Sustainable Architecture in Muslim Millennial MICE: Application of the 3E principles (Ecology, Economy, Equity)

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Abstract

The MICE (Meeting, Incentive, Convention, Exhibition) industry is rapidly developing as a strategic sector that drives economic growth, tourism, and the exchange of ideas in urban communities. The participation of the Muslim millennial generation is increasing, thus creating a need for MICE spaces that not only support professional activities, but also reflect spiritual values, diversity, and environmental sustainability. MICE design with a sustainable architectural approach is carried out to harmonize professional, social, and spiritual functions with ecological awareness. This study uses a research-based design method with a descriptive exploratory approach to produce the concept of "Empowering Ummah, Elevating Earth with Dhikr at the Heart of Every Encounter", which is implemented through integrated space zoning with the mosque as the center of activity. The three pillars of sustainability (ecology, economy, and social) are implemented through environmentally friendly design, support for halal MSMEs, and inclusive and equitable access to space. This research is a preliminary study that has not been widely found before, especially regarding MICE design for the Muslim millennial generation with sustainable architectural principles. The design is expected to be able to create a multifunctional, family-friendly MICE area, and reflect the role of millennial Muslims as caliphs on earth in maintaining the sustainability of the earth.

INTRODUCTION

The tourism industry in Indonesia is inseparable from the important role of the MICE (Meetings, Incentives, Conferences, and Exhibitions) service sector. In the era of globalization and the rapid development of the Industrial Revolution 4.0, supported by technological advances, the growth of knowledge, and increasingly competitive business competition, various national and international meeting and negotiation activities continue to increase, making the prospects for the MICE industry in Indonesia increasingly rapid growth (Kusuma, 2019).

The MICE (Meeting, Incentive, Convention, and Exhibition) industry is a strategic sector in economic and tourism development, serving not only as a forum for professional meetings but also as a medium for exchanging ideas, promoting the creative industry, and driving the growth of small and medium-sized businesses (Cupian et al. 2021). In Indonesia, the development of the MICE industry is increasingly relevant with the increasing role of the Muslim millennial

generation, which dominates the productive age demographic. Data from the Central Statistics Agency (BPS) shows that more than 64 million people, or approximately 50% of Indonesia's total Muslim population, are millennials. The millennial generation is characterized as a productive group that is technologically literate, ecologically aware, and prioritizes spiritual and social experiences in their daily activities (Fauziah, R. 2021).

Millennials, the age group between 25 and 40, currently dominate the productive demographic in Indonesia. According to data from the Central Statistics Agency (BPS), this generation is a key pillar of the economy, both as a workforce and as the largest consumers in various industries. They have different preferences than previous generations, particularly in terms of lifestyle, including the increasingly popular halal lifestyle (Mursalin, H. 2023). Among Indonesia's millennial population, a significant number are Muslim, which has a direct impact on the increasing demand for sharia-compliant products and services, including in the MICE (Meeting, Incentive, Convention, and Exhibition) sector.

From an Islamic perspective, the millennial generation of Muslims plays the role of caliph on earth, or leader on earth. The concept of caliph on earth, as explained in the Qur'an (QS. Al-Baqarah: 30), mandates humans to protect and prosper the earth. This responsibility encompasses not only social and economic aspects but also ecological awareness in the management of nature and resources. This understanding gives rise to the view that architectural spaces must be designed with the principles of maintaining natural balance, promoting social welfare, and not forgetting the spiritual aspect in everyday human activities.

Meanwhile, growing awareness of the importance of sustainability in architecture is gaining increasing attention globally. Sustainable architecture is not just a design trend, but rather a strategic approach that takes ecological, social, and economic aspects into account in a balanced manner (Shofi'. 2020). The application of sustainable architecture principles in the design of MICE buildings is highly relevant, considering the large environmental impact that mass activities such as conventions, exhibitions, and large-scale meetings can have. Starting from energy consumption, water use, waste production, to the impact on the surrounding area. Therefore, the principles of energy efficiency, rainwater management, optimization of natural lighting, and the creation of green open spaces are important parts of an environmentally friendly MICE design strategy.

Based on the author's observations, existing MICE facilities do not fully meet the needs of millennial Muslims, including in terms of providing places and services that comply with Islamic sharia principles. One common example is unclear access to prayer rooms, minimal ablution facilities, and limited availability of halal food (Fauziah, R. 2021). This is important to note because for a Muslim, every action and decision taken in this world will be accounted for in the afterlife. As Allah says in the Qur'an, Surah Az-Zalzalah verses 7-8: "Whoever does good equal to the weight of an atom will see it . And whoever does evil equal to the weight of an atom will see it ." This verse emphasizes that everything we do, including how we worship and maintain our commitment to religious rules, will be a witness in the afterlife.

The need for MICE facilities that accommodate Islamic values and sustainability principles is becoming increasingly important amidst the growing participation of the Muslim millennial generation. Designing MICE areas with mosques as activity centers, environmentally friendly circulation routes, flexible multi-functional spaces, and the integration of halal MSMEs and

green open spaces can be a comprehensive solution to meet the needs of today's productive Muslim millennial generation.

Therefore, this study aims to formulate a design concept for a MICE area that harmonizes Islamic spiritual values, the professionalism of the MICE industry, and the principles of sustainable architectural balance that encompass ecological, economic, and social justice (equity) aspects. This area is expected to be a concrete representation of the role of the Muslim millennial generation as khalifah fil ardh, who contribute to maintaining the sustainability of the earth through ecological spatial design, supporting the economic growth of the community, and providing inclusive and equitable access to space for all levels of society.

LITERATURE REVIEW

1. Basic Concepts of MICE (Meeting, Incentive, Convention, and Exhibition)

MICE is a tourism service business consisting of Meetings, Incentives, Conventions, and Exhibitions (MICE). These four types of activities are efforts to provide services for meetings, including showcasing business products (Tyas, Annisa, 2020).

Meeting is a meeting/gathering of a group of people who are members of an association, a company that has the same interests with the goals and interests of discussing a common problem (Tyas, Annisa. 2020). Incentives, namely incentive travel, is a travel activity organized by a company for employees and business partners as a reward for their achievements (Tyas, Annisa. 2020) . Conventions are meetings of a group of people (statesmen, entrepreneurs, scholars, professionals and so on) to discuss issues related to common interests and usually in a large number of participants (Tyas, Annisa. 2020) . Exhibition is a form of activity to show, demonstrate, introduce, promote and disseminate information on the results of production of goods/services or visual information in a certain place within a certain period of time to be witnessed directly by the public to increase sales, expand the market and seek trade relations (Tyas, Annisa. 2020).

According to the World Tourism Organization, meetings and business events are tourism activities that provide a significant contribution to the Gross Domestic Product for a country and region and can become branding for a destination (UNWTO, 2016) in (Tyas, Annisa. 2020).

2. Criteria for Selecting MICE Facilities by the Muslim Millennial Generation

Generation Y, also known as Millennials, is the generation born between 1981 and 1996. They are an influential group in the tourism industry, including MICE. They are known for their strong digital habits, are more connected to technology, and tend to seek unique and authentic experiences in every activity they participate in (Anuar et al., 2021). Millennials are highly attracted to interactive, technology-based events that support networking and collaboration (Taiminen et al., 2019).

In the context of MICE, they prefer flexible events, entertainment elements, and opportunities for both in-person and virtual interaction. Kusumaningrum & Putra (2020) noted that MICE event organizers must adapt their event formats to be more dynamic and interactive

to attract this generation, which is increasingly connected to digital devices. Millennial Muslims are a rapidly growing consumer segment in the halal tourism industry .

For millennials, lifestyle encompasses many aspects, including time allocation, education, exercise, and even religious practices. Millennials prioritize spending time on enriching experiences, such as traveling and learning new skills, according to a report from *Eventbrite,* which shows that 78% of millennials prefer spending their money on experiences over material products (Eventbrite, 2017). According to research from *the World Economic Forum (WEF)* , millennials prefer education to be more flexible and relevant to industry needs. They prefer online learning methods and courses that offer practical skills that can be directly applied in their careers (WEF, 2016). A study by *the Pew Research Center* shows that millennials are more likely to practice their religion in a personal and flexible way. They utilize digital platforms to learn about religion through apps, podcasts, or videos on social media, which gives them the freedom to learn about religion at a time and place of their choosing (Pew Research Center, 2018).

According to Rahman et al. (2020), they care not only about religious aspects such as the availability of halal food and prayer facilities, but also about ethical values, the environment, and sustainability. Millennial Muslims are more selective in choosing events and destinations that comply with Sharia principles and are often more likely to choose providers that support a halal lifestyle and sustainability (Zamani- Farahani & Eid, 2021). Research by Zamani-Farahani and Henderson (2021) confirms that Muslim millennials are increasingly concerned about environmental aspects, making halal tourism a key factor in determining their participation in MICE events.

In a study by El-Gohary et al. (2020), Muslim tourists, including millennials, tend to choose destinations and tourism services that meet their religious needs. Factors such as the availability of halal food, access to prayer facilities, and event schedules that do not clash with prayer times are important in influencing their decision to participate in MICE events. Ramli et al. (2021) added that the more integrated religious needs are into an event, the more likely millennial Muslims are to engage.

Based on research on the Study of Perception and Preferences for MICE (Meeting, Incentive, Convention, and Exhibition) Design from the Perspective of Muslim Millennials in Medan City 2024, the perspective of Muslim millennials shows a significant difference between the current MICE event design and the preferences of Muslim millennials.

This study highlights that Muslim millennials have specific criteria that are not yet fully met by current MICE event organizers. The main criteria of concern in this study is the need for adequate prayer facilities , such as a comfortable and easily accessible prayer room during the event. Furthermore, a library space that supports educational activities and a family-friendly playground are also important elements for Muslim millennials in choosing MICE events. This study provides clear insights into the importance of understanding the unique preferences of Muslim millennials in designing MICE events. By accommodating their specific needs, such as adequate prayer facilities, educational spaces, and family-friendly facilities, the MICE industry can become more inclusive and relevant to this growing segment. MICE organizers are expected to use the results of this study as a guide to create more meaningful event experiences, which are not only professional and educational, but also aligned with religious values and a halal lifestyle .

The author conducted a comparative study of the spatial criteria of 10 MICE facilities in various countries with similar functions and themes. Based on the research results, it was found that :

- Space flexibility : All convention centers offer highly flexible and adaptable spaces for a wide variety of events.
- Large Capacity : Each convention center is designed to accommodate large numbers of attendees, with varying capacities.
- Modern Technology : All these centers are equipped with the latest technological infrastructure.
- Sustainability Criteria : Sustainability is a key focus in design and operations.
- Accessibility and Location : Strategic location in the city center and good access via public transportation are important features for all centers.
- Supporting Facilities : Each convention center offers additional facilities such as catering space, outdoor areas, and breakout rooms that support social interaction among participants.

Although the MICE (Meetings, Incentives, Conferences, and Exhibitions) sector has grown rapidly and become a vital part of the global tourism and business industry, studies specifically addressing MICE in the context of millennial Muslims and their halal lifestyle remain limited. The halal lifestyle, which encompasses Sharia values in various aspects of life, from food and worship to business ethics, is increasingly gaining attention in various industries, including tourism. However, so far, there has been no comprehensive study specifically highlighting how this halal lifestyle influences the needs and preferences of Muslim millennials in participating in or organizing MICE events. With the increasing awareness of the halal lifestyle among millennial Muslims, it is crucial to understand how their needs for Sharia-compliant facilities and services can be incorporated into the planning and implementation of MICE events. The absence of studies addressing this issue indicates a research gap that needs to be filled to support the development of a more inclusive and halal-compliant MICE industry.

3. Sustainable Architecture (3E: Ecology, Economy, Equity)

According to Guyer (2009) in Pamungkas (2020) Sustainable is an applied concept in the field of architecture to support the concept of sustainability, namely a concept of maintaining natural resources so that they last longer which is linked to the life span of the vital potential of natural resources and the human ecological environment, such as the planet's climate system, agricultural system, forestry industry, and of course architecture.

Simply put, sustainable architecture can be defined as environmentally conscious architecture. Therefore, sustainable design is design that can address the conditions associated with the global environmental crisis, including rapid economic growth and human population growth, natural resource depletion, ecosystem degradation, and the loss of human biodiversity (Pamungkas, 2020).

The sustainable development scheme is at the intersection of three spheres: environmental, social and economic. Fig. 1 explains that sustainable development requires three equally strong and mutually supportive sectors, namely: economic growth, environmental

protection from the negative consequences of development and improving the quality of life of the community (Danusastro, 2010, p.9) in (Pamungkas, 2020).

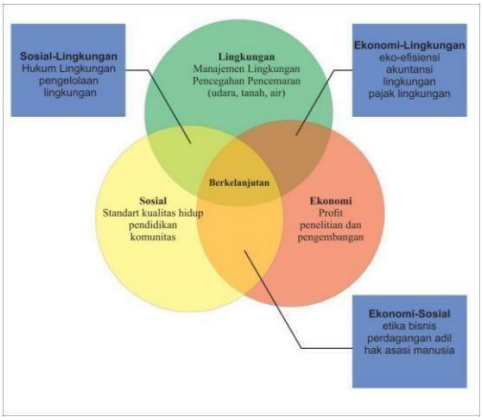

Fig. 1. Three Elements of Sustainable Development
(Source: Danusastro, 2010, p. 10, edited by the author, 2025)

Sustainable development has three main pillars that are interconnected (Hapsoro, 2020), including:

- **Ecology:** namely by maintaining a comfortable and safe residential environment through zero emissions.
- **Economy:** namely maintaining stable economic growth by restructuring the productive system to save resources and energy.
- **Equity:** namely ensuring social justice in the distribution of wealth and social services.

The three aspects of sustainable development (economic, environmental, and social) are key pillars that must be integrated in a balanced manner into every design and development process. The economic aspect ensures business continuity and resource efficiency; the environmental aspect maintains natural sustainability and environmental quality; while the social aspect ensures equitable distribution of development benefits and community well-being. All three are interrelated and mutually supportive in realizing development that prioritizes not only growth but also sustainability for future generations. The integration of these three aspects is an important foundation in designing facilities and spaces, including in the development of an inclusive and environmentally friendly MICE industry.

METHODS

This design uses a research-based design approach, a design approach that relies on research findings as the primary basis for design decisions. The research was conducted in two forms: field research and literature research, to obtain contextual data, user needs, and in-depth theoretical references.

1. The research stage is divided into two, namely literature research and field research.
   - Literature Research
     - Study of the Muslim Millennial Generation: Psychological, Social, and Lifestyle Characteristics of Muslim Millennials Based on Academic and Statistical Sources.

- Principles of sustainable architecture: passive design strategies, energy efficiency, environmentally friendly materials, water management, and green open spaces.
- MICE building typology and standards: space function, capacity, circulation, zoning, and technical requirements
- Case study: analysis of MICE buildings and other sustainable public spaces as an inspirational reference.

- Field Research
  - Site study (site visit): analysis of the physical condition of the site such as sun orientation, wind direction, contour, accessibility, vegetation, and potential views.
  - User survey/interview: data collection through observation, interviews, and questionnaires of target users (millennial Muslims), covering habits, space preferences, lifestyle, and MICE activity needs religiously and socially relevant.
  - Local MICE activity study: observation of similar MICE events that have been held, including the facilities used and visitor circulation flow.

2. Design Stage

   The design process is carried out systematically, starting from exploration ideas to technical drawings, through the following stages:

   - Collection and analysis of research data (field & literature)
   - Identify site and user problems and potential
   - Formulation of issues and planning concepts
   - Development of space and zoning programs
   - Study of mass and form (architectural mass & form)
   - Design development (mass layout, facades, circulation systems, etc.)
   - Detailing (materials, structures, openings, landscape elements)
   - Preparation of working drawings/detail drawings (DED)

RESULTS AND DISCUSSION

1. Project Description

Based on the results of previous descriptions and studies, a Muslim millennial MICE area was designed with a sustainable architectural approach that integrates the principles of ecology, economy, and social justice (equity). The project is planned to be located at Jl. Mongonsidi No. 1, Polonia, Medan Polonia, Medan City, North Sumatra, with a land area of ± 30,000 m². Based on the RDTR, the site is included in the commercial service zone (K2). Currently, the land is a strategic vacant area for development because of its location close to the city center. This location is supported by supporting facilities in the surrounding area, such as hotels, restaurants, and shopping centers, which greatly support MICE activities.

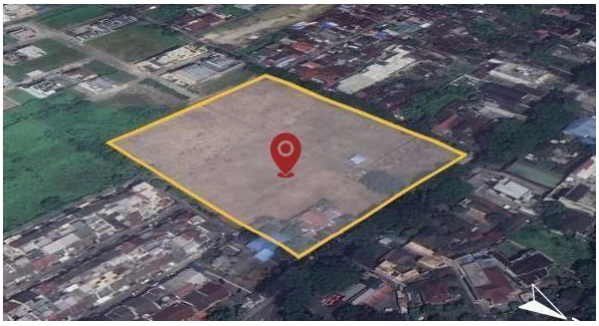

Fig . 2. Site Location
(Source: author)

The study, "A Study of MICE Design Perceptions and Preferences from the Perspective of Muslim Millennials in Medan 2024," reveals a mismatch between current MICE design and the needs of Muslim millennials. They expect comfortable prayer facilities, educational spaces such as libraries, and family-friendly playgrounds. The results of this study serve as the basis for designing spatial programs to create MICE facilities that are more inclusive, functional, and in line with the religious values and halal lifestyle of Muslim millennials.

To understand the rationale for designing Muslim Millennial MICE with a sustainable architectural approach, a conceptual diagram was compiled that illustrates the relationship between the characteristics of the Muslim millennial generation, their adopted lifestyle, and its implications for space needs and the principles of sustainability in architecture.

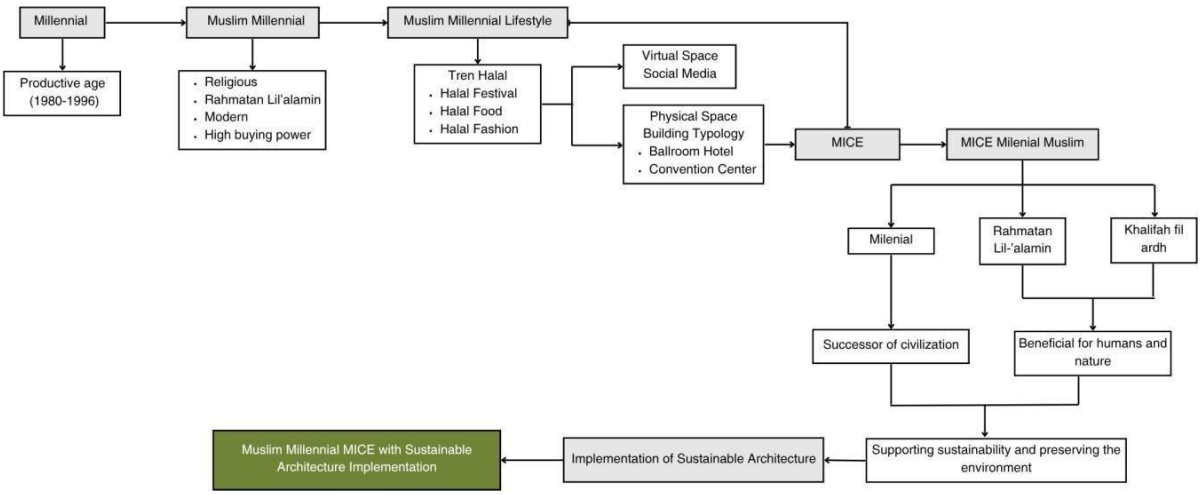

Fig . 3. Scheme of Thought
(Source: author)

Fig. 3 shows a flowchart that summarizes the relationship between the characteristics of the Muslim millennial generation, halal lifestyle, and the need for physical and virtual spaces in the context of the MICE (*Meeting, Incentive, Convention, and Exhibition*) industry. In this chart, it is shown that the Muslim millennial generation who are in their productive age and have high purchasing power have a tendency towards a halal lifestyle, such as halal festivals, halal food, and halal fashion. This need then leads to the need for MICE spaces that not only support professional and social activities, but also reflect spiritual values such as *Rahmatan lil 'alamin* and ecological responsibility as *khalifah fil ardh* . Therefore, the concept of Muslim Millennial

MICE with the implementation of sustainable architecture is important as a form of integration between identity, space needs, and environmental responsibility.

2. Design Exploration

The concept of Muslim millennials as *khalifah fil ardh* (leaders and guardians of the earth) serves as the philosophical foundation for this design exploration. The productive-age millennial generation not only plays a strategic role in social and economic development but also has a moral responsibility to maintain environmental sustainability. As a technologically literate and socially active generation, they require spaces that are not only functional and modern but also reflect spiritual values and concern for the sustainability of the earth. Therefore, the theme of sustainable architecture was chosen as the primary approach, in order to design a built environment that can holistically address the physical, emotional, and spiritual needs of this generation .

The discussion in this study resulted in a design concept for a MICE area for Muslim millennials using a sustainable architectural approach based on the principles of balance: ecology, economics, and social justice (equity). This balanced concept is expected to create a MICE area that not only meets the professional needs of the Muslim millennial generation but also represents ecological and social responsibility as a manifestation of their role as khalifah fil ardh.

- Ecological Aspect

The ecological aspect in the design of MICE areas is an important foundation that reflects the role of the younger generation of Muslims as *khalifah fil ardh*, or guardians and stewards of the earth. This approach emphasizes a harmonious relationship between humans and the environment with the aim of creating spaces that not only function optimally but are also ecologically responsible. According to Hapsoro (2020), one of the main pillars of sustainable development is ecology, which is realized through efforts to keep the environment comfortable and safe with the principle of zero emissions. In line with this, ecological balance and energy efficiency are the main principles in sustainable architecture theory, which emphasizes energy efficiency, rainwater management, cross ventilation, and the existence of green open spaces. The alignment of this theory is evident in the application of ecological design parameters for MICE areas, such as energy efficiency through building massing and natural ventilation (Wang et al., 2019), provision of approximately 40–50% green open space to create a healthy microecosystem (Liu et al., 2022), the use of environmentally friendly materials with a low carbon footprint (Pritesh et al., 2017; Beheshti et al., 2024), and the application of renewable energy systems, rainwater harvesting, and integrated wastewater management (Shao et al., 2019; Chiu et al., 2023; Alberto et al., 2018). In the context of MICE events, this ecological balance is also reflected in the balance between public and private spaces, where meeting rooms, exhibition halls, and public open spaces are flexibly designed to accommodate professional, social, and spiritual needs. Therefore, the ecological aspects in MICE area design are not only a manifestation of the Muslim generation's responsibility towards the environment but also realize the theory of sustainable development balance into a tangible, measurable, and applicable design strategy.

  - Massing

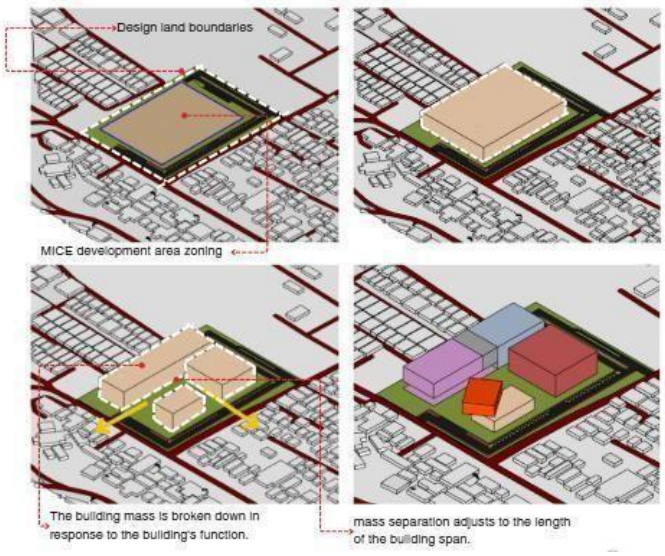

Fig . 4. Mass transformation that implements energy efficiency and environmental friendliness (Source: author)

- Energy Efficiency

  As stated by Wang et al. (2019), *subtractive building massing* can significantly optimize natural lighting and directly reduce a building's electricity needs. Based on this principle, the mass transformation in this design is carried out through the following steps:

  - The division of building mass based on function by applying a subtractive strategy, thus enabling the optimization of natural lighting and cross ventilation.
  - The creation of gaps between building masses that function as air corridors and natural light entry paths, in order to reduce dependence on artificial energy such as air conditioning (AC) and electric lighting.

- Environmentally Friendly and Public Space

  The arrangement of building masses that leave space between buildings is intended to support the creation of functional green open spaces, such as infiltration areas, gardens, and inner courtyard vegetation. As explained by Liu et al. (2022), the configuration of green open spaces on a block scale can create healthier micro-ecosystems, lower local air temperatures, and significantly improve thermal comfort. This can be achieved with a sufficiently large proportion of green open space, approximately 40–50% of the total land area, which plays a crucial role in rainwater absorption and air filtration.

  The results of this design are concrete evidence of the application of this principle, through:

  - The separation of building masses leaves plenty of space between buildings for green areas, infiltration gardens, and vegetation.
  - The proportion between building area and open space reaches ±45%, which creates a healthier micro-ecosystem and supports ecological functions such as lowering local temperatures, absorbing rainwater, and filtering air.

- Use of Environmentally Friendly Materials

Use of Environmentally Friendly Materials, various sustainable materials are selected such as GRC board facade panels, perforated acoustic panel ceilings, auditorium space with vinyl and carpet floors, tempered glass skylights + WPC louvers, to landscapes in the form of grass blocks or grass. which functions not only aesthetically, but also improves environmental performance and user comfort. A study by Pritesh et al. (2017) and Beheshti et al. (2024) confirmed that micro -perforated panels (MPP) based on natural fibers such as sugarcane bagasse or jute are able to provide high sound dampening performance at low to medium frequencies with a low carbon footprint, and are superior to conventional plastic panels. The implementation of this material in the design of especially the use of perforated acoustic panels and skylights with WPC (wood plastic composite) is concrete evidence of this principle. Acoustically enhanced perforated panels, combined with weather-resistant WPC materials and the possibility of vegetation (such as grass blocks), help create a MICE environment that is acoustically comfortable, healthy, and has a low ecological impact.

Fig . 5. Environmentally Friendly Materials
(Source: author)

- Ongoing Features

Sustainable features in this design are implemented as part of a commitment to green architecture, which aims to improve energy efficiency and comprehensive resource management. The integration of technologies such as *photovoltaics* , *thermal collectors* , *rainwater harvesting* , and *hybrid cooling* are essential elements in supporting the building's sustainable and environmentally responsible performance.

- Photovoltaic, Thermal Collectors, Rain Water Harvesting, Hybrid Cooling, etc

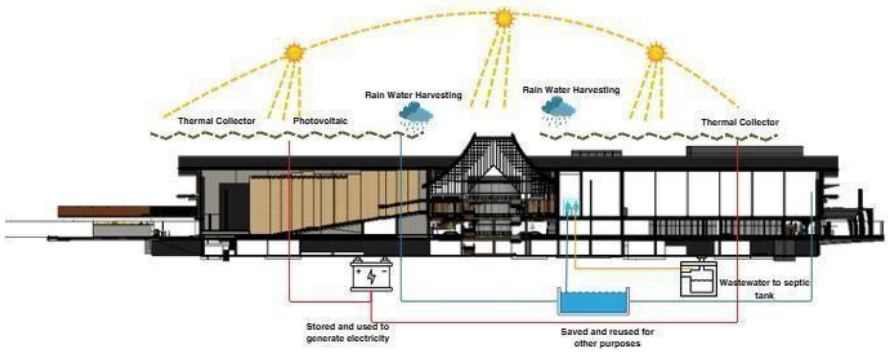

Fig . 6. Sustainable features of utility systems in buildings
(Source: author)

[1] Utilization of Solar Energy

According to a study by Sirin et al. (2023), the integration of photovoltaic panels and solar thermal collectors into roof structures and building facades significantly reduces electrical and thermal energy consumption. This is in line with the findings of Shao et al. (2019), who stated that *building-integrated photovoltaic-thermal* (BIPV/T) systems can generate both electrical and thermal energy, with a total efficiency of approximately 86.8% , and can reduce heating and cooling loads by 39.9%, respectively . and 38.6%. The design applies this principles through:

- Photovoltaic Panels**:** Photovoltaic solar panels are installed on building roofs to capture solar energy and convert it into electricity. The resulting electrical energy is stored and used for building operations.
- Thermal Collectors**:** Solar thermal collectors are installed to absorb solar energy and produce hot water or are used as part of a building's natural cooling system.

[2] Rain Water Harvesting (Rainwater Utilization)

A`ccording to a study by Chiu et al. (2023), rainwater harvesting (RWH) systems in urban environments have been shown to reduce water pump energy consumption by up to 21.3%. within a year of operation for basic households, while reducing clean water use by up to 21.3% in hilly cities in Taiwan. The implementation of this system in the design of MICE areas is a concrete demonstration of the application of this principle, where:

- The building's roof is designed to capture rainwater, which is then channeled to a storage system.
- Collected rainwater is reused for various building purposes such as watering gardens, flushing toilets, or cooling systems.

[3] Wastewater Management

According to Alberto et al. (2018), an onsite wastewater management system that combines a septic tank with a multi-level constructed wetland successfully reduces contaminants such as FOG (fats, oil, grease) by approximately 67.5% **,** Suspended Solids (SS) by 75.2% **,** Suspended Solids Total (TSS) by 55.5% **,** Biological Oxygen Demand (BOD_5) by 61.1% **,** and Chemical Oxygen Demand (COD) by 49.6% at the initial septic tank stage, while the advanced unit (up flow anaerobic filter) increases the removal efficiency to 85.7% for BOD **,** 71.1% for COD **,** and 100% for SS and reduces pathogens by up to 95.6%.

The implementation of this approach in the design of MICE areas is concrete evidence of the application of this scientific strategy. These include:

- Wastewater from all activities in the building is channeled to the first septic tank for initial separation of solids and oil.
- The liquid waste that comes out of the septic tank is then channeled to a further processing unit (for example an anaerobic filter or constructed

wetland), which functions to optimize the control of contaminants, pathogens, and nutrients.

- This system supports environmental protection efforts by producing treated wastewater that is safer to dispose of or even reuse for landscaping or non-potable sanitation needs.

[4] Water Circulation System

According to a study by Domènech & Saurí (2011), separating clean water and wastewater systems and implementing rainwater reuse can significantly reduce pressure on urban water resources. This system allows for clean water savings of up to 47% in household scenarios, particularly in urban areas with limited water availability. This demonstrates that rainwater utilization and water reuse support effective water resource conservation practices.

In designing this MICE area, these principles are applied through:

- Separation of the piping system between clean water (either from PDAM or *rainwater harvesting*) and wastewater, to avoid contamination and facilitate processing.
- Rainwater collected on the roof is channeled to a storage tank, then redistributed for toilet flushing, landscape watering, and passive cooling.
- This system simultaneously reduces the burden on the city's water distribution network and optimizes the use of locally available alternative water.

- Use of Double Facade

Fig . 7. Double Façade
(Source: author)

The use of a double façade system in buildings serves as a passive strategy to improve energy efficiency and thermal comfort. This system consists of two layers of building skin that create an air cavity between them, which can be used to control temperature, reduce direct solar radiation, and increase natural ventilation (Poirazis, 2006). The implementation of this system in the design of MICE buildings is a clear demonstration of the application of sustainable architecture that is adaptive to tropical climates.

- Solar Radiation Control : Double façade functions as protection against direct solar radiation, thereby reducing the cooling load on the air conditioning system (AC).

- Natural Ventilation : The air space between the two facade layers creates natural air circulation, which helps to passively lower the room temperature without requiring additional energy.
- Energy Efficiency : By reducing the energy requirement for cooling, this system directly contributes to energy savings and supports the principles of green buildings.

Thus, the ecological aspects of the MICE area not only respond to the demands of sustainable development theory, which encompasses the three main pillars of ecology, economy, and equity, but also translate them into concrete and applicable design strategies. Through the application of energy efficiency, green open spaces, environmentally friendly materials, and sustainable utility systems, this area proves that the principles of sustainable architecture can be implemented concretely in the context of MICE facilities. These ecological aspects support the creation of spaces that are not only professionally functional but also inclusive for the wider community by providing family-friendly public spaces, worship facilities, and sustainable thermal comfort.

- Economic Aspects

The economic aspects of sustainable MICE building design focus on long-term cost efficiency, operational optimization, and increased investment value, while emphasizing social inclusion by providing space for sharia-based MSMEs. This strategy is in line with the theory of sustainable development that emphasizes a balance between ecology, economy, and equity (Hapsoro, 2020; Pamungkas, 2020), where the economic aspect is not only interpreted as growth but also as a means of community empowerment and fair distribution of benefits.

Fig . 8. Economic aspects implementation through balancing proportional zone for small, medium (UMKM) to large scale economic zone

In the context of the Muslim millennial generation who are of productive age (1980–1996), their role as a group with high purchasing power (Tyas, 2020) is an important factor in economic transactions. Their halal lifestyle, ranging from halal food, halal fashion, to halal tourism, has

encouraged the creation of new sharia-based economic trends (Zamani-Farahani & Eid, 2021). This halal lifestyle transformation is naturally moving towards the MICE sector, as this generation prefers flexible interactive spaces that support social and professional activities and are in line with their spiritual values (Anuar et al., 2021; Kusumaningrum & Putra, 2020).

Based on the floor plan and function of the MICE building space, the economic aspect is reflected in several design strategies that encourage local economic activities and building operational efficiency, namely:

[1] Exhibition Zone, Auditorium, and Meeting Room (Zone 1, 2, 3)

- These three zones allow for the holding of various types of national and international scale events.
- By attracting participants from outside the area, this area produces a multiplier economic effect , such as increased demand for accommodation, transportation, and consumption around the area.

[2] Open Plaza (Zone 4)

- The plaza serves as a multi-functional public space that can be used for outdoor events, themed markets, or community activities.
- The plaza serves as a supporting space for MSMEs to hold bazaars or seasonal events that support the strengthening of the local economy.

[3] Convention Room Function Flexibility (Zone 5)

- The Convention Hall , which can be used for various scales of events (from business meetings, seminars, to large exhibitions), provides flexibility for event organizers, increasing occupancy rates and regional revenue.
- This multi-purpose space is designed to be rented to various parties, thus supporting sustainable income.

[4] Support for Halal MSMEs (Zone 6)

- The presence of MSME Retail on the second floor demonstrates a commitment to empowering small and medium enterprises, particularly those operating in the halal product sector.
- This area allows local MSMEs to sell directly to MICE event visitors, thereby opening up new business opportunities and expanding market access for community products.

[5] Cafe & Resto Commercial Zone (Zone 7)

- The Cafe & Resto area supports economic activities by providing culinary business space for local managers.
- With the halal concept, cafes & restaurants are not only commercial areas, but also encourage a sharia- based economy that suits the preferences of Muslim millennials.

Thus, the characteristics of millennial Muslims of productive age—who have high purchasing power, play an active role in economic transactions, and make halal lifestyle their consumption identity—become a key factor in driving the formation of a sharia-based economic

ecosystem. This preference then naturally moves towards the need for inclusive, sharia-friendly, and sustainable MICE facilities. Therefore, MICE serves as a new platform that not only supports local and global economic growth but also translates sustainable development theory into concrete and practical design strategies.

- Equity Aspect

Equity aspect of sustainable MICE area design emphasizes inclusion and equal access for all levels of society. This principle is in line with the theory of sustainable development, which places social justice as one of its pillars (Hapsoro, 2020; Pamungkas, 2020) and is in harmony with the Sustainable Development Goals (SDGs) objective of “leaving no one behind” (Patrick & McKinnon, 2022). Therefore, MICE design not only focuses on economic and ecological functions, but also ensures fair participation by providing public spaces that are open to all groups, including children, the elderly, and people with disabilities. This theoretical alignment is realized through design parameters such as free public plazas, integration of worship facilities, and the application of universal design. Ramps with a slope of <7° and a width of 3 m (Wahyudi et al., 2024), circular corridors between floors, and shaded pedestrian paths with disability-friendly seating areas ensure barrier-free accessibility. Thus, the principle of social justice is not merely a conceptual idea but is tangibly implemented in spatial strategies that enable all communities to equally enjoy the benefits of MICE.

  - Public Space

    In the context of *equity* , inclusively designed public spaces play a crucial role in ensuring equal access and participation for all users, including vulnerable groups such as the disabled, the elderly, and children. A study by Patrick & McKinnon (2022) confirms that co- -creation in public space design improves accessibility and reduces social, physical, and cultural barriers faced by marginalized groups, in line with the principle of *"no one left behind"* in the SDGs.

Fig . 9. Public Space, July 2025

The results of the MICE area design are concrete evidence of the application of this principle by providing the following:

- The plaza in the center of the area is designed as a public space that is open to all groups, without any social, economic, or status restrictions on visitors.
- This space provides free access to the general public, thus serving not only MICE event visitors, but also the local community around the area.
- This public space is a place for social interaction, education, and recreation in a fair and equal manner for all users of the space, including the elderly, children, and the disabled .
- The design of this public space is oriented to ensure that no group is marginalized (the principle of no one left behind), by providing pedestrian paths, public seating areas, and disability-friendly landscapes.
- Integration with worship facilities adds spiritual value to an open and comfortable public space.
- Interconnected areas facilitate access for all levels of society.

o Universal Design

Njunge & Asilsoy (2020) highlight that public participation in the design of public spaces plays a role in ensuring inclusivity and equal opportunities for all communities without exception. Therefore, public space facilities prioritize disability-friendly pedestrian paths, accessible public seating for all ages, inclusive signage, and layouts that facilitate mobility across user groups.

Fig . 10. Some fetures of universal design
(Source: author)

- *Barrier-Free Accessibility*

A study in Kendari by Wahyudi et al. (2024) found that a ramp design with an optimal slope of 7°, a multiple height of 25 cm, and a minimum path width of 150 cm and a ramp length of 175 cm significantly increased public accessibility for people with disabilities in green open spaces, as empirical evidence that the accessibility design was effective. Therefore, the following are the design results for MICE buildings:

- The circulation path is in the form of a ramp (sloping floor) with a slope of <7° and a path width of 3m. which is seen in the image to be a universal accessibility solution.
- This path allows wheelchair users, the elderly, pregnant women, children, and users with limited mobility to access the entire area independently without physical limitations.
- The strategic position of ramps at several main entry points (marked with red circles on the site plan) shows that disability-friendly access is not just an additional facility, but part of the area's main circulation system.

- *Inclusive Vertical Circulation*
  - The circular ramps in the interior also ensure that movement between floors is accessible to all visitors without reliance on lifts or escalators.
  - This design reinforces the principle of fair access to space, where everyone has an equal opportunity to enjoy all the functions of the area.
- *Equal Space Experience*
  - Shaded and comfortable pedestrian paths allow everyone to enjoy public space with the same quality of space, without discrimination.
  - Open views from the ramp and pedestrian bridge provide an equal visual experience for users with special needs and general users.
- *Interconnectivity room*
  - Pedestrian paths that connect directly to the plaza and commercial areas demonstrate seamless spatial integration.
  - All area functions, from worship spaces, commercial spaces, to social interaction spaces, are accessible to every visitor, reinforcing the principle of social inclusivity.

- The Mosque as a Center for Sustainable Spiritual and Social Activities

Fig . 11. Mosque as a Center for Sustainable Spiritual and Social Activities
(Source: author)

Within the context of sustainable MICE design oriented towards the characteristics of millennial Muslims, the mosque serves not only as a place of worship but also as a hub

for social, educational, and cultural activities that are active throughout the day. Its location at the front of the area is strategically designed to create a primary attraction while representing a strong and open Islamic identity. This position allows the mosque to function as a starting point for circulation orientation and a transitional space between public and semi-public spaces, inviting participation from various groups.

Fig . 12. Mosque Interior, July 2025
(Source: author)

In Islamic architectural history theory, since the time of the Prophet Muhammad, mosques have functioned not only as places of worship, but also as centers of education, justice, diplomacy, and social services (El- Gohary et al., 2020). This principle is in line with the theory of justice in sustainable development, which emphasizes social inclusion and equal access for all levels of society.

This alignment of theories is applied in the design of mosques in sustainable MICE areas. The mosque is strategically located as an Islamic identity as well as an orientation for public and semi-public spaces, thereby strengthening its function as a center for spiritual and social activities. This mosque is designed as a symbol of inclusivity and social justice, accommodating women, children, the elderly, and people with disabilities through special facilities such as separate wudhu and prayer areas and universal ramp access. Activities within the mosque are open, family-friendly, and encourage community participation. Thus, the mosque is not only a symbolic element but also a tangible implementation of the theory of the mosque as a center of living Islamic civilization, as well as an embodiment of the principle of social justice in sustainable architecture.

- Daycare

Based on the field survey, in the context of the Muslim millennial generation's preference for MICE facilities, the existence of daycare or childcare centers is an important element that reflects the need for spaces that support a balance between professional roles and family responsibilities. This aligns with the preferences of Muslim millennials in Medan and the trend of active participation of Muslim women in the public sector and creative industries, which require an ecosystem of activities that is inclusive of family needs, particularly childcare.

Fig . 13. Daycare, July 2025
(Source: author)

- *Access to Services for All*
  - Providing daycare and children's play areas allows parents, especially working mothers or MICE event participants, to continue their professional activities without neglecting their childcare needs.
  - These facilities make the MICE area more inclusive and family-friendly , ensuring that all groups can access services according to their needs.
- *Creating a Just and Equal Space (Social Equity)*
  - Daycare as a supporting facility strengthens the principle of social equity , where the needs of vulnerable groups (children) and the elderly are provided equally with other users.
  - This broadens the meaning of public space as a shared space that serves all levels of society, not just professionals.
- *Safe and Strategic Daycare Location*
  - closed and secure indoor area , separate from the main circulation route for adult visitors.
  - Daycare access is in an easily supervised zone and does not directly intersect with exhibition areas or heavy traffic zones.
  - This placement takes into account the safety of children as well as the comfort of parents who can monitor their children easily.
- *Child-Friendly and Eco-Friendly Design*
  - The daycare area is equipped with green zones, trees, and safe flooring materials , creating a healthy learning and playing environment.
  - This space also supports children's social development through interactions with others in a safe and inclusive environment.

CONCLUSION

The design of a MICE area for Muslim millennials using a sustainable architectural approach generates a design concept that integrates spiritual values, professionalism, and sustainability.

The application of the 3E principle (Ecology, Economy, Equity) is able to address the needs of the Muslim millennial generation as *khalifah fil ardh* (leader of the earth), through ecological spatial design, supporting economic growth, and providing inclusive and equitable access. The ecological aspect is realized through the optimization of natural lighting, the use of renewable energy, rainwater management, and the provision of green open spaces. The economic aspect is reflected in support for halal MSMEs, flexible zones for professional activities, and sharia-based commercial spaces. The equity aspect is realized through universal design, open public spaces, prayer facilities, daycare, and family-friendly areas. Thus, the design of this MICE area is expected to be a multifunctional space that not only meets professional needs, but also becomes a sustainable and friendly spiritual and social space for all levels of society.

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