(2024), 2 (12): 353-361 **Scientica** 3021-8209

Jurnal Ilmiah Sain dan Teknologi

Designing Science Center with High-Tech Architecture Approach in Medan City

Egi Satri Edsa, Wahyu Abdillah

[1]*Architecture Department, Faculty of Engineering, Universitas Sumatera Utara, 20155, Indonesia*

*Corresponding Author: egiedsa391@gmail.com

Abstract (English)

The progress of a nation is highly dependent on the quality of its education, both through formal and informal education. Science and Technology (Science and Technology) oriented education has an important role in creating a qualified and competitive next generation. However, the progress of science and technology in Indonesia has not been fully supported by public interest, mainly due to the lack of supporting facilities, especially for students. Therefore, constructing the Science Center in Medan City is proposed as a place for entertainment education. Presenting science and technology in a practical and interactive manner is expected to increase public interest in science and technology, create a technologically responsive generation, and potentially serve as a tourist attraction. The Science Center is expected to shape scientific skills and attitudes at an early age, change the paradigm of consumerism, and encourage science and technology awareness in society.

Article History

Submitted: 19 August 2024

Accepted: 28 August 2024

Published: 29 August 2024

Key Words

High-Tech, IPTEK, Science Center

1. Introduction

Nowadays, an understanding of science and technology (science and technology) is generally conveyed through theory but still lacks depth in the context of direct practice and lacks an understanding of the process of occurrence. Insights related to science and technology should not be limited to theoretical aspects alone. Rather, the delivery of science and technology insights should be done practically and interactively. This approach is expected to facilitate understanding and increase public interest, especially students, in science and technology.

The construction of the Science Center aims to serve as a means of education and entertainment to stimulate public interest in Science and Technology (IPTEK). By being presented interestingly and entertainingly, the Science Center is expected to have potential as a tourist attraction. The main goal is to create a young generation that has an understanding of technology and encourage the development of scientific skills and attitudes from an early age, which in turn will form a society that has an awareness of science.

2. Method

Design methods carried out:

1. Study Literature, which is an activity carried out by collecting data from reliable sources to collect, analyze, and concluding all data from relevant or similiar written sources. Literatur studies are useful in providing in-depth information related to perspectives on Islamic boarding school architecture.

2. A comparative study is a method that compares design cases that have similar functions or themes by looking for them from various sources.

3. Result and Discussion

3.1 Science Center

Science Center is a science and technology demonstration building that is a group of types of supporting activities in teaching (Peghton, 1971). A place that aims to transform abstract science into something more concrete and digestible for visitors through visual and sensory experiences (Dr. et al.). The vision and mission of the science centre are no different from the vision and mission of museums in general, which underwent changes in 1946 by the International Council of Museums (ICOM). These changes have become a benchmark for museums around the world in institutions. The revision of the definition became a milestone in the institutional change of the museum to be unique, and several institutions were added to the museum category.

Of course, there is a difference between a science centre and a science museum, namely the method of presenting the collection. According to Jeff Rosenblatt, director of Science City in Union Station, Kansas, the museum tends to make visitors more passive, just come, see, and conclude. But at the science center, visitors are more active with the presentation of a collection of props that allow visitors to try it themselves and get a different experience.

3.2 Purpose Of Science Center

The original purpose of the science centre was to popularize science by instilling a scientific attitude and spreading awareness of science to the wider community, especially children.4 The science displayed is not just the results of research or experiments but the events and their application in everyday life in any field. This way, visitors who are just laymen about science will more easily understand and quickly grasp how a tool works. Science centres should cover science, technology, applied science, and mathematics.

Science centres aim to foster curiosity, spark questions in mind, and provide new positive experiences for both children and adults. In addition, the role of science centres also involves helping people cope with the rapid development of technology and empowering them by improving their skills. Science centres serve as a complement to learning in schools and act as science facilitators, similar to the roles of teachers, parents and educators in providing science training.

3.3 Classification Of Science Center

Science centres can be distinguished into three categories, namely:

1. Comprehensive Centers A science centre is a facility that presents a variety of interactive and educational teaching aids.

2. Specialized Centers Specialized science centres address narrower and more specific themes.

3. Limited Center Limited science centres have a more specific target audience and are limited to certain fields. Examples of limited science centers include children's museums, natural history museums, science history museums, and others.

3.4 High-Tech Architecture

High Tech architectural style features "building service" elements that are not only exposed but also

given special emphasis. For example, air ducts and pipes may be painted in bright colours to visually distinguish and highlight their respective functions.

Literally, High-Tech Architecture reflects the application of advanced technology in the building design process. This approach utilizes advances in science and technology to create buildings that consider various aspects, including space, function, form, structure, materials, and other elements.

It is important to remember that the term "High Tech" does not imply the use of technology that is significantly higher than other architectural styles. Rather, the focus lies on placing technology and equipment outside the building itself, creating a clear appearance and strong characteristics. This approach emphasizes designing the framework with full attention, with the aim of achieving a building that is not only functional but also flexible.

3.5 Project Description

The Science Center is located in Jl. Gagak Hitam No.37, Sei Sikambing B, Kec. Medan Sunggal, Kota Medan, Sumatera Utara with a land area of 21.000 m².

Figure 1 Location

Source: Google

3.6 Mass Concept

Basic Building Form Analysis:

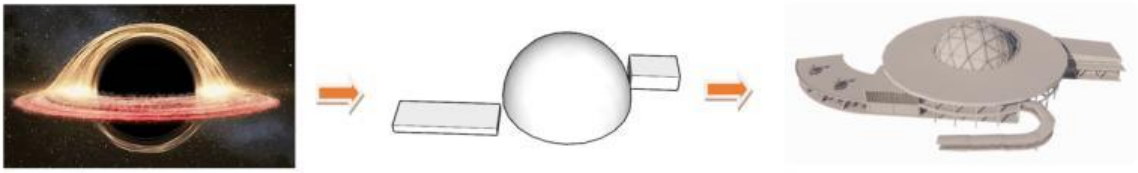

Figure 2 Basic shape of the building idea

The basic mass of the building is inspired by the concept of a black hole, wherein a half circle serves as the primary mass, while the remaining masses serve as supporting functions. The supporting functions, which were initially block-shaped, subsequently assumed a curved configuration, mirroring the fundamental tenet of a black hole's capacity to draw in surrounding matter.

Figure 3 Massing

- The square, long shape shows something pure and rational and has a clear orientation.

- The circular shape has a centralized meaning that is stable which reinforces its basic nature as an axis in accordance with the main function of this Science Center, namely the exhibition hall and planetarium.

3.7 Basic Concept

The main idea of the design originated from the problem that people in the city of Medan, especially students, showed their ability to use technology, as seen by the increase in the use of smartphones and other telecommunication devices. However, the majority of the celndelruling community has a consumptive attitude, only as users, without any initiative or encouragement to innovate in the creation of new technologies.

This condition is not in line with the interest of the people of Medan City, who still lack knowledge of telecommunications, although the development of telecommunications and knowledge of telecommunications are related. One of the reasons is the lack of extension facilities that can enhance the exploration and development of science and technology, so it is necessary to design a science centre in Medan City with a high-tech approach. This can help people in Medan City to increase their knowledge and awareness about the development of science and technology. The high-tech approach is used because it is in line with the function of the building, which is related to technology (Figure 4).

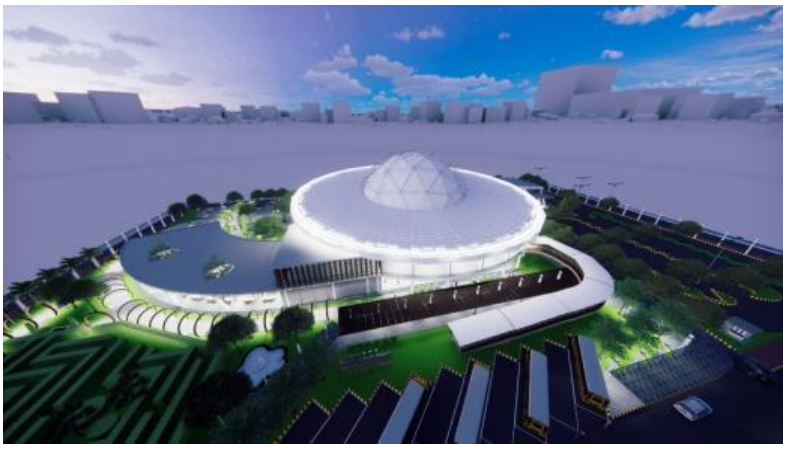

Figure 4 Mass Building

3.8 Zoning

The Science Center Design Project is located on Jalan Gagak Hitam, which is the main road and mostly consists of residential and commercial zones. Figure 5 zoning of the design area shows that only Jalan Gagak Hitam can be used to reach the main entrance. To prevent congestion outside the site and facilitate visitor access, the entrances and walkways within the site are designed with

sufficient width and 60-degree angles. The configuration of the site allows for optimal parking, with the parking lot located close to the entrance. The front of the site is equipped with a canopy, providing shade and increasing pedestrian comfort (Figure 6).

Figure 5 Zoning

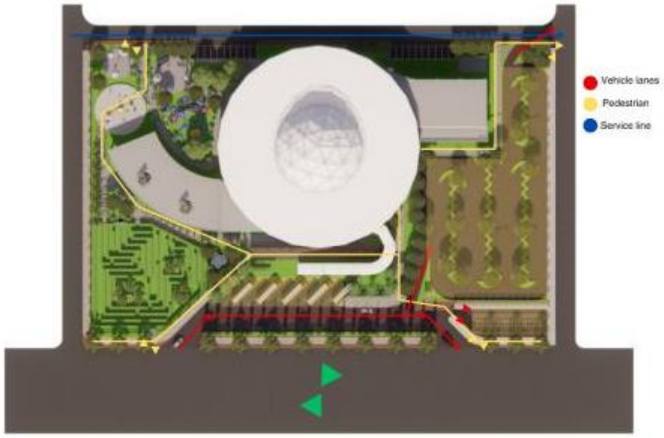

Figure 6 Circulation

3.8.1 Floor Plan

3.8.1.1 Ground Plan

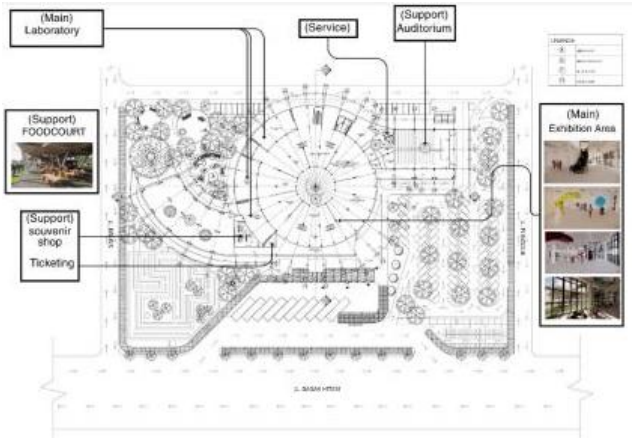

Figure 7 Ground Plan

The first floor of the main building has a spacious exhibition area featuring various miniature models and interactive scientific equipment. This area is also equipped with three specialized

laboratories, namely a physics laboratory, a chemistry laboratory and a biology laboratory. This area is designed according to the open space concept, which facilitates the organization of science exhibits and props.

In addition to its main function, the first floor of the building is also equipped with additional spaces, including a retail venue offering souvenirs, a dining room, and a venue for presentations and performances. Access to these additional facilities is independent of access to the main building, so visitors do not need to purchase an admission ticket to enter. , which can be seen in (Figure 7)

3.8.1.2 Second Floor Plan

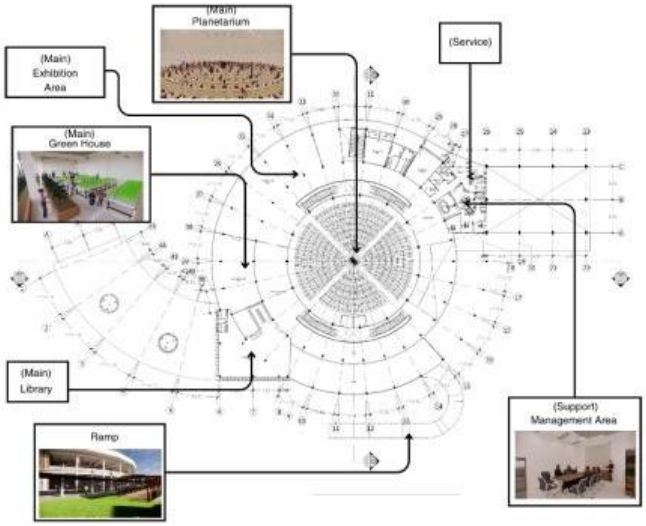

Figure 8 Second Floor Plan

The second floor is the primary attraction of the building, namely a planetarium that showcases scientific films utilizing IMAX technology, thereby offering a distinctive experience to visitors. In addition to the planetarium, the second floor also contains an exhibition area and a greenhouse. The supporting functions on the second floor are a library and a prayer room. These are illustrated in the accompanying (Figure 8).

3.9 Theme Implementation

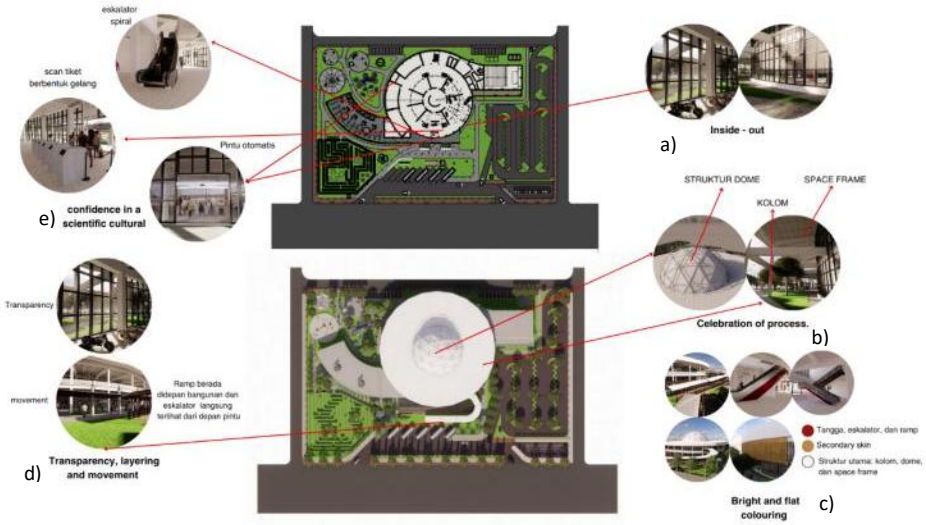

Figure 9 (a)Inside Out;(b) Celebration of process.;(c) Bright and flat coloring;(d) Transparency, layering and movelmelnt Transparan .;(e) confidence in a scientific culture.

The architectural design employs glass as a structural element, particularly at the front of the building. This is done with the intention of providing a view for people outside the building to observe the activities within and vice versa (Figure 9. a). The structure of the building is deliberately exposed in order to facilitate an understanding of the rationale behind the dome structure, the roof, and the exposed columns. Furthermore, the structure serves as an additional ornamental element, enhancing the aesthetic appeal of the building (Figure 9. b). In the selection of colours for the building, bright hues were employed, with white utilized for the structure, red for vertical circulation elements such as ramps, escalators, and stairs, and orange applied to the secondary skin (Figure 9. c).

The building's transparent appearance is largely due to the extensive use of glass, which covers a significant portion of the building. The visible ramps and escalators at the front of the building facilitate visitor access to the second floor (Figure 9.d). The building incorporates advanced technologies, including automatic doors, ticket systems with microchip integration, and spiral escalators, which are uncommon in such structures(Figure 9. e).

4. Conclusion

The Science Center, located on Jl. Gagak Hitam No.37, Sei Sikambing B, Kec. Medan Sunggal, Kota Medan, Sumatera Utara, is a modern educational facility designed to popularize science and technology by transforming abstract concepts into concrete, engaging experiences. Utilizing high-tech architectural elements, the building features extensive use of glass for transparency and exposed structural components, enhancing both its aesthetic appeal and educational value. The vibrant colour scheme and advanced materials emphasize the centre's innovative approach. The Science Center houses specialized laboratories, exhibition spaces, a planetarium, a greenhouse, and supporting facilities such as a library and a prayer room, all designed to ensure efficient circulation and accessibility. Aimed at fostering curiosity and enhancing scientific literacy, the centre encourages active participation in science and technology exploration, serving as a dynamic complement to traditional education and empowering visitors with knowledge and skills in an evolving technological landscape.

5. References

[1] Wartono. 2003. Strategi Belajar Mengajar Fisika. Universitas Negeri Malang.

[2] Setiawan, A.R. (2020). Desain Pembelajaran untuk Membimbing Siswa Sekolah Dasar Dalam Memperoleh Literasi Saintifik

[3] Asmoro, Bondan Bayu. 2015. Landasan Konseptual Perencanaan dan Perancangan Observatorium dan Museum Antariksa di Kabupaten Gunungkidul. Skripsi. Universitas Atmajaya Yogyakarta.

[4] Neufrst, Ernst. 1996. Data Arsitek Jilid 1. Diterjemahkan oleh: Sunanto Tjahjadi. Jakarta: Erlangga.

[5] Neufrst, Ernst. 2002. Data Arsitek Jilid 2. Diterjemahkan oleh: Sunanto Tjahjadi. Jakarta: Erlangga.

[6] Jencks, Charles. 1990. High Tech Maniera. London: Academy Edition.

[7] Jencks, Charles. 1992. The Battle of High-Tech Great Buildings With Great Faults.London: Routledge.

[8] Akbar, Ali. 2010. Museum di Indonesia Kendala dan Harapan. Jakarta : Papas Sinar Sinanti.

[9] Seulgi. 2015. 8 Struktur Bentang Lebar. Artikel.

[10] Johanes Thomas Cokro dan SanggamB. Sihombing.(2022) ANALISIS KONSTRUKSI BENTANG LEBAR DENGANGAYAARSITEKTUR HIGHT TECHPADAPUSAT AKUATIK MEDAN. Jurnal RuangLuar dan Dalam 4(1), 1-8

[11] Safdie. 2016. www.area-arch.it/it/artscience-museum/ ArtScience Museum. Diakses pada tanggal 13 januari 2024.

[12] Liem, Yoel. 2013. http://www.palangparkirbandung.com/2013/01/system-kerja-pintu-otomatis-bandung.html. System Kerja Pintu Otomatis Bandung. Diakses pada tanggal 13 januari 2024.

[13] Martin, Robert. 2017. http://www.arcspace.com/features/santiago-calatrava/city- of-arts-and-sciences/ City of Arts and Sciences. Diakses pada tanggal 13 januari 2024.

[14] Kawatu, F. E. (2017). Aplikasi Bangunan High-Tech Dalam Teori Perancangan Richar Rogers. 32 -37

[15] Ardiansyah. (2012). Analisis Rancangan Norman Foster Pada Bangunan Chek Lap Kok Airport (Hongkong) Dalam Konteks Arsitektur High-Tech

[16] Peraturan Daerah Kota Medan No. 2 Tahun 2015 tentang Rencana Detail Tata Ruang dan Peraturan Zonasi Kota Medan Tahun 2015-2035, “Lampiran X, Tabel Intensitas Pemanfaatan Ruang,”. 2015.

[17] Peraturan Daerah Kota Medan No. 2 Tahun 2015 tentang Rencana Detail Tata Ruang dan Peraturan Zonasi Kota Medan Tahun 2015-2035, “Lampiran XI, Tabel Tata Bangunan,”. 2015.

[18] Badan Pusat Statistik, “Jumlah Penduduk Kota Medan Menurut Kelompok Umur dan Jenis Kelamin,” 2022. Accessed:Jan.7,2024.Available:https://medankota.bps.go.id/indicator/12/102/1/jumlah-penduduk-kota-medan-menurutkelompok-umur-dan-jenis-kelamin.html

[19] Hanifah. 2012. Ilmu Sain. Jakarta : Universitas Indonesia

[20] Anonim, https://id.wikipedia.org/wiki/Kimia diakses tanggal 5 February 2024

[21] Anonim, https://id.wikipedia.org/wiki/Biologi diakses tanggal 5 February 2024

[22] Anonim, https://id.wikipedia.org/wiki/Ilmu_kebumian diakses tanggal 5 February 2024

[23] Anonim, Sumber : https://id.wikipedia.org/wiki/Astronomi diakses tanggal 10 mei 2024

(2024), 2 (12): 353-361 Scientica 3021-8209
Jurnal Ilmiah Sain dan Teknologi