



DESIGNING DELI TOBACCO HEALTH MUSEUM IN MEDAN CITY WITH A FUTURISTIC ARCHITECTURE APPROACH

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ABSTRACT

This study explores the design of the Deli Tobacco Health Museum in Medan City as a response to the scarcity of health education facilities that integrate historical heritage with contemporary innovation. Employing an analytical-descriptive approach, the museum's design was developed through field data synthesis, comparative analysis of futuristic architecture, and inclusive spatial planning principles prioritizing universal accessibility. Findings reveal that a futuristic architectural concept featuring organic forms, high-tech materials (GFRP/GFRC), and interactive technology creates dynamic educational spaces while revitalizing the cultural heritage of the former Deli Tobacco Hospital site. The design not only addresses post-pandemic health awareness needs through multisensory experiences but also establishes a sustainable public space model harmonizing education, historical conservation, and urban identity. This research offers a replicable framework for culturally rooted healthcare infrastructure development in Indonesia, bridging architectural innovation with community well-being imperatives in rapidly urbanizing contexts.
Keywords: Design, Museum, Health, Futuristic, Architecture

ABSTRAK

Penelitian ini mengeksplorasi perancangan Museum Kesehatan Tembakau Deli di Kota Medan sebagai respons terhadap keterbatasan fasilitas edukasi kesehatan yang mengintegrasikan warisan sejarah dengan inovasi kontemporer. Penelitian ini menggunakan pendekatan deskriptif-analitis, perancangan museum dikembangkan melalui sintesis data lapangan, analisis komparatif terhadap arsitektur futuristik, serta prinsip perencanaan ruang inklusif yang mengutamakan aksesibilitas secara universal. Hasil penelitian menunjukkan bahwa konsep arsitektur futuristik yang memadukan bentuk organik, material berteknologi tinggi seperti *Glass Fiber Reinforced Polymer* (GFRP) atau *Glass Fiber Reinforced Concrete* (GFRC) dan teknologi interaktif mampu menciptakan ruang edukasi yang dinamis sekaligus menghidupkan kembali warisan budaya dari bekas lokasi

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Rumah Sakit Tembakau Deli. Perancangan tersebut tidak hanya menjawab kebutuhan peningkatan kesadaran kesehatan pascapandemi melalui pengalaman multisensori, tetapi juga membentuk model ruang publik berkelanjutan yang menyelaraskan aspek edukasi, pelestarian sejarah, dan identitas perkotaan. Penelitian ini menawarkan kerangka yang dapat direplikasi dalam pengembangan infrastruktur kesehatan yang berakar pada budaya di Indonesia, dengan menjembatani inovasi arsitektur dan kebutuhan peningkatan kesejahteraan masyarakat dalam konteks urbanisasi yang berkembang pesat.

Kata Kunci: *Perancangan, Museum, Kesehatan, Futuristik, Arsitektur.*

1. INTRODUCTION

The COVID-19 pandemic has significantly impacted Indonesia's healthcare system, particularly in Medan City. According to a 2020 survey conducted by the Mitigation Team of the Indonesian Medical Association (IDI), Medan recorded the highest number of doctor fatalities nationally during the pandemic. This situation highlights the vulnerability of healthcare workers and the urgent need for adequate health education, public awareness, and preventive measures. Therefore, integrating health education with historical and contemporary approaches can be an important step toward strengthening community awareness and preparedness for future health crises [1]. This phenomenon stems not only from the challenges posed by the pandemic but also from low public awareness of health protocols, partly due to limited understanding of the risks and dangers associated with the virus.

Public non-compliance with health recommendations can be explained through the Health Belief Model (HBM), developed in the 1950s by social psychologists in the United States [2]. This model identifies six key components: perceived susceptibility to illness, perceived severity of illness, perceived benefits of preventive actions, perceived barriers to accessing healthcare services, cues to action, and self-efficacy. Perceived susceptibility refers to an individual's belief regarding their likelihood of contracting an illness, while perceived severity concerns their perception of the seriousness and potential consequences of the illness. Perceived benefits describe the belief that taking preventive actions can reduce the risk or severity of illness, whereas perceived barriers refer to the obstacles that may prevent individuals from adopting recommended health behaviors. Cues to action involve external or internal factors that encourage individuals to take preventive measures, such as health campaigns, public health information, or personal experiences. Finally, self-efficacy refers to an individual's confidence



in their ability to perform and maintain recommended health behaviors. Together, these components explain how individual perceptions and external factors can influence health-related decision-making and preventive behavior [3].

Applying HBM to the pandemic context reveals that Indonesian communities, particularly in Medan, continue to face various obstacles in building health-related self-efficacy [4]. Limited understanding of personal vulnerability, disease severity, prevention benefits, coupled with insufficient cues to action, has resulted in public uncertainty when implementing appropriate health measures [5].

Meanwhile, access to adequate healthcare facilities and health education remains limited. Data indicates that Medan City currently lacks a health museum as a public education facility, despite Indonesia having only one such museum located in Surabaya [6]. Establishing a Health Museum in Medan is crucial for building collective community awareness, educating the public about healthy lifestyle behaviors, and preserving the historical struggles of healthcare workers in addressing various public health challenges.

2. METHODOLOGY

This research adopts a descriptive analytical approach to comprehensively understand the design context of the Deli Tobacco Health Museum in Medan City, integrating primary data collection through direct site observation and stakeholder interviews with secondary data from literature studies and comparative analysis of similar buildings. The analytical process progresses systematically from problem identification and functional requirements mapping to site character evaluation and the development of a futuristic architectural concept that considers technical, aesthetic, and social relevance aspects. This methodology ensures the design outcome not only fulfills modern architectural principles but also effectively addresses post-pandemic community health education needs through sustainable solutions that resonate with local cultural identity and contemporary technological advancements.

3. RESULTS AND DISCUSSION

3.1 Museum

A museum is a permanent institution that serves society and contributes to its development by preserving and presenting cultural and historical heritage to the public. It acquires, conserves, researches, communicates, and exhibits both tangible and intangible heritage, as well as aspects of the surrounding environment. Beyond preserving collections, museums also function as educational and informative spaces that enable visitors to gain



knowledge, conduct studies, and experience cultural and historical values [7]. As an integral component of social infrastructure, museums function as dynamic educational platforms that bridge historical narratives with contemporary understanding while fostering cultural awareness and lifelong learning. Through exhibitions, interactive displays, and educational programs, museums provide opportunities for visitors to engage with knowledge in meaningful ways. They also encourage public participation and create connections between cultural heritage, social values, and contemporary issues [8]. Unlike static repositories of artifacts, modern museums actively engage communities through interactive experiences that transform passive observation into meaningful knowledge construction and social connection [9].

3.2 Health

Health in contemporary perspectives is understood as a dynamic state in which individuals can function optimally and adapt to various challenges in life, even while living with chronic conditions or disabilities. This perspective emphasizes that health is not merely the absence of disease but also involves physical, mental, and social well-being. Therefore, promoting health requires a broader approach that supports individuals in maintaining well-being, developing healthy behaviors, and adapting to changing health conditions [10]. This concept transcends the traditional World Health Organization definition emphasizing complete physical, mental and social well-being by recognizing that health and disease often coexist in everyday life [11].

Modern understanding of health focuses increasingly on an individual's ability to maintain a meaningful quality of life through social adaptation, psychological resilience, and effective self-management of health conditions within diverse environmental and cultural contexts. This perspective recognizes that health is influenced by various factors beyond physical well-being, including emotional, social, environmental, and cultural dimensions. Consequently, health promotion should emphasize not only disease prevention but also the development of individuals' capacity to adapt, maintain well-being, and actively manage their health throughout different stages of life [12]. Current perspectives also position healthy lifestyles as a fundamental criterion in assessing one's health status, shifting the paradigm from mere absence of disease toward achieving sustainable holistic well-being potential [13].

3.3 Deli Tobacco

Deli Tobacco refers to a premium variety of tobacco historically cultivated in the Deli region (present-day North Sumatra), representing a significant economic commodity during



Indonesia's colonial plantation era from the late 19th to early 20th centuries [14]. The name has also been immortalized through the Deli Tobacco Hospital, constructed in 1870 to provide healthcare services for plantation workers in East Sumatra, an institution that now stands as a cultural heritage site in Medan City despite its deteriorated condition [15]. The Deli Tobacco legacy extends beyond its economic dimensions to encompass complex socio-cultural aspects of Indonesia's plantation history, where the relationship between plantation workers' health and tobacco industry development forms a crucial narrative about societal transformation in the region [6]. This historical significance makes it an appropriate namesake for contemporary health education initiatives that acknowledge both past challenges and future aspirations in community health development [16].

3.4 Medan City

Medan City, as the capital of North Sumatra province, stands as the largest metropolitan area outside Java Island, demonstrating remarkable demographic and economic growth in recent years. With a population reaching 2.54 million inhabitants in 2024, the city has shown consistent development over eight consecutive years [17]. Medan functions not merely as an administrative center but also serves as the economic backbone of the Sumatra region, achieving an impressive economic growth rate of 5.07 percent in 2024 compared to the previous year [15]. The city's distinctive character lies in its harmonious cultural diversity, where various ethnic groups including Batak, Malay, Chinese, Indian, and Javanese communities coexist peacefully within a unified social fabric. As Sumatra's primary transportation and trade hub, Medan experiences the highest population density in the province at 8,902 people per square kilometer, reflecting the intense economic and social activities concentrated in its urban area [18]. Its strategic position as a center for education, healthcare, and tourism continues to strengthen its pivotal role in both national and regional development frameworks, making it an essential node in Indonesia's economic landscape [15].

3.5 Futuristic Architecture Approach

Futuristic architecture approach represents a design paradigm that transcends conventional architectural norms by embracing innovative, forward-thinking ideas that materialize through dynamic forms and technologically advanced materials [19]. Its defining characteristics encompass the strategic application of cutting-edge materials such as steel, glass, and composites exposed authentically, integrated with expressive mass compositions that flow freely beyond rigid geometric constraints [20]. This approach extends beyond mere visual

spectacle, actively incorporating predictions of technological evolution, future societal needs, and sustainability principles as central considerations in the design process [21].

Fundamentally, futuristic architecture represents a critical response to contemporary realities by anticipating future needs and challenges. Every curve, space, and façade is carefully designed not only to fulfill present functional requirements but also to accommodate evolving technological, environmental, and social demands. Through the integration of intelligent systems, innovative technologies, and environmentally responsive design, futuristic architecture seeks to create buildings that are adaptable, efficient, and sustainable. This approach ultimately redefines the relationship between humans and the built environment in the twenty-first century [22].

3.6 Design Location

The Deli Tobacco Health Museum's location was strategically selected at Putri Hijau Street, Kesawan, West Medan District, by revitalizing the site of the former Deli Tobacco Hospital, a recognized cultural heritage property. This location choice prioritizes optimal accessibility within the city center, featuring comprehensive transportation infrastructure and proximity to key public facilities including Putri Hijau Hospital, the Samsat Office, Merdeka Field, shopping centers, and hotels. Site analysis revealed ideal development potential with approximately 30,000 square meters of land area, enabling integrated spatial arrangement of public zones, educational spaces, and administrative functions, while leveraging the flat terrain and local climate considerations to enhance visitor comfort through strategic building placement that minimizes western sun exposure and traffic noise. Establishing the museum at this historical location not only revitalizes heritage value but also strengthens Medan's community health identity as a meaningful response to pandemic experiences and future health awareness initiatives.

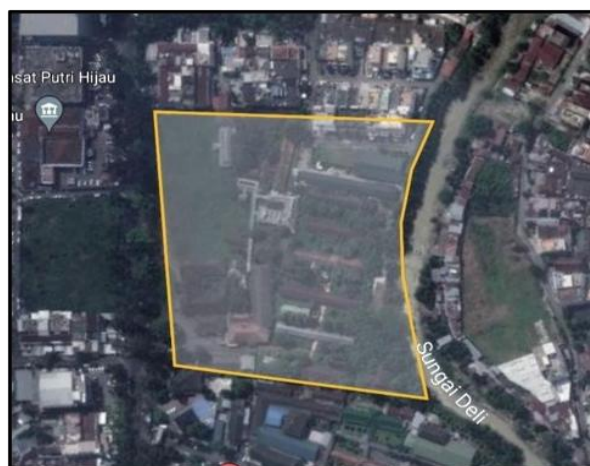


Figure 1. Project Location

3.7 Accessibility Concept

The accessibility concept in the Deli Tobacco Health Museum design is implemented through a site layout that considers the needs of diverse users, including people with disabilities, elderly visitors, and those with special requirements. As shown in the site plan, the main access is designed with adequate width and minimal physical barriers. There is a direct entrance connected to Jalan Putri Hijau with an appropriate slope (maximum 1:12), allowing wheelchair users and those with limited mobility to enter the museum area easily. The parking area is strategically placed close to the main entrance with dedicated spaces for disabled users. The circulation pattern within the site shows continuous, unobstructed pathways with anti-slip surface materials and visual contrast that assist visually impaired visitors. The design also features comfortable transition zones between outdoor and indoor spaces, along with sensory signage that intuitively guides users. This design not only meets technical accessibility requirements but also creates an inclusive and dignified experience for all visitors, reflecting the museum's commitment to being an institution open to all segments of society.

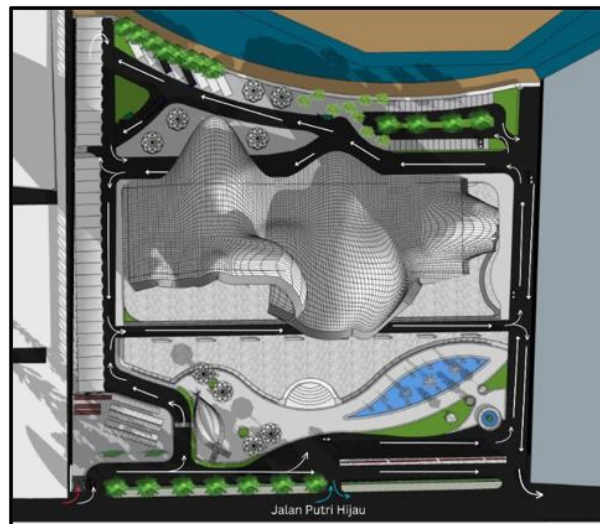


Figure 2. Accessibility Concept

3.8 Building Mass Concept

The building mass concept in the Deli Tobacco Health Museum design adopts a futuristic approach that originates from the metaphor of life and health, as illustrated in the conceptual transformation from heartbeat patterns to flowing organic forms. The building mass is arranged with a dynamic, curvilinear composition that avoids rigid geometric shapes to create a sense of living, continuous movement. This approach not only fulfills futuristic architectural aesthetics but also represents health as an ongoing, evolving process. Considering local climate conditions, solar orientation, and visitor circulation needs, the building mass is organized in a cluster

pattern that enables a continuous and interactive educational experience. Each distinct building volume connects visually and functionally, creating harmony between technical requirements and meaningful human experience, allowing visitors to feel the connection between themselves and the health concepts embodied through responsive and living architectural forms. This organic massing strategy transforms abstract health concepts into tangible spatial experiences that engage visitors on both intellectual and emotional levels.

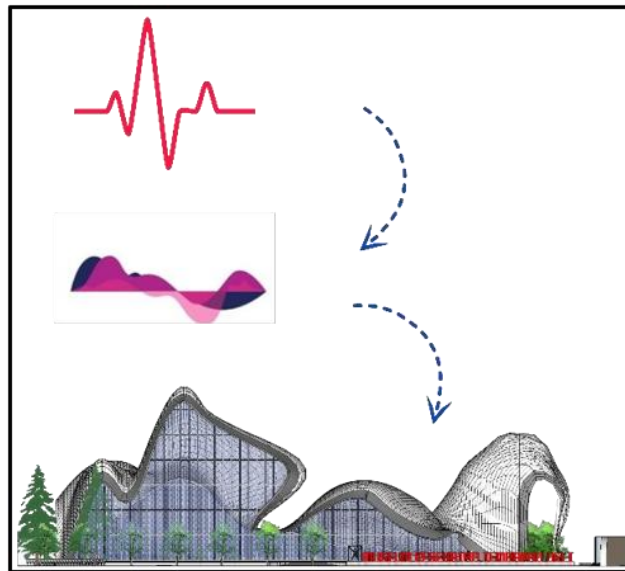


Figure 3. Building Mass Concept

3.9 Building Facade Concept

The building facade concept of the Deli Tobacco Health Museum is realized through two complementary perspectives as shown in Figure 5 in image (a), the bird eye view reveals an organic flowing pattern with dynamic curved forms, creating a metaphorical visualization of life's pulse and health as continuous movement. This pattern emerges harmoniously through transparent glass integrated with steel framework, producing a silhouette that appears like waves following the flow of life. Meanwhile, image (b), the cat-eye view, clearly shows how GFRP and GFRG materials are used as exterior cladding with smooth, glossy texture characteristic of futuristic architecture.

This perspective also highlights the integrated LED lighting that follows the building's curves, not only strengthening the futuristic identity but also serving as an engaging visual educational tool. Together, these perspectives illustrate how the environmentally responsive facade allows optimal natural light penetration into exhibition spaces while creating strong visual contrast through minimalist color usage. This facade is more than just the building's outer skin; it serves as a communication medium connecting the community with the museum's health

messages through living, responsive forms that embody the fluidity of health education in contemporary society.

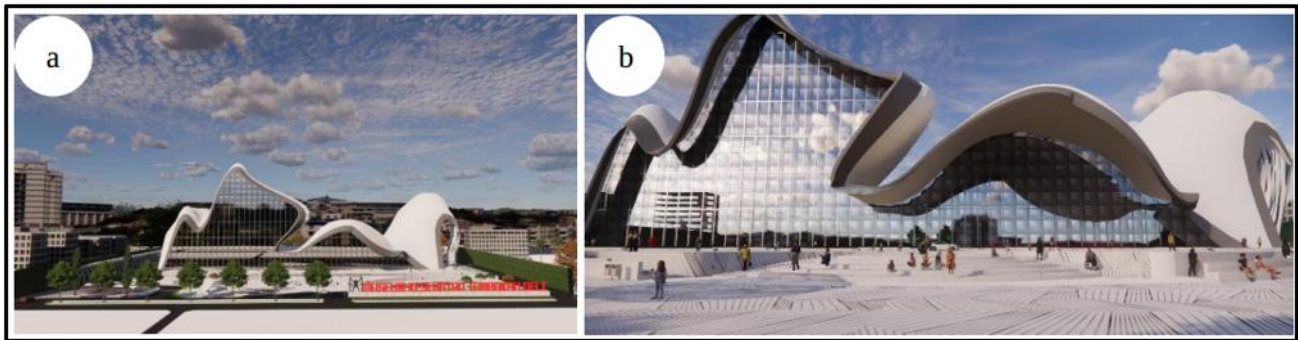


Figure 4. Building Facade Concept

3.10 Futuristic Architectural Approach

The futuristic architectural approach in the Deli Tobacco Health Museum design is manifested through organic, flowing forms as shown in Figure 5. The exterior views (a, b, c, and d) display dominant curvatures inspired by the heartbeat metaphor, creating a dynamic silhouette that follows the flow of life. Smooth, glossy materials such as glass fiber reinforced plastic (GFRP) and glass fiber reinforced concrete (GFRC) are used for the exterior cladding, providing a modern appearance with minimal maintenance requirements. Integrated LED lighting follows the building's contours, not only strengthening the futuristic identity but also serving as an engaging visual educational tool. Meanwhile, the interior views (e, f, g, and h) feature a high-class minimalist concept through dominant white coloring combined with blue and yellow accents, creating strong visual contrast.

The open spatial arrangement with organic column structures and high-tech ceilings enables a continuous and interactive educational experience. This approach not only fulfills futuristic architectural aesthetic principles but also creates an environment that supports public understanding of health through meaningful multisensory experiences, transforming abstract health concepts into tangible spatial encounters that resonate with visitors' emotional and intellectual engagement.



Figure 5. Futuristic Architectural Approach

CONCLUSION

The design of the Deli Tobacco Health Museum in Medan City through a futuristic architectural approach has successfully presented an innovative solution to enhance community health awareness in the post-pandemic era. By revitalizing the former Deli Tobacco Hospital heritage site, this design elegantly merges historical value with future vision through dynamic organic forms, interactive facades, and Hi-Tech systems that support multisensory educational experiences. The true achievement of this concept lies in its ability to create inclusive spaces accommodating diverse visitor needs while symbolizing Medan's collective health consciousness revival. For further development, collaborative partnerships with healthcare and educational institutions in developing integrated curricula are essential, alongside regular monitoring of technology effectiveness in achieving sustainable health education goals that resonate with



both local communities and global health perspectives, ensuring the museum functions not merely as an exhibition space but as a meaningful catalyst for positive health behavior transformation within society.

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CONFLICT OF INTEREST

This document serves to affirm that all information presented herein is accurate and complete to the best of the undersigned's knowledge. In cases where the number of contributing authors exceeds ten, additional copies of this form may be utilized to ensure proper documentation.

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14 September 2026

REFERENCES

- [1] Tim Mitigasi IDI, "Survey Kematian Dokter Selama Pandemi COVID-19," Jakarta: Ikatan Dokter Indonesia, 2020.
- [2] Kompas, "Psikologi Jelaskan Penyebab Masyarakat Tak Patuh Protokol Corona Covid-19," KOMPAS.com. Diakses: 8 Januari 2026. [Daring]. Tersedia pada: <https://www.kompas.com/sains/read/2020/06/03/130400023/psikologi-jelaskan-penyebab-masyarakat-tak-patuh-protokol-corona-covid-19>



- [3] M. F. A. Ghifari, A. Demartoto, dan B. Murti, "Path Analysis: Application of Health Belief Model and Social Cognitive Theory in Smoking Cessation in Surakarta," *J. Health Promot. Behav.*, vol. 9, no. 3, hlm. 199-208, Jul 2024, doi: 10.26911/thejhp.2024.09.03.02.
- [4] C. L. Jones, J. D. Jensen, C. L. Scherr, N. R. Brown, K. Christy, dan J. Weaver, "The Health Belief Model as An Explanatory Framework in Communication Research: Exploring Parallel, Serial, and Moderated Mediation," *Health Commun.*, vol. 30, no. 6, hlm. 566-576, 2015, doi: 10.1080/10410236.2013.873363.
- [5] A. Alyafei dan R. Easton-Carr, "The Health Belief Model of Behavior Change," dalam *StatPearls*, Treasure Island (FL): StatPearls Publishing, 2025. Diakses: 8 Januari 2026. [Daring]. Tersedia pada: <http://www.ncbi.nlm.nih.gov/books/NBK606120/>
- [6] N. W. B. Sembiring, "Perancangan Museum Kesehatan Tembakau Deli di Kota Medan dengan Pendekatan Arsitektur Futuristik," Thesis, Universitas Sumatera Utara, 2022. Diakses: 8 Januari 2026. [Daring]. Tersedia pada: <https://repository.usu.ac.id/handle/123456789/97944>
- [7] T. Ambrose dan C. Paine, *Museum Basics: The International Handbook*. London: Routledge, 2025. Diakses: 8 Januari 2026. [Daring]. Tersedia pada: <https://www.routledge.com/Museum-Basics-The-International-Handbook/Ambrose-Paine/p/book/9781032708362>
- [8] U. Tunç, "Museums of Medicine and Health: Curating Public Health," *Infect. Dis. Clin. Microbiol.*, vol. 5, no. 1, hlm. 69-81, doi: 10.36519/idcm.2023.195.
- [9] S. P. Pirastyo, F. B. Annishia, L. R. Aprilia, dan R. C. M. A. Stj, "Museum Sebagai Inovasi Destinasi Alternatif Wellness Tourism," *J. Tour. Econ.*, vol. 6, no. 2, hlm. 168-180, Des 2023, doi: 10.36594/jtec/e6v6n2a3.
- [10] T. Schramme, "Health as Complete Well-Being: The WHO Definition and Beyond," *Public Health Ethics*, vol. 16, no. 3, hlm. 210-218, Nov 2023, doi: 10.1093/phe/phad017.
- [11] S. Varga dan A. J. Latham, "Is Health the Absence of Disease?," *Inquiry*, vol. 0, no. 0, hlm. 1-21, Jun 2024, doi: 10.1080/0020174X.2024.2361694.
- [12] A. K. Stuifbergen, H. Becker, dan N. Kim, "The Meaning of Health to Persons Aging With Longstanding Multiple Sclerosis," *Res. Nurs. Health*, vol. 47, no. 5, hlm. 563-572, Okt 2024, doi: 10.1002/nur.22409.
- [13] W. Zhu, H. Chen, Y. Zhang, Y. Zhao, Y. Ji, dan H. Sun, "Health from a Health Promotion Perspective: A Concept Analysis," *J. Health Popul. Nutr.*, vol. 44, no. 1, hlm. 369, Okt 2025, doi: 10.1186/s41043-025-01055-2.
- [14] J. T. Lindblad, "Pursuit of Profit in the Shadow of Decolonisation: Indonesia in the 1950s," dalam *Commodities, Ports and Asian Maritime Trade Since 1750*, U. Bosma dan A. Webster, Ed., London: Palgrave Macmillan UK, 2015, hlm. 241-257. doi: 10.1057/9781137463920_13.
- [15] W. Wasino, E. S. Hartatik, F. A. Shintasiwi, N. B. Wijanarko, dan L. O. Putri, "A Historical Analysis of Health Services in Medan and The Tobacco Plantation Areas of East Sumatra During The Dutch Colonial Period," *Cogent Arts Humanit.*, vol. 12, no. 1, Des 2025, doi: 10.1080/23311983.2025.2482399.
- [16] A. V. D. Meer, *Performing Power: Cultural Hegemony, Identity, and Resistance in Colonial Indonesia*. London: Southeast Asia Program Publications, 2021. Diakses: 8 Januari 2026. [Daring]. Tersedia pada: <https://dokumen.pub/performing-power-cultural-hegemony-identity-and-resistance-in-colonial-indonesia-9781501758607.html>



- [17] Badan Pusat Statistik Kota Medan, “Kota Medan Dalam Angka 2024.” Diakses: 8 Januari 2026. [Daring]. Tersedia pada: <https://medankota.bps.go.id/id/publication/2024/02/28/37e78618776809c6328bec65/kota-medan-dalam-angka-2024.html>
- [18] A. Pane, “Metadata Statistik Sektoral Kota Medan Tahun 2024.” Pemko Medan, 2024.
- [19] Z. Alesaily, A. Albialy, dan A. S. Gabr, “The Role of Urban Planning in Designing Future Cities: An Analytical Study of The Conceptual Structure,” *Soc. Sci. Humanit. Open*, vol. 12, hlm. 102050, Jan 2025, doi: 10.1016/j.ssaho.2025.102050.
- [20] N. Spiller, *Digital Architecture Now*. London: Thames & Hudson, 2025.
- [21] C. Jencks, *The Story of Post-Modernism: Five Decades of the Ironic, Iconic and Critical in Architecture*. Chichester: Wiley, 2022.
- [22] P. Jishtu dan M. A. Yadav, “Futuristic Technology In Architecture & Planning - Augmented and Virtual Reality: An Overview,” 1 Februari 2021, *Social Science Research Network, Rochester, NY*: 4066326. Diakses: 8 Januari 2026. [Daring]. Tersedia pada: <https://papers.ssrn.com/abstract=4066326>