provision of comprehensive health services that address physical, psychological, emotional, and environmental well-being in an integrated manner. Such circumstances indicate

the need for a holistic wellness facility capable of supporting the multidimensional health requirements of urban communities.

A wellness center is defined as a facility that integrates physical fitness, relaxation, disease prevention, and mental recovery within a unified spatial environment. In contemporary architectural discourse, wellness-oriented design increasingly emphasizes the importance of human–nature relationships as a fundamental component in enhancing health quality. One relevant approach in this context is biophilic architecture, which positions natural elements and qualities as integral components of the built environment.

Biophilic architecture is grounded in the biophilia hypothesis proposed by Wilson (1984), which suggests that humans possess an inherent tendency to seek connections with nature. Numerous studies have demonstrated that the incorporation of natural elements within built environments can reduce stress levels, improve cognitive performance, and enhance emotional balance. However, existing research on biophilic architecture has largely focused on aesthetic aspects or partial spatial strategies, with limited discussion regarding the integration of local demographic characteristics into wellness programming within urban contexts.

This study seeks to address this gap by formulating a synthesis of Wellness Center programming based on the demographic characteristics of Medan City, integrated with biophilic architectural principles. Unlike previous studies that primarily emphasize building form or visual expression, this research highlights the relationship between urban socio-demographic conditions particularly the dominance of the productive-age population and the formulation of spatial programs that support holistic physical and psychological health.

The objective of this research is to identify and synthesize the programmatic requirements of a Wellness Center based on the demographic characteristics of Medan City, as well as to examine the role of biophilic architectural principles in enhancing community health quality within a tropical metropolitan environment. The findings of this study are expected to contribute a conceptual framework for wellness facility development that may serve as a reference for other cities experiencing similar urban pressures.

2. Method

This study employs a descriptive qualitative approach aimed at understanding the relationship between the demographic characteristics of Medan City's population, the wellness needs of the productive-age community, and the application of biophilic architectural principles in the development of a Wellness Center facility. This approach was selected because the research focuses on conceptual analysis and spatial program synthesis rather than quantitative measurement or statistical testing.

2.1 Research Approach

The descriptive qualitative approach is used to examine urban contextual conditions, user-need patterns, and the characteristics of wellness facilities relevant to a tropical metropolitan environment. This study emphasizes an in-depth understanding of urban stress phenomena and architectural responses through the integration of wellness concepts and biophilic architecture.

2.2 Data Collection Techniques

Data collection was conducted through several stages as follows:

1. Literature Review
   A literature review was conducted on wellness theories, biophilic architectural principles, holistic health concepts, and relevant previous studies. The sources included peer-reviewed journals, academic books, and institutional publications related to healthcare architecture and the built environment.
2. Demographic Data Analysis
   Population data for Medan City were obtained from the Central Bureau of Statistics (Badan Pusat Statistik BPS), particularly data related to age structure. These data were

used to identify the dominance of the productive-age population and its implications for urban health and wellness facility requirements.

3. Field Observation
   Field observations were carried out at existing fitness and health facilities in Medan City to identify service characteristics, spatial patterns, and the level of integration between built spaces and natural elements. The findings were used to assess existing conditions and limitations of current wellness facilities.
4. Precedent Study (Case Study Analysis)
   Precedent studies were conducted on selected international Wellness Centers that apply biophilic architectural approaches. The analysis focused on spatial programming, space–nature relationships, natural lighting strategies, and user experience quality. These precedents were examined to obtain comparative insights adaptable to the local context of Medan City.

2.3 Analytical Framework and Research Stages

The research analysis was conducted through three main stages:

1. Urban Context and User Demographic Analysis
   This stage aimed to identify the characteristics of Medan City as a metropolitan environment and to understand the specific needs of the productive-age group as the primary users of the Wellness Center. The results generated parameters related to users' physical, psychological, and social needs.
2. Synthesis of Wellness Needs Based on the Productive-Age Group
   Based on demographic analysis and wellness literature, user needs were mapped into wellness dimensions, including physical, emotional, social, spiritual, and environmental aspects. This stage resulted in the formulation of activity programs relevant to urban lifestyle patterns.
3. Integration of Biophilic Architectural Principles into Spatial Programming
   The final stage involved synthesizing user wellness needs with biophilic architectural principles, such as visual connections to nature, the presence of natural elements, natural lighting and ventilation quality, and the creation of restorative spaces. This integration served as the conceptual foundation for developing the Wellness Center program in Medan City.

3. Result and Discussion

3.1 Contextual and User Demographic Analysis of the Wellness Center in Medan City

The analysis of Medan City's urban conditions indicates a pattern of daily activities strongly influenced by high mobility and intensive work demands. These conditions shape the characteristics of urban users who require spaces not only for physical activities but also for mental and emotional recovery. Based on demographic data analysis, approximately 67% of Medan City's population belongs to the productive-age group (15–64 years). This finding suggests that the primary users of wellness facilities are individuals exposed to substantial physical and cognitive workloads, thereby requiring environments that support continuous bodily recovery and psychological balance.

Field observations reveal that existing fitness facilities in Medan City are predominantly characterized by enclosed commercial gym typologies. Most of these facilities exhibit limitations in spatial diversity, access to natural lighting, and integration with natural elements. As a result, their functions tend to prioritize physical training activities rather than providing a comprehensive restorative experience.

These findings indicate a mismatch between user needs and the characteristics of existing facilities. The productive-age population requires not only spaces for improving physical fitness but also environments capable of reducing stress, stabilizing emotional conditions, and

enhancing overall environmental comfort. Consequently, a holistic wellness approach remains insufficiently accommodated within the current urban facilities of Medan City.

Based on the synthesis of demographic analysis and field observation results, this study identifies four primary user needs: physical recovery, psychological relaxation, social interaction, and connection with nature. These aspects serve as the fundamental basis for formulating a wellness center spatial program that responds to urban lifestyle patterns.

The analysis confirms that the development of a Wellness Center in Medan City requires an integrated spatial approach, in which physical, psychological, social, and environmental dimensions are designed simultaneously rather than as fragmented functions. Based on the demographic characteristics and urban context of Medan City, user needs were subsequently synthesized into a facility program aligned with the lifestyle of the productive-age population. This synthesis aims to generate a composition of spaces capable of responding to urban lifestyle pressures while supporting long-term quality of life, as summarized in Table 1.

Table 1 Identification of User Needs for Wellness Center in Medan

User Needs	Wellness Function	Proposed Facilities
Physical recovery	Physical Wellness	Gym, Aerobic, Cardio Area
Urban stress reduction	Emotional & Spiritual Wellness	Yoga Studio, Pilates, Spa, Meditation Room
Social interaction	Social Wellness	Healthy Café, Communal Area, Social Lounge
Connection with nature	Environmental Wellness	Therapeutic Garden, Reflexology Path

3.2 Biophilic Design

In this study, the biophilic architectural approach is employed as the primary design strategy to integrate natural elements into the built environment. This concept is rooted in the biophilia theory proposed by Edward O. Wilson (1984), which states that humans possess an inherent biological tendency and emotional affiliation with nature. The biophilic approach is applied through the incorporation of natural elements within architectural spaces to enhance users' physical, psychological, and emotional well-being.

In the context of dense urban fitness facilities such as those in Medan City, biophilic principles are implemented through the optimization of natural lighting, air circulation, the use of natural materials, the presence of vegetation, and both visual and non-visual connections to natural elements. The presence of nature is considered essential for urban communities, as the lack of natural elements in metropolitan environments is closely associated with declining physical and mental health quality. Numerous studies indicate that while both natural and built environments may contribute to stress reduction, natural environments tend to provide stronger restorative effects. Therefore, biophilic architecture extends beyond aesthetic considerations and plays a significant role in creating environments that support human health, comfort, and holistic well-being.

Biophilic design is generally classified into three primary categories of experience that shape human–nature interactions. The first is Direct Experience of Nature, which includes the presence of living vegetation, natural daylight, natural ventilation, and water elements (presence of water) that are physiologically proven to reduce heart rate and blood pressure. The second is Indirect Experience of Nature, expressed through the use of natural materials, wood

textures, and biomorphic forms that contribute to psychological comfort without requiring direct contact with living natural elements. The third category, Experience of Space and Place, emphasizes spatial configuration that provides a sense of refuge while simultaneously offering expansive outward views (prospect), a spatial quality considered crucial for creating a relaxing atmosphere within the densely built urban context of Medan City.

Through the integration of these three experiential categories, the proposed Wellness Center is expected to function as a restorative environment that supports holistic health and well-being for urban communities.

3.3 Functional Analysis of Wellness Centers and Their Facilities in Case Study Objects

The functional analysis was conducted to examine how various wellness center typologies—namely community-based, campus-based, and resort-based facilities—distribute their spatial programs to achieve holistic well-being, encompassing physical, mental, and social dimensions, across both private and public scales.

Table 2. Analysis of Spatial Program Distribution and Functional Organization in Case Study Objects

Objek Studi	Tipologi	Fasilitas Utama	Hasil Analisis Fungsi
Raga Svara (India)	Therapeutic & Ecological Wellness	A healthy restaurant, library, yoga center in a mango orchard, relaxation spaces, private cottages, and a swimming pool.	Focusing on privacy and contemplation, the placement of therapy units in secluded areas demonstrates privacy and deep reflection, directly connecting with nature to support mental well-being and self-healing.
Kaneka Wellness Center (Jepang)	Corporate & Physical Wellness	A gym, multifunctional rooms, relaxation areas equipped with OLED technology, and an eco-friendly living laboratory.	Emphasizing work-life balance, the facilities are designed to reduce occupational stress through precise thermal and visual comfort, supporting employees' physical and psychological well-being.
West Lafayette Wellness Center (USA)	Community & Inclusive Wellness	An aquatic swimming pool, fitness area (gym), communal spaces, running track, and public park.	Prioritizing social inclusivity, the spatial programs are designed with visual transparency to ensure safety while connecting different age groups in healthy communal activities.
Mashouf Wellness Center (USA)	Collegiate & Holistic Wellness Family & Social Wellness	A gymnasium (2 courts), competition and recreational pools, an elevated running track, universal changing rooms, and a juice bar.	Supporting student success through the pillar of sustainability, the complex features facilities such as a natatorium (competition pool), an elevated running track, universal changing rooms (gender inclusivity), and a juice bar to promote social well-being.
Titi Ubud Club (Bali, Indonesia)		A dance studio, skate park, squash and multi-sport courts, sauna, jacuzzi pool,	Functioning as a community-based family fitness center, the facility offers a diverse range of amenities that enable physical activity while

	playground, health clinic.	and fostering social interaction among families within a single area.

Results of Spatial Program Analysis

Based on the five case study objects, it can be concluded that the functional composition of a wellness center consists of three primary and interconnected zones:

1. Active Zone; This zone includes facilities such as gyms, swimming pools (as found in Mashouf and Titi Ubud), sports courts, and dance or yoga studios. These functions are primarily intended to support physical fitness and energy stimulation.
2. Passive/Therapeutic Zone; This zone comprises spa areas, saunas, meditation rooms, and reflective gardens (as exemplified by Raga Svara). The functions within this zone focus on mental recovery, relaxation, and emotional calmness.
3. Social Support Zone; This zone includes healthy cafés, libraries, and communal spaces designed to facilitate positive social interaction and promote social wellness.

The case studies highlight the importance of separating private functions (such as therapy and meditation spaces) from public functions in order to maintain user tranquility and comfort. At the same time, visual connectivity between zones is preserved through the use of transitional spaces, wide openings, and integrated landscape elements.This zoning pattern creates a gradual spatial experience, transitioning from dynamic and physically active environments toward calmer and more restorative atmospheres. Such an approach is considered a key principle in organizing the spatial program of the proposed Wellness Center in Medan, ensuring that each function operates optimally without compromising the comfort of other users.

3.4 Analysis of the Application of Biophilic Architecture Principles in a Wellness Center Case Study

The analysis was conducted by identifying design elements in three comparative study objects against biophilic architectural patterns to see the effectiveness of their application in wellness center facilities.

Table 3. Analysis of the Implementation of Biophilic Architecture Principles on Comparative Study Objects

Case Study Object	Applied Biophilic Patterns	Description and Analytical Results of the Design
Naman Retreat Pure Spa (Vietnam)	Visual Connection with Nature	The use of hanging vegetation and vertical planting on the building façade functions as a filter for tropical sunlight while simultaneously providing visual access to greenery from interior spaces.
	Thermal & Airflow Variability	The implementation of perforated screen walls and open corridors facilitates optimal air circulation while creating dynamic shadow patterns.
The Retreat at Blue Lagoon (Iceland)	Material Connection with Nature	The integration of authentic lava stone textures, exposed concrete, and warm wood materials provides a tactile and visual experience that reflects the surrounding volcanic landscape.
	Connection with Natural Systems	The direct utilization of geothermal energy for spa facilities and therapeutic lagoon functions.
	Prospect conncet to place	Each space is equipped with floor-to-ceiling glass openings that provide direct visual orientation

		toward the blue lagoon and the expansive, uninterrupted volcanic landscape.
Viveda Wellness Retreat (India)	Complexity & Order	Penempatan massa *cottage* melingkar yang mengikuti kontur alami lereng, menyerupai pola organik pemukiman tradisional.
	Material Connection with Nature	The use of basalt stone and reclaimed teak wood, handcrafted by local artisans, serves to integrate the building harmoniously with the natural ground.
The Therme Vals (Swiss)	Non-Visual Connection with Nature	Multisensory stimulation is achieved through the sound of water droplets resonating within stone spaces, the presence of water vapor, and carefully designed temperature variations that support biological relaxation.
	Prospect & Refuge	The spatial configuration employs contrasting opening strategies, in which certain areas are embedded into the slope to create a sense of refuge, while other spaces incorporate large openings oriented toward the mountain landscape to provide a prospect experience.
Taman Air Spa (Bali, Indonesia)	Material Connection with Nature	The use of approximately 60,000 local Valser quartzite slabs creates an atmosphere reminiscent of natural caves or stone quarries.
	Presence of Water	Water pools with gentle wave movements are positioned along the curvilinear circulation paths to generate continuous calming water sound effects.
	Visual Connection with Nature	Outdoor vegetation functions as a "building skin," in which existing trees are preserved and integrated into both the interior and exterior design.
	Material Connection with Nature	The combination of modern materials (concrete) with natural materials such as bamboo and wood in the reception and treatment areas is intended to create a warm and welcoming atmosphere.

Sintesis Hasil Analisis untuk Proyek di Kota Medan

Based on the analysis presented in the preceding table, several biophilic design patterns were identified as the most relevant for implementation in the proposed Wellness Center in Medan.

1. The integration of the *prospect and refuge* principle is considered essential. Given that wellness facilities require a high degree of privacy, therapeutic spaces should be designed as protected and enclosed environments (refuge), while simultaneously maintaining visual access (prospect) toward gardens or water elements. This approach is intended to prevent spatial claustrophobia and enhance users' psychological comfort.
2. Sensory and acoustic strategies play a significant role in mitigating urban stress. In the context of Medan's dense urban environment, the incorporation of water features as natural "white noise," combined with textured and natural materials, may facilitate a gradual psychological transition from the urban atmosphere to a more contemplative and meditative environment.

3. Responsiveness to the tropical climate constitutes a crucial design consideration. The application of a double-skin façade system integrated with vertical vegetation, as observed in precedents such as Naman Spa, demonstrates potential effectiveness in reducing indoor thermal loads while maintaining adequate natural daylight penetration. This strategy supports environmental comfort while reinforcing the biophilic character of the building.

3.5 Analysis of the Application of Biophilic Principles in the Wellness Center

Based on the analysis of users' relaxation and comfort needs within the urban context of Medan, this study formulates five fundamental elements as interior design parameters for the Wellness Center. First, the color palette should prioritize neutral and natural tones, such as beige, light gray, and sage green. These colors are selected due to their ability to create visual harmony and evoke a calming atmosphere without causing visual dominance.Second, the lighting strategy emphasizes the use of warm white lighting with adjustable intensity to support various relaxation activities, along with the integration of natural daylight to help regulate users' circadian rhythms. Third, the application of natural materials such as wood, natural stone, and bamboo is proposed to strengthen sensory connections with the environment while conveying a sense of warmth and spatial purity.Fourth, the connectivity between interior and exterior spaces should be maintained through large window openings or the incorporation of green walls, ensuring a strong and continuous visual relationship with nature. Finally, the creation of a multisensory experience is considered essential, achieved through the integration of soft material textures, natural aromatherapy elements (such as lavender and eucalyptus), and natural sound features derived from water elements.The synthesis of these elements aims to establish a restorative environment capable of facilitating users' full immersion in physical and mental well-being.

Figure 1. Illustration of Biophilic Element Applications in Wellness Center
Source: Pinterest, processed by Author (2026)

3.6 Program

3.6.1 Function Analysis

1. Primary Function

a. Gym

The gym serves as the main hub for strength and cardiovascular training, equipped with free weights, cardio machines like treadmills and ellipticals, and functional training zones. It accommodates diverse fitness levels, from beginners to advanced athletes, promoting muscle building, endurance, and fat loss through structured workouts. Space optimization includes mirrored walls for form checking, rubberized flooring for safety, and integrated ventilation to manage sweat and odors.

b. Yoga

The yoga studio facilitates mindful movement and flexibility practices, featuring non-slip mats, ambient lighting, and sound systems for guided sessions like Hatha, Vinyasa, or restorative yoga. It supports group classes or private sessions, enhancing mental clarity, stress reduction, and core strength while accommodating

props such as blocks, straps, and bolsters. Acoustic panels and temperature-controlled environments ensure a serene atmosphere conducive to breathwork and meditation.

c. Aerobic

The aerobic area hosts high-energy group classes like Zumba, kickboxing, or dance cardio, designed with sprung flooring to absorb impact and prevent injuries during rhythmic, calorie-burning exercises. It boosts cardiovascular health, coordination, and stamina for 20-60 participants per session, with motivational mirrors, stereos, and flexible layouts for choreography. Proper acoustics and exhaust systems maintain energy without overwhelming noise.

d. Pilates

The Pilates studio focuses on low-impact core strengthening and postural alignment through the use of reformer, cadillac, chair, and mat-based exercises that emphasize controlled and precise movements. This facility targets deep muscle activation, injury rehabilitation, and body awareness, making it suitable for users of all ages with equipment that allows adjustable intensity levels. Soft lighting, cushioned flooring, and wall-mounted reformers maximize spatial efficiency while creating a calm and focused environment.

e. Spa

The spa provides holistic relaxation through treatments like massages, facials, saunas, steam rooms, and hydrotherapy baths, using natural elements such as essential oils and heated stones. It alleviates muscle tension, improves circulation, and promotes skin health in private suites with dimmable lights, ambient music, and plush loungers. Wet zones require waterproof finishes and drainage for seamless operations.

f. Physiotherapy

The physiotherapy clinic provides holistic and personalized rehabilitation services for physical injuries, chronic pain, post-operative recovery, and mental well-being through manual therapy, electrotherapy, ultrasound treatment, and prescribed therapeutic exercises. These interventions stimulate endorphin release, help reduce anxiety and depression, and build patient confidence through gradual improvements in mobility. Therapists utilize treatment beds, modality equipment, and private consultation rooms to restore integrated physical and mental functions, reduce inflammation, prevent recurrent injuries, and facilitate social interaction that helps alleviate feelings of isolation. Integrated administrative areas and medical-grade storage support clinical precision, patient privacy, and a holistic approach that connects both body and mind.

2. Supporting Functions

a. Healthy Café

It functions as a supporting space for a healthy lifestyle by providing nutritious food and beverages, such as smoothies, salads, fresh juices, and balanced meals that support users' energy needs after exercising. The café is equipped with a service counter, display refrigerator, blender, coffee machine, and seating area, allowing visitors to rest while enjoying healthy intake suitable for body recovery.

b. Retail Area

It functions as a supporting commercial area that provides sports and health equipment such as fitness apparel, sports shoes, supplements, protein bars, sports accessories, as well as small training equipment such as resistance bands and foam rollers. This area is equipped with display racks, a cashier/point of sale system, and storage facilities, allowing users to purchase items that support their fitness activities while also enhancing the economic value of the facility.

c. Communal Area

The communal area functions as a social interaction space that supports the creation of social connections and a sense of togetherness within the fitness facility environment. This area serves as a place for gathering, discussion, and sharing experiences among users, both before and after engaging in activities. In addition to its social function, the communal area also acts as a transitional and relaxation space that allows visitors to take a short break, restore energy, and enjoy a more relaxed atmosphere. The presence of this space supports the formation of an active and inclusive community, enhances user comfort, and strengthens the concept of a healthy lifestyle that focuses not only on physical well-being but also on social and psychological wellness.

5.2.1 Division of Space Zones

In the design of a Wellness Center, the implementation of a zoning system is an essential aspect for regulating levels of access, privacy, and operational efficiency within the building. A clear separation between public functions and private functions, such as therapy and meditation spaces, is required to ensure user comfort and tranquility, as well as to support the optimization of wellness activities for users.

1. Publik Zone

The public zone is an area that can be accessed by all visitors without special restrictions and functions as a reception and social interaction space. Facilities included in this zone consist of the lobby, reception area, communal area, healthy café, and retail area. The public zone serves as the initial space that introduces the wellness concept while supporting social and commercial activities within an open and dynamic atmosphere.

2. Semi-public Zone

The semi-public zone is an area that can only be accessed by users or members who participate in fitness activities, yet it remains communal in nature. This zone includes the main facilities such as the gym, yoga studio, aerobic studio, Pilates studio, swimming pool, as well as changing rooms and shower areas. Activities within this zone involve moderate to high physical intensity, therefore requiring more controlled access while still allowing interaction among users.

3. Privat Zone

The private zone is an area with a high level of privacy intended for therapy, recovery, and personalized services. Facilities within this zone include spa treatment rooms, the physiotherapy clinic, therapy rooms, and consultation rooms. The private zone is designed with a calm atmosphere, soft lighting, and minimal disturbance in order to support the healing process, comfort, and the physical and mental well-being of users.

4. Service & Management Zone

The service and management zone is an area that supports the overall operational activities of the Wellness Center and is not accessible to the general public. This zone includes administrative offices, staff areas, management rooms, medical and equipment storage, utility rooms, and service areas. The presence of this zone is essential to ensure efficient facility management, maintain hygiene and safety standards, and support professional and sustainable services.

3.6.2 User Activity

1. Visitors/Clients

a) Daily Visitors/Clients

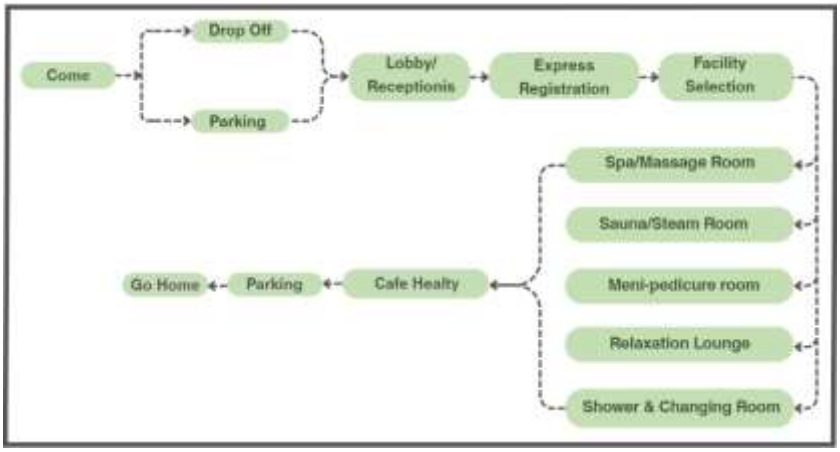
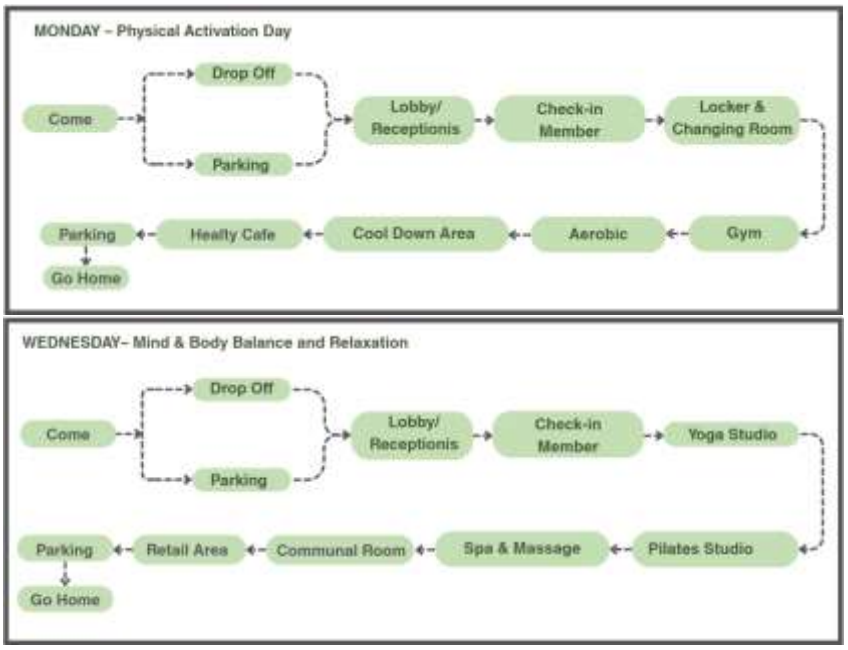


Figure 2. Mapping of Daily Visitor Activity Flow
Source: Author (2026)

The diagram illustrates the flow of visitor activities, starting from arrival and vehicle parking, then proceeding to the receptionist to purchase a ticket to select and access various activities such as primary activities (gym, yoga, spa, counseling, swimming, aerobics). Following this, there are secondary activities such as the library, healthy café, beauty treatment, retail products, and communal room. Additionally, there are supporting activities such as lockers, toilets, and changing rooms. After completion, visitors return to the parking area and depart.

b) Regular Members



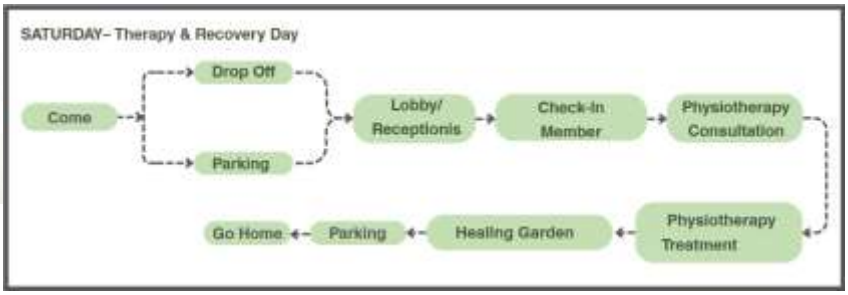


Figure 3. Mapping of Regular Member Visitor Activity Flow
Source: Author (2026)

Regular Members are visitors who attend the wellness center on a routine basis. According to the standards of the integrated wellness industry, which include physical exercise, therapy, and relaxation activities, the average visit frequency is estimated at 2–3 times per week, with different activity focuses spread throughout the week to support physical health, mental balance, and body recovery processes.

1) Monday – Physical Activation Day

On Mondays, activities are focused on physical activation to restore the body's fitness after the weekend. The visit flow begins when members arrive via the drop-off area or parking lot. Next, they proceed to the lobby/reception to check in. After checking in, visitors change into workout attire in the locker and changing rooms, then continue with exercise sessions in the gym and aerobic areas. Following the workout, members are guided to the cool-down area for light recovery, and may then visit the healthy café before returning to the parking area and leaving the premises.

2) Wednesday – Mind & Body Balance and Relaxation

Wednesdays focus on mind and body balance, with calmer and more relaxing activities. Visitors arrive via drop-off or parking, proceed to the lobby/reception for member check-in, and begin their session in the yoga studio. This is followed by activities in the Pilates studio, spa & massage treatments, and time in the communal room for social interaction and light relaxation. Before leaving, members may visit the retail area, then return to the parking lot and exit the wellness center.

3) Saturday – Therapy & Recovery Day

Saturdays are the peak of the wellness program, emphasizing therapy and body recovery. Visitors arrive via drop-off or parking and check in at the lobby/reception. Activities begin with a physiotherapy consultation, ollowed by personalized physiotherapy treatments. After therapy, members are guided to the relaxation area for post-treatment recovery, and may also use the swimming pool for light water therapy. Upon completion, visitors return to the parking area and leave the wellness center.

2. Management (Employees/Staff)

a) Staff Administrasi

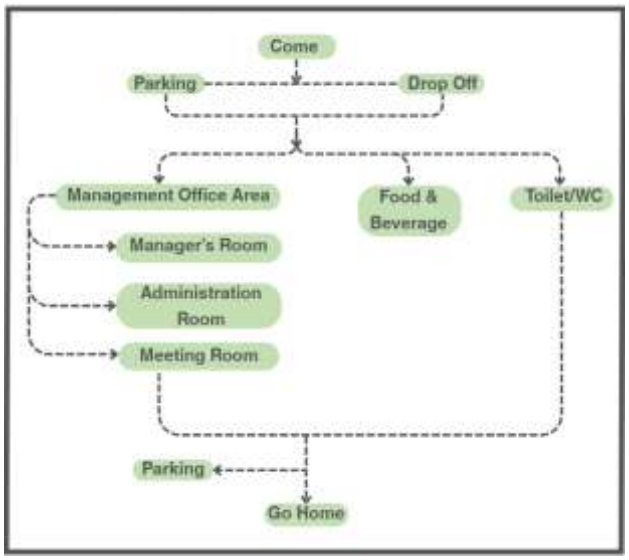


Figure 4. Mapping the Activity Flow of Management (Administrative Staff)
Source: Author (2026)

The activity flow for administrative staff begins from the parking area and proceeds to the management office area to oversee the operations/all activities and functional needs running smoothly, efficiently, and effectively, through coordination, communication, and maintaining security. After that, they can take a break using the ISOMA (rest, prayer, meal) facilities and restrooms. After completing all activities, the administrative staff will head back to the parking area to go home.

b) Expert/Professional Staff

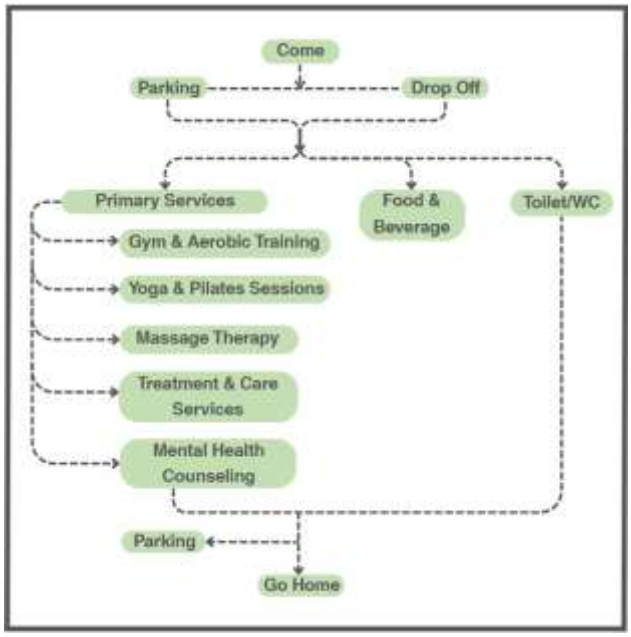


Figure 5. Activity Flow Mapping for Management (Expert/Professional Staff)
Source: Author (2026)

The activity flow for Expert/Professional Staff begins with arrival and vehicle parking. Next, they proceed to the primary service areas to provide guidance & training for fitness, yoga,

aerobics, perform massage therapy, and conduct mental and nutritional counseling for visitors according to their respective service expertise. When resting/finished, they can use the ISOMA (rest, prayer, meal) facilities and restrooms. Then they return to the parking area to go home.

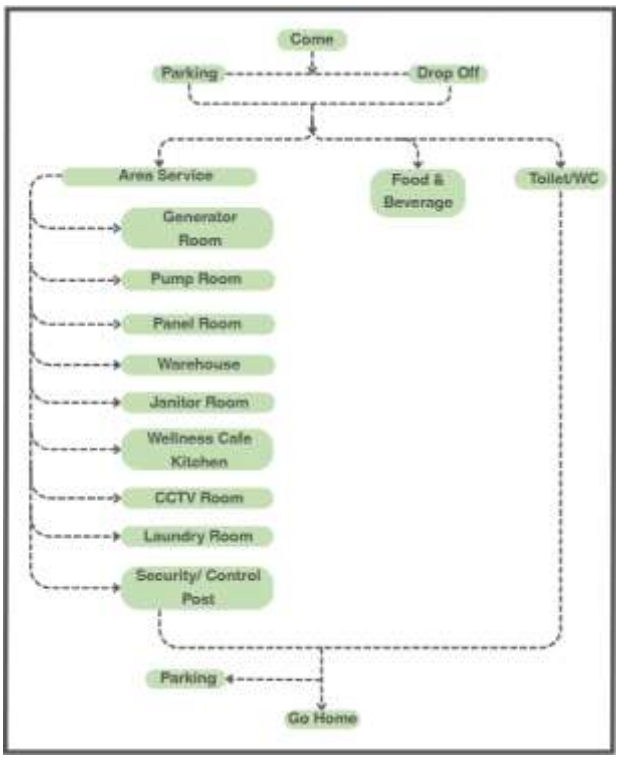


Figure 5. Mapping the Activity Flow of Service Personnel.
Source: Author (2026)

The activity flow for Service Personnel begins with arrival (come) via the parking area or drop off point. Afterward, they proceed to the Service Area to carry out operational duties according to their respective fields. These duties include technical management in the generator room, pump room, and panel room, as well as logistics management in the warehouse. Additionally, service staff are responsible for cleanliness in the janitor room, kitchen operations in the wellness cafe kitchen, security monitoring in the cctv room and security/control post, and sanitation management in the laundry room. During breaks or after completing their work, staff may utilize supporting facilities such as food & beverage for meals and the toilet/wc. Once all work activities are finished, they return to the parking area to go home.

3.6.3 Area Program Analysis

Table 2 Building Space Program

Facilities	Users	Activity	Rooms Used
Office Area	**Management**		
	General manager	Working, supervising, and making key decisions.	• Waiting Room • Manager Room • Administration Room • Meeting Room • Toilet/WC Man • Toilet/WC Woman
	Administrative staff, secretaries, or the finance/HR department	Managing documents, correspondence, and daily office operations	
	Internal teams, the board of directors,	Discussing, presenting, and coordinating projects	

	or staff members with clients.		
Primary Room (Physical Fitness)	**Gym**		
	Operational & Front-of-House	Administrative activities	• Gym Reception • Staff Locker and break • Security / Control Post
		Providing service information	
		Building operational monitoring	
	Service Providers & Educators	Providing instructional training	• Trainer Office / Control Desk • Equipment Storage & Maintenance Room • Staff Locker and changing room • Toilet & Shower Men • Toilet & Shower Woman
		Developing exercise programs	
		Maintaining and setting up gym equipment	
	Users / Clients	Performing weight training	• Reception & Checkin Counter • Main Workout Area • Functional Training Zone / Stretching Area • Men's Locker Room & Changing Area • Woman's Locker Room & Changing Area • Toilet & shower Men • Toilet & shower Woman • Drinking & Resting Corner
		Muscle stretching	
		Self-cleaning (showering)	
		Hydration and resting	
Primary Room (Physical Fitness)	**Pilates**		
	Operational & Front-of-House	Administrative activities	• Pilates Reception • Staff Locker and break • Security / Control Post
		Providing service information	
		Building operational monitoring	
	Service Providers & Educators	Providing instructional training	• Reception

		Developing exercise programs	• Waiting Area • Instructor Prep Room / Control Desk • Equipment Storage • Staff Locker • Toilet & Shower Men • Toilet & Shower Woman • Utility / Maintenance Room
		Maintaining and setting up pilates equipment	
		Administrative & monitoring activities	
	Users / Clients	Checking in and waiting	• Reception & • Waiting Area • Main Pilates Area • Mat Zone / Floor Exercise Are • Personal Pilates Room • Men's Locker Room & Changing Area • Woman's Locker Room & Changing Area • Shower & Toilet Men • Shower & Toilet Woman • Relaxing Corner/ Lounge
		Performing Pilates exercises	
		Self-grooming and changing	
		Relaxing and hydrating	
Primary Room (Physical Fitness)	**Aerobic**		
	Operational & Front-of-House	Administrative activities	• Pilates Reception • Staff Locker and break • Security / Control Post
		Providing service information	
		Building operational monitoring	
	Service Providers & Educators	Providing instructional training	• Reception & Check-in Counter • Instructor Platform / Control Desk • Equipment Storage • Staff Locker
		Developing exercise programs	
		Audio-visual and equipment setup	
		Monitoring class safety	

			• Toilet & Shower Men • Toilet & Shower Woman
	Users / Clients	Checking in and preparing	• Reception & Check-in Counter • Main Aerobic Hall • Mat & Step Area • Men's Locker Room & Changing Area • Woman's Locker Room & Changing Area • Shower & Toilet Men • Shower & Toilet Woman • Rest & Hydration Corner
		Participating in aerobic sessions	
		Self-cleaning and grooming	
		Post-workout recovery and hydration	
Primary Room (Physical Fitness)	**Yoga**		
	Operational & Front-of-House	Administrative activities	• Yoga Reception • Staff Locker and break • Security / Control Post
		Providing service information	
		Building operational monitoring	
	Service Providers & Educators	Preparing for classes and organizing equipment	• Reception • Equipment Storage • Instructor Preparation Room • Staff Locker/changing room • Toilet & Shower Men • Toilet & Shower Woman
		Providing instructional yoga training	
		Developing yoga practice programs:	
		Maintaining studio hygiene and equipment	
	Users / Clients	Checking in and mindful waiting	• Reception & Waiting Area • Main Yoga Hall • Men's Locker Room & Changing Area
		Practicing yoga and meditation	
		Post-workout recovery and relaxation	
		Self-cleaning and personal grooming	

			• Woman's Locker Room & Changing Area • Resting / Cool-Down Zone • Shower & Toilet Men • Shower & Toilet Woman
Primary Facilities (Emotional & Spiritual Wellness)	**Spa**		
	Operational & Front-of-House	Administrative activities	• Yoga Reception • Staff Locker and break • Security / Control Post
		Providing service information	
		Building operational monitoring	
	Service Providers & Educators	Conducting client consultations and assessments	• Reception & Consultation Area • Therapist Preparation Room • Treatment Equipment Storage • Laundry & Utility Room • Staff Locker • Toilet & Shower Men • Toilet & Shower Woman
		Preparing therapists and treatment rooms	
		Performing body care and therapy services	
		Performing body care and therapy services	
	Users / Clients	Checking in and waiting	• Reception & Waiting Area • Spa Treatment Room / Massage Room • Sauna / Steam Room • Jacuzzi / Hydrotherapy Room • Reflexology Room • Grooming Room • Meni–Pedicure Room • Men's Locker Room • Woman's Locker Room
		Receiving body and beauty treatments	
		Changing and securing personal belongings	
		Changing and securing personal belongings	

			• Men's Shower & Changing Room • Woman's Shower & Changing Room
Primary Facilities (Emotional & Spiritual Wellness)	**Physiotherapy**		
	Operational & Front-of-Ho	Handling patient registration and medical administration	• Physiotherapy Reception • Clean & Dirty Utility
		Managing consultation schedules and physiotherapy service information	
		Monitoring cleanliness and the availability of clean/dirty utilities	
	Service Providers & Educators	Conducting initial assessments and patient counseling	• Physiotherapist Office • Counseling room • Treatment Rooms (1 & 2 Bed) • Equipment & Linen Storage
		Providing physical therapy and rehabilitation treatments	
		Managing the storage of medical equipment and sterile linen/towels	
		Performing internal staff administrative activities	
	Users / Clients	Checking in at the receptionist and waiting for consultation or treatment schedules	• Reception & Waiting Area • Counseling & Treatment Rooms • Creation Studio. • Men's & Women's Patient Changing Room. • Toilet Men & Woman
		Engaging in counseling sessions and physical examinations	
		Receiving physiotherapy treatments on available beds	
		Performing recovery activities or exercises in the specialized studio	
		Changing clothes and self-cleaning	

Social Well-being	**Healthy cafe**		
	Operational & Front-of-Ho	Managing payment transactions and customer orders	• Cashier & Service Counter. • Service Area / Waste.
		Providing menu information and cafe services	
		Managing service area cleanliness and waste disposal	
	Service Providers & Educators	Preparing healthy food ingredients and beverages (juices/meals)	• Kitchen (Preparation Area) • Juice Bar / Counter. • Storage (Dry & Cold)
		Managing raw material stocks in dry and cold storage	
		Performing kitchen equipment dishwashing and cleaning activities	
	Users / Clients	Ordering and paying for food or beverages	• Healty Cafe Reception • Dining Area (Indoor) • Outdoor terrace / Garden Cafe • Cashier & Service Counter • Toilet Men & Woman
		Enjoying meals in the indoor dining area or the outdoor terrace	
		Engaging in social interaction and relaxing	
		Using public sanitation facilities	
Social Well-being	**Retail Area**		
	Operational & Front-of-House	Processing payment transactions and customer checkouts	• Cashier / Checkout Area • Fitting Room • Office / Staff Room.
		Directing customers to the fitting room	
		Coordinating staff during operational hours	
	Service Providers & Educators	Assisting customers with product information and fitting	• Display Area (Wall & Floor) • Storage / Back-of-House.
		Managing store operations and staff administrative tasks	
		Organizing and displaying products on the sales floor	

		Managing stock and back-of-house inventory	
		Maintaining the cleanliness and order of the retail area	
	Users / Clients	Browsing and selecting products in the display area	• Sales / Selling Area. • Display Area (Wall & Floor) • Fitting Room • Cashier / Checkout Area • Toilet Men & Woman
		Trying on apparel or products in the fitting room	
		Completing purchases at the cashier counter:	
		Using public sanitation facilities	
Social Well-being	**Communal Area**		
	Operational & Front-of-House	Managing guest arrivals and initial transitions	• Arrival / Transition Lounge
		Monitoring area security and communal facility maintenance	
	Service Providers & Educators	Maintaining the cleanliness and landscape of the inner garden	• Inner Garden / Healing Garden • Relaxation Lounge
		Assisting guests in finding suitable relaxation or quiet spots	
	Users / Clients	Entering the facility and adjusting to the environment	• Relaxation Lounge • Social seating • Quiet Seating • Inner Garden / Healing Garden.
		Relaxing and recovering in a peaceful setting	
		Engaging in social interactions and group seating	
		Finding silence and personal space for meditation	
		Enjoying nature and passive therapeutic activities	

3.6.4 Detailed Area Program

Reference sources for the spatial standards used :

Table 3 Source of Standard Measurements

No	Referensi	Simbol
1	Neufert Architect's Data	NAD
2	Time Saver Standards for Building Types	TSS
3	Metric Handbook Planning and Design Data	MHD
4	The Human Environment Model	THEM
5	Society for Experiential Graphic Design	SEGD
6	ISPA	International Spa Association
7	Global Wellness Institute	GWI
8	Healing Garden Design – Marcus & Barnes	Marcus & Barnes (1999)
9	WELL Building Standard v2	WELL v2
10	Society for Experiential Graphic Design	SEGD
11	Health Building Note	HBN
12	Australian Health Facility Guidelines	AusHFG
13	Personal Analysis and Assumptions	PAA

Table 4 Presentation of Circulation Calculations

No	Referensi	Simbol
1	20-25 %	Persyaratan Area Sirkulasi
3	30 %	Sirkulasi Kebutuhan Kenyamanan Fisik

4. Conclusion

Based on the results of the analysis and discussion, this study indicates that the development of a Wellness Center in Medan City holds a high level of urgency as a response to urban lifestyle pressures and the limited availability of holistic health facilities. The dominance of the productive-age population, accounting for approximately 67% of the total population, emphasizes the need for spaces that support a balance between work productivity and physical as well as mental recovery. The findings reveal that existing fitness facilities in Medan City remain primarily oriented toward physical activities, thus failing to comprehensively address multidimensional wellness needs. Through a synthesis of demographic analysis, field observations, and precedent studies, this research identifies key user requirements, including physical restoration, psychological relaxation, social interaction, and connection with nature. The application of biophilic architectural principles is proven to be a relevant design strategy for enhancing the quality of restorative spaces. The integration of natural elements, natural lighting, ventilation, organic materials, and spatial configurations based on prospect and refuge experiences contributes significantly to improving psychological comfort and overall user well-being. This approach functions not merely as an aesthetic expression but also as a performative strategy that supports holistic health. This study contributes to the development of a conceptual framework for Wellness Center design grounded in urban demographic characteristics and biophilic architectural principles. The proposed framework is expected to serve as a reference for designers, academics, and policymakers in developing sustainable and context-responsive health facilities in metropolitan cities, particularly within tropical climate regions such as Medan City.

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6. Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper. This research did not receive any external funding.

References

References use Vancouver style with numbering order as follow:
[1] Abdel H. *Raga Svara Wellness Center / Shanmugam Associates*. Accessed September 18, 2025. Available from: https://www.archdaily.com/998353/raga-svara-wellness-center-shanmugam-associates
[2] Abdel H. *Viveda Wellness Retreat / a for architecture*. Accessed September 18, 2025. Available from: https://www.archdaily.com/958179/viveda-wellness-retreat-a-for-architecture
[3] Abdel H. *Kaneka Wellness Center / Kengo Kuma & Associates + Taisei Design Planners Architects & Engineers*. Accessed September 18, 2025. Available from: https://www.archdaily.com/1009091/kaneka-wellness-center-kengo-kuma-and-associates-plus-taisei-design-planners-architects-and-engineers
[4] ArchDaily. *The Therme Vals / Peter Zumthor*. Accessed September 18, 2025. Available from: https://www.archdaily.com/13358/the-therme-vals
[5] Statistics Indonesia (BPS) Medan City. *Medan City in Figures 2025*. Medan: BPS Kota Medan; 2025.
[6] Browning W, Ryan C, Clancy J. *14 Patterns of Biophilic Design: Improving Health and Well-Being in the Built Environment*. New York: Terrapin Bright Green; 2014.
[7] Castro F. *Mashouf Wellness Center / WRNS Studio*. Accessed September 18, 2025. Available from: https://www.archdaily.com/907734/mashouf-wellness-center-wrns-studio
[8] Chaplin JP. *Relaxation*. 1999.
[9] Castro F. *Naman Retreat Pure Spa / MIA Design Studio*. Accessed September 18, 2025. Available from: https://www.archdaily.com/770560/naman-spa-mia-design-studio
[10] *Darmawan IGH, Sastrawan IWW, Warnata IN. Wellness center in Denpasar City with a healing environment approach. Journal of Architecture. 2021;9(1):134–142.*
[11] Wilson EO. *Biophilia: The Human Bond with Other Species*. Cambridge: Harvard University Press; 1984.
[12] Sport England. *Fitness and Exercise Spaces Design Guidance*. 2008. p. 8.
[13] Justice R. Biophilic concept in architectural design. *ARCADE Journal of Architecture*. 2021;5(1):110–119.
[14] Kusuma AB, Putra TW. Ethno-wellness as an economic approach of Sinduharjo waterfall based on social empowerment. In: *Entrepreneurship in Multiple Perspectives*. Tangerang Selatan: Universitas Terbuka; 2017. p. 73–82.
[15] Kellert SR. *Nature by Design: The Practice of Biophilic Design*. New Haven: Yale University Press; 2018.
[16] Koerniawan MD, Gao W. Investigation and evaluation of thermal comfort and walkability in hot-humid climates: Case study of Mega Kuningan Superblock open space, Jakarta. *BUILT International Journal of Building, Urban, Interior and Landscape Technology*. 2015;6:53–72.
[17] Musyawaroh DR. Application of biophilic architecture in the design of a wellness center in Jakarta. *Journal of Architecture Student Research*. 2024;7(2):564–573.

[18] Nursamsiah E, Setyowati E, Karsih. Social self-wellness profile of undergraduate students at the Faculty of Education, Universitas Negeri Jakarta. 2015.
[19] Pintos P. *West Lafayette Wellness Center / Perkins&Will*. Accessed September 18, 2025. Available from: https://www.archdaily.com/976161/west-lafayette-wellness-center-perkins-and-will
[20] Pintos P. *The Retreat at Blue Lagoon Iceland / BASALT Architects*. Accessed September 24, 2025. Available from: https://www.archdaily.com/985770/the-retreat-at-blue-lagoon-iceland-basalt-architects
[21] Rizki R, Faizal G, Firzal Y. Implementation of high-tech architectural concepts in fitness and wellness center design in Pekanbaru. 2020;18:291–302.
[22] Suci MRH. *Medan Wellness Center with a Biophilic Architecture Approach*. 2024.