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Study of Building Facade Typology in the Simarjarunjung Area as a Character Former of the Area

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ABSTRACT
The Simarjarunjung Corridor in Simalungun Regency, North Sumatra, is a well-known tourist destination celebrated for its natural beauty and distinctive local cuisine. The development of the tourism sector has driven significant changes in the appearance and function of buildings. This study examines the typology of building façades and their impact on the character of the Simarjarunjung area. Using a qualitative descriptive approach, data were collected through field observations, document studies, and interviews with stakeholders associated with buildings along the main corridor. The findings reveal that buildings have adapted to the hilly topography and the local social, economic, and cultural dynamics. These adaptations are reflected in the transformation of building functions, the use of vertical space, variations in façade elements, and the combination of traditional and modern materials. This research contributes to a deeper understanding of the relationship between architecture, the environment, and the local community, which can serve as a foundation for formulating strategies for sustainable tourism management and development in the region.

Keyword: Typology, Building Facade, Area Character

ABSTRAK
Koridor Simarjarunjung di Kabupaten Simalungun, Sumatera Utara, merupakan destinasi wisata yang terkenal dengan keindahan alam dan kuliner khasnya. Perkembangan sektor pariwisata telah mendorong perubahan signifikan pada tampilan dan fungsi bangunan di kawasan tersebut. Penelitian ini bertujuan untuk mengkaji tipologi fasad bangunan serta dampaknya terhadap karakter kawasan Simarjarunjung. Dengan pendekatan deskriptif kualitatif, data dikumpulkan melalui observasi lapangan, studi dokumen, dan wawancara pada bangunan di sepanjang koridor utama. Hasil penelitian menunjukkan bahwa bangunan beradaptasi dengan kondisi topografi perbukitan serta dinamika sosial, ekonomi, dan budaya setempat, yang tercermin dari perubahan fungsi bangunan, pemanfaatan ruang vertikal, variasi elemen fasad, dan penggunaan material tradisional serta modern. Penelitian ini memberikan kontribusi berupa pemahaman yang lebih mendalam mengenai hubungan antara arsitektur, lingkungan, dan komunitas lokal yang dapat dijadikan landasan dalam merumuskan strategi pengelolaan serta pengembangan pariwisata yang berkelanjutan di wilayah tersebut.

Keyword: Tipologi, Fasad Bangunan, Karakter Kawasan

1. Introduction

Lake Toba is one of the five Super Priority Tourism Destinations (SPTD) designated by the Indonesian government due to its outstanding natural landscape, rich Batak cultural heritage, and significant historical value (Andrian & Nasution, 2024). Peraturan Presiden Republik Indonesia Nomor 89 Tahun 2024 Tentang Rencana Induk Destinasi Pariwisata Nasional Danau Toba Tahun 2024 - 2044. Additionally, in 2020, the Toba Caldera was recognized as a UNESCO Global Geopark for its geological and cultural diversity.

Various strategic infrastructures have been developed to support tourism development in the region, including the Tigaras Port in Simalungun Regency, completed in 2020 (Direktor Jenderal Perhubungan, 2023) . This port is directly connected via the Simarjarunjung Road corridor, a main route currently undergoing infrastructure improvements and experiencing significant growth in the surrounding area.

The rapid development along Simarjarunjung Road directly responds to the increasing number of tourists visiting Lake Toba. According to data from the Ministry of Tourism in 2024, domestic tourist visits to the Lake Toba Super Priority Tourism Destination (SPTD) reached approximately 9,244,742 people (Kementerian Pariwisata RI, 2025). This condition has directly influenced development patterns along the corridor, as seen in the growing number of buildings and various physical changes to their façades. The study of settlement morphology becomes crucial in understanding this dynamic, particularly in tracing changes in the area's form, function, and spatial arrangement of buildings (Nurmiaha & Eran Moh, 2024). Etymologically, the term "morphology" is derived from two Greek words: *morphe*, meaning "form," and *logos*, meaning "study." Thus, morphology can be understood as a branch of knowledge that examines forms and their transformations over time. In this context, morphology encompasses physical form and reflects developmental processes influenced by various elements. The main components in morphological studies include building structures, land use, road network systems, and other typological factors. Among these elements, typology often plays the most significant role in shaping the morphological character of a region. Therefore, typology can serve as a foundation for understanding visible morphological changes in buildings, as a response to environmental conditions and community behavior (Novianti, 2023).

The changes in building typology are not only driven by functional needs and economic factors but are also the result of acculturation processes between local cultures and those of newcomers. Factors such as shifts in lifestyle, population growth, and the increasing demand for more adequate facilities have contributed to the emergence of buildings with more modern characteristics in terms of materials, visual forms, and structural design (Kartiniasih & Dharmayanty, 2024; Murtiono et al., 2023). Consequently, these changes reflect a transformation in the area's visual identity, ultimately influencing the overall morphological structure.
Based on these conditions, this study aims to identify and analyze the typology of building façades along the Simarjarunjung Road corridor leading to Tigaras Port to represent settlement morphology changes within the context of tourism development in the Lake Toba region.

1.1 Building Typologi

Typology is the study of grouping or classifying research objects based on their characteristics, types, and categories to identify buildings' physical features (Satria et al., 2023). This understanding forms a crucial foundation in architectural studies, as building typology directly relates to analyzing the elements that make up a structure. In line with this, Taqiuddin et al. (2023) explain that determining architectural typology is carried out systematically through three main stages: identifying the basic form, examining the nature of its elements, and tracing the development of the building's form. This process considers physical characteristics and contextual aspects such as construction chronology, location, and building height, including the number of floors. Changes in the number of floors often indicate shifts in building function for example, a transformation from a residential unit into a multifunctional structure such as an apartment or office space. Furthermore, Leskovar & Premrov (2021) emphasize that such changes in function and form can reflect both the age and architectural evolution of a building. These are visible through the transformation of elements, increased building height, and changes in geometry and façade expression over time.

Furthermore, changes in building façades that reflect their functions are closely tied to the local identity of the region where the buildings are located. In addition, building typology is influenced by architectural styles, which generally adapt to the local climatic conditions. Factors such as humidity and temperature, for instance, significantly affect the design and adaptation of buildings to their environment (Dzuri, 2024). Therefore, when analyzing building typology, it is essential to consider the physical form and the building’s function as part of its response to social and natural environments (Aisy & Anisa, 2020). The process of naming typologies typically refers to previous studies conducted in other regions, which are then adjusted to the study area's current conditions while still considering the evolving local culture (Sukowiyono et al., 2021).

Building typology can also be determined through the physical appearance and the materials used as exterior finishing elements (Sukowiyono et al., 2021; Zhang et al., 2024). A more detailed identification of façade elements such as roofs, columns, doors, and windows provides insights into the architectural style adopted by a building (Panggabean et al., 2020). However, relying solely on the façade to identify building typology requires in-depth observation, as other variables such as site area, building height, roof type, number of floors, and building age play significant roles. Therefore, comparing visual documentation over time, such as photographs or technical drawings, becomes essential in identifying and understanding the changes that have occurred (Gonzalez et al., 2020).

Meanwhile, according to Alejendro et al (2024) building typology is generally classified based on form, layout, and construction characteristics, which are highly influenced by the period during which the building was constructed. In this context, building height and the number of floors serve as important indicators that reflect shifts in typology. On the other hand, Rahman et al. (2024) argue that other façade design elements—such as foundation choices, visual character, massing, and ornamentation—also play a significant role in shaping typology. Thus, building typology in a given area cannot be separated from land use patterns and the locally occurring development of building forms. Over time, changes in typology and urban morphological features emerge through continuous phases and periods of development (Malek & Mahat, 2020).

After reviewing the theories above, the researcher will rize several viewpoints related to the abuilding typology inllowing table (Table 1).

Table 1. Building Typology Aspects

Reference	Aspect	Conclusion
(Taqiuddin et al., 2023)	- Basic form - Basic properties - Form development process	
(Leskovar & Premrov, 2021)	- Chronology - Construction location - Building height - Number of floors - Building function	
(Dzuri, 2024)	- Building Function - Building Facade - Building Style	
(Aisy & Anisa, 2020)	- Building form - Building function	
(Sukowiyono et al., 2021)	- Building Facade - Material	- Building Function - Building Facade
(Zhang et al., 2024)	- Material	- Material
(Panggabean et al., 2020)	- Building Façade	- Number of floors
(Gonzalez et al., 2020)	- Building Facade - Building Age - Building Structure	
(Alejendro et al., 2024)	- Form - Distribution - Construction features - Building height - Number of floors	
(Rahman et al., 2024)	- Building Height - Building Character - Foundation Selection - Building Ornaments - Building Mass Layout	

Based on the various studies mentioned, research on building typology has identified several key factors influencing the form and function of buildings, including physical elements, architectural styles, and

adaptation to local climate. However, there remain limitations in fully integrating all of these factors comprehensively, especially in rapidly developing areas such as the region surrounding Lake Toba, North Sumatra. Therefore, a more contextual approach is needed so that typology analysis in developing areas can accurately reflect the real conditions shaped by local dynamics.

Following up on this, several previous studies (Satria et al., 2023; Taqiuddin et al., 2023) have emphasized the importance of chronological aspects, location, and building height in determining typology. However, most of these studies still focus on general classification approaches without adequately considering the impact of highly dynamic social and economic changes, such as the development of the tourism sector, which now significantly influences the character of buildings in areas like Tigaras Port. These changes often result in shifts in building functions and forms that typological studies cannot overlook. One of the gaps that has been less explored is how direct and indirect tourism development alters building typology in developing areas. Infrastructure development and increasing tourist flows can transform building functions from residential to commercial or multifunctional uses, such as apartments and business spaces. Additionally, although adaptation to climate has been widely discussed in the literature (Dzuri, 2024), aspects of cultural acculturation and social and economic changes resulting from population growth and economic activities have received limited attention in building typology studies.

Therefore, further research is needed to holistically examine how social, cultural, economic, and environmental factors interact and shape the typological character of buildings in developing tourist areas. By synthesizing existing literature, new hypotheses can be formulated regarding how tourism development and infrastructure dynamics contribute to changes in building façades and functions. This study is expected to provide a deeper understanding of the complex relationship between social change and architectural character, particularly in rapidly transforming areas like Lake Toba within the context of tourism development.

2. Method

2.1 Research Area

The research location is set along the corridor of the Simarjarunjung area in Simalungun Regency (Figure 1). The site selection was conducted using purposive sampling, meaning the location was deliberately chosen based on the suitability of the area's characteristics with the study's focus. Simarjarunjung was selected due to its strategic position around Lake Toba and its role as the main route to Tigaras Port, making it an area with relatively high mobility and development levels. Spatially and visually, this area exhibits striking dynamics, primarily driven by the growth of the tourism sector. This has led to significant changes in the form and appearance of building façades. The diversity of building typologies emerging along this corridor becomes an important subject of analysis for understanding the evolving architectural patterns and character. Therefore, the Simarjarunjung area represents the visual façade transformation phenomenon in regions experiencing development pressure and tourism influence.

Figure1. Simarjarunjung Corridor Research Location
Source: Google Earth, 2024

2.2 Data Collection Technique

This study uses a qualitative data collection method to gain an in-depth understanding of building façade typologies in the Simarjarunjung area. This approach was chosen because it allows for a more detailed analysis of the visual, social, and cultural elements that shape the area's character through the changes and diversity of building façades. The data were collected from two sources: primary data and secondary data.

Primary data were obtained through direct observation of building façade elements, including materials, design, and the relationship between buildings and their surrounding environment, and photographic documentation capturing the diversity of façade typologies. The direct observation involved the researcher carefully examining and recording various façade elements along the Simarjarunjung corridor. This observation covered the analysis of materials, design, composition, and the interaction between buildings and their environment. The main focus was to identify existing façade typologies and understand their role in shaping the area's visual identity. In addition to observation, in-depth interviews were conducted with various local stakeholders, such as residents, business owners, and community leaders. The purpose of these interviews was to explore their perspectives on the changes occurring in building façades and their impact on the area's social and cultural character. To complement these methods, photographic documentation was used to capture the variety of façade typologies. These photos served as visual references that enriched the observation and interview findings, providing a clearer picture of the aesthetics and the façades' influence on the area's identity.

Meanwhile, secondary data were obtained through a literature review, which included national and international journals published within the last five years. This literature helped enrich the findings from observations and interviews, providing a theoretical foundation and references related to the research topic. Through this approach, the study aims to understand the role of building façades in shaping the visual and social identity of the Simarjarunjung area. Similar studies have employed the same qualitative method to analyze building façade typologies. For example, Ronarizkia & Giriwati (2020) in their study on the visual character of colonial building façades in Probolinggo, used a descriptive qualitative method to classify façade elements and explore how these elements reflect local history and culture. Likewise, Novrial & Rangkuti (2023) also adopted a qualitative approach to analyze the typology of shophouse façades in Medan, identifying the elements that shape the character of the area.

The qualitative approach used in these studies is highly appropriate for the context of the Simarjarunjung area, which is a tourist destination with great potential to preserve its visual character. This method enables the researcher to gain deep insights into the influence of local culture and history as reflected in the elements of building façades. Furthermore, data triangulation through observation, interviews, and literature review strengthens the analysis by ensuring the findings are more valid and comprehensive. Thus, through this in-depth qualitative approach, the study aims to provide a more holistic understanding of the role building façades play in shaping the visual and social character of the Simarjarunjung area.

2.3 Data Analysis Technique

The data collected through observation, photographic documentation, interviews, and literature review will be analyzed using a qualitative approach with descriptive interpretative analysis techniques. First, data from direct observations and photos of building façades will be categorized based on materials, shapes, ornaments, and the interaction between buildings and their surrounding environment. The goal is to identify the various façade typologies in the Simarjarunjung area. Next, the interview results with residents will be analyzed to understand the social and cultural meanings behind the changes in building façades.

Validation is conducted through source and method triangulation to enhance the validity of the results. Data from observations and interviews are compared with literature reviews from national and international journals and regional planning documents. Additionally, a temporal comparison approach uses photographic documentation from various periods to identify physical changes in façades over time. The combination of these analytical processes aims to build a comprehensive understanding of the contribution of building façades to the visual and social identity of the Simarjarunjung area. This study also seeks to reveal dominant façade typology patterns that reflect the interaction between local culture, modernization, and the dynamics of the tourism sector in the region.

Emphasis on the importance of triangulation can be found in the book written by Arianto (2024) titled "Triangulasi Metoda Penelitian Kualitatif" (Triangulation in Qualitative Research Methods), which states that this approach is a crucial component in ensuring data validity in qualitative research. Triangulation is an essential aspect of qualitative studies that verifies data accuracy, making it one of the main elements in producing valid and reliable research. Arianto also explains that there are various types of triangulation, such as data triangulation, method triangulation, theory triangulation, and investigator triangulation, which provide researchers with the flexibility to tailor the approach to their capabilities and foster innovation in data verification.

The research process is organized into six main stages: data collection, data analysis, validation, findings identification, drawing conclusions, and formulation of recommendations. Each stage is interconnected, forming a framework to understand the building façade typology within the context of the development of the Simarjarunjung tourism corridor area (Figure 2).

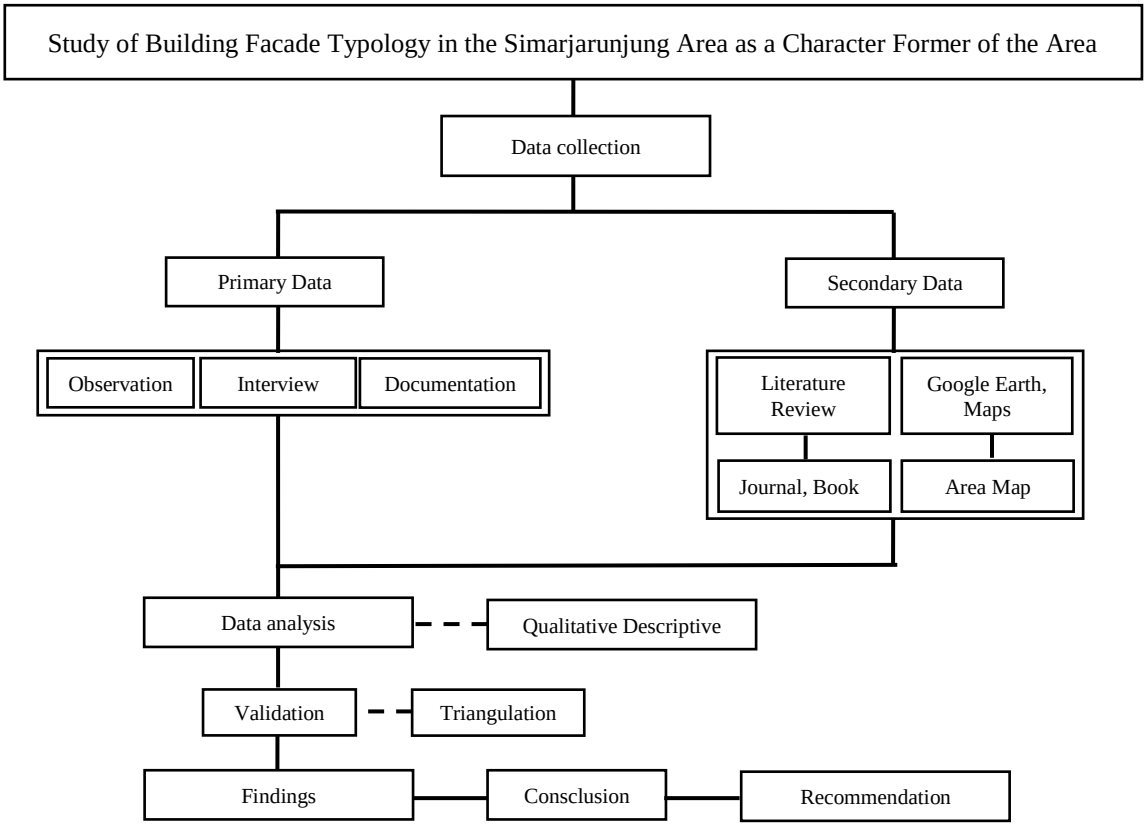

Figure 2. Research Method Framework
Source: Personal Analysis, 2024

3. Discussion

The research data were analyzed by identifying and classifying each building selected at the research site. This process involved categorizing the building types and systematically breaking down factual data from field observations and results.

3.1 Building Mass Composition

The Simarjarunjung Corridor area features a linear mass structure with relatively moderate density. The buildings are arranged in rows with varying spacing—some positioned close together, while others are set farther apart. Additionally, the rear sides of the building masses differ: one side faces the hillside, while the other directly overlooks Lake Toba (Figure 3).

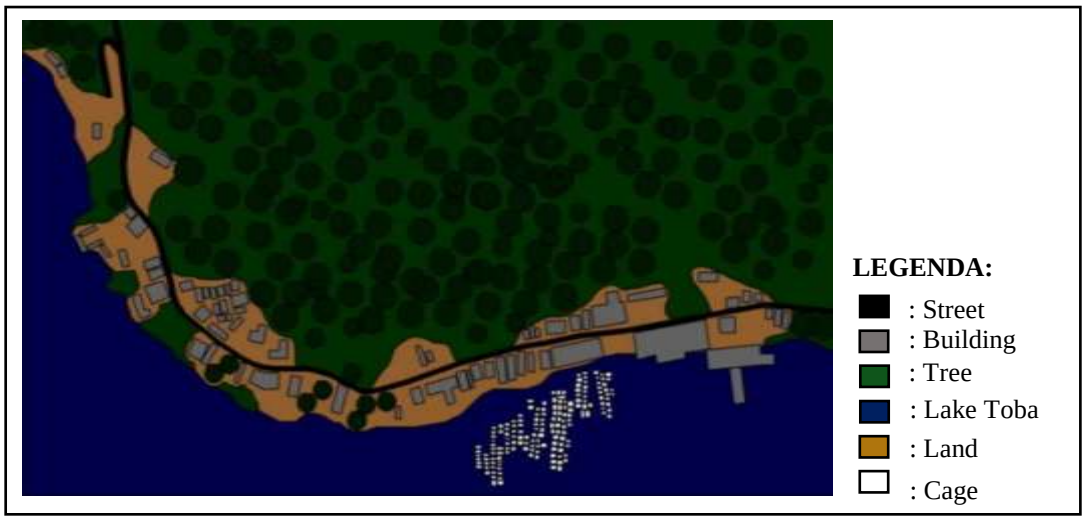

Figure 3. Building Mass Composition
Source: Personal Analysis, 2024

Related to the backyard of a house facing the hill, it is generally almost non-existent because it directly faces the hillside. In contrast, the backyard of a building facing Lake Toba can be used as a space with various activities such as fish ponds, planting, tourist attractions, and fields with a size of 400 m² to 1500 m² with a distance varying between 5m to 20 m from the edge of Lake Toba to the back of the building. At the same time, the building itself has a length of 15 to 30 m.

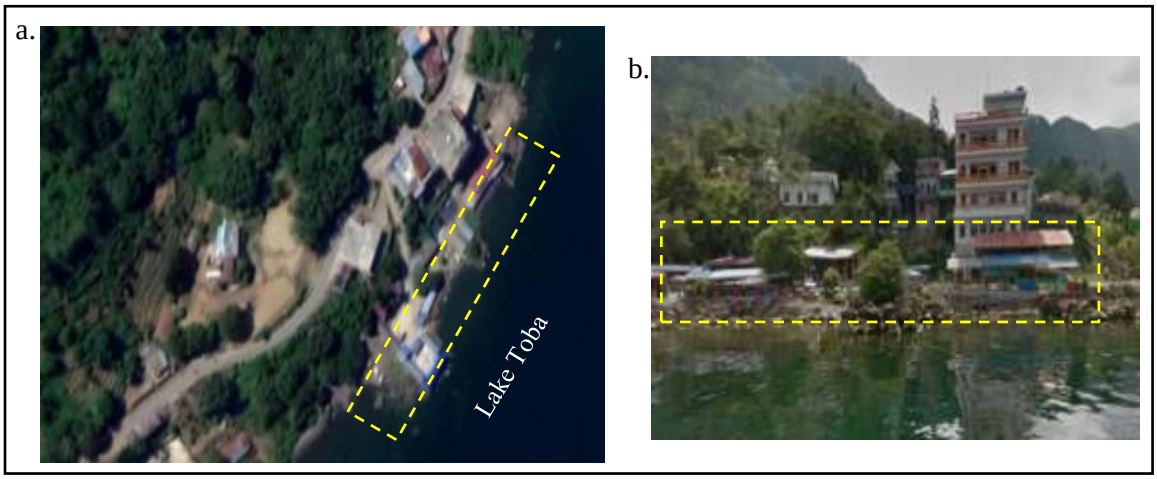

Figure 4. (a) Area Map ; (b) Recreation areas
Source: Personal Analysis, 2024

The backyard used by residents as a recreation area also provides facilities such as a pandoro that visitors can use to relax and enjoy the beauty of Lake Toba directly; in addition, because of its location close to the fish pond, visitors can also do other activities such as fishing. Residences that function as a place of business and, simultaneously, a place of recreation or inland fish ponds in the backyard are generally 20 to 30 m from the back of the building to the edge of Lake Toba (Figure 4).

3.2 Building Typologi

The Simarjarunjung corridor exhibits various building typologies that reflect the diversity of functions, environmental conditions, and local cultural and socio-economic influences. Differences in facade design, building height, and traditional and modern materials give this area a unique and adaptive architectural character. This diversity in typologies not only meets functional needs and adapts to the topography but also reflects the region's cultural values and evolving socio-economic dynamics. The following is an overview of the existing conditions along the Simarjarunjung corridor, where the researcher has selected several buildings as samples to represent the results of the observations conducted. These existing images are intended to clearly understand the various building typologies discussed in this study (Figure 5).

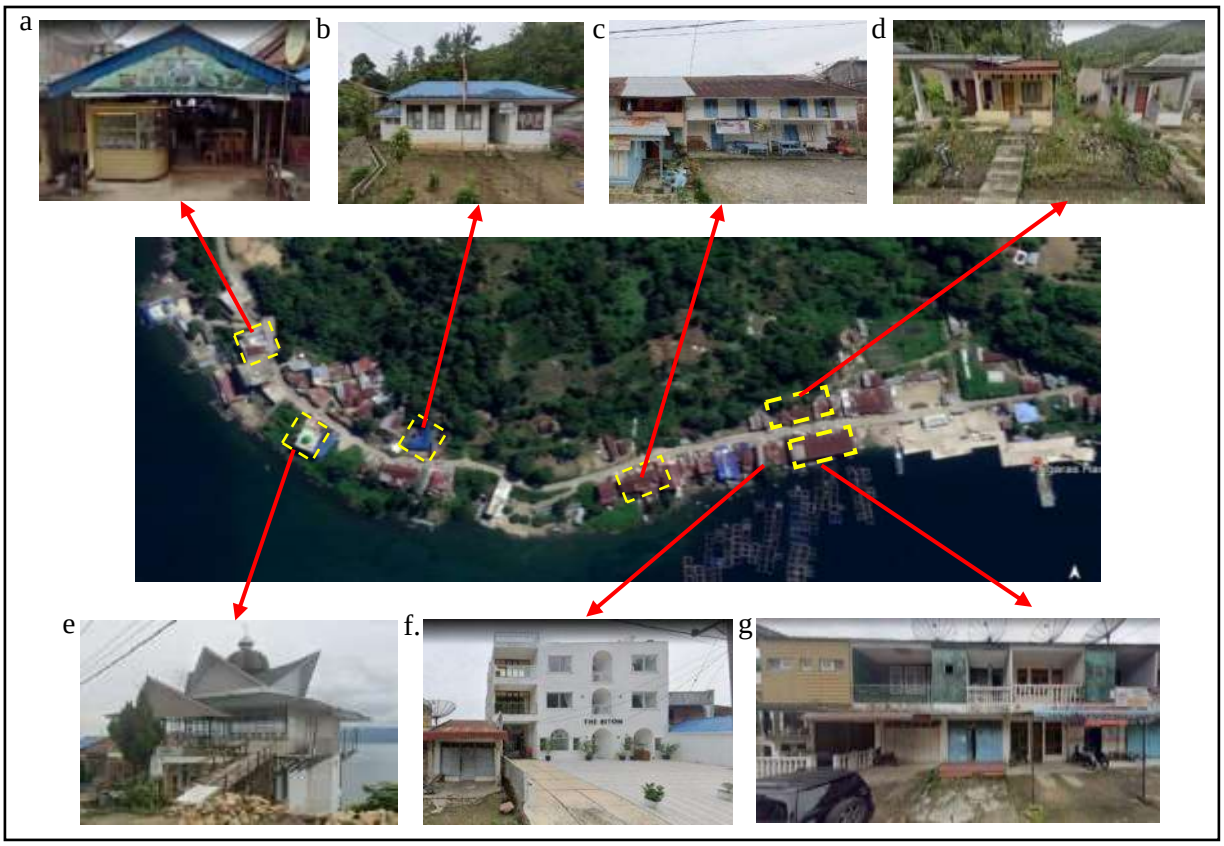

Figure 5. (a) Restaurant ; (b) Health Center ; (c) Wooden House; (d) Concrete Residential House;(e) Mosque; (f) Hotel; (g) Mix Building
Source: Personal Analysis, 2024

In this study, building typology is analyzed based on four main aspects. First, building function refers to the intended use, such as residential, commercial, or other purposes. Second, the number of floors reflects the scale and complexity of the building and influences its structural design and overall aesthetics. Third, the building facade includes the exterior appearance and design elements such as ornaments, colors, and shapes that represent the architectural character of the building. Lastly, materials, referring to construction materials, are crucial in durability, technical function, and the building's aesthetic value. Together, these four aspects provide a comprehensive overview of the building typology that is the focus of this study.

A. Building Function

Field observations indicate that the building typology along the Simarjarunjung Corridor is closely related to the function of each building, which develops dynamically over time alongside the transformation of the area as a tourist destination. Residential functions generally dominate the area; however, there is also a diversity of other functions such as commercial, shophouses, religious facilities, and healthcare services. Each building function exhibits distinctive typological characteristics, arranged based on spatial needs and types of activities carried out, as well as adaptations to the social and economic dynamics of the area (Agustina & Agustian, 2023).

The transformation of building typology, particularly in commercial buildings and shophouses, is also influenced by the growing tourism sector in Simarjarunjung. This is reflected in the emergence of more open and inclusive design patterns, such as the presence of display areas and accessibility that facilitate interaction with tourists. Also, lodging facilities like homestays have begun responding to the increasing demand for accommodation in the tourist area. Meanwhile, social facilities such as places of worship and healthcare centers have also adjusted to provide more optimal services for the local community and visitors from outside the region.

These conditions demonstrate that the development of the tourist area significantly impacts shaping flexible

and adaptive building typologies. Building functions no longer merely fulfill basic needs but are also the result of interactions with broader environmental, social, and economic factors (Agustina & Agustian, 2023). Therefore, a comprehensive understanding of the relationship between function and building typology within the context of tourist areas is crucial to support the formulation of sustainable spatial planning responsive to the region's dynamics.

B. Number Of Floors Of The Building

Significant variations can be observed from two perspectives in the context of development in hillside areas. From the main roadside, buildings generally appear to have one to three floors. However, when viewed from the lakeside, which is at a lower elevation, the visible number of floors can reach three to five. This difference in visual perception is caused by the land's position on a steep slope contour, where limited horizontal space encourages the optimization of vertical space usage. Such geographical conditions necessitate architectural design adjustments, resulting in a distinctive and adaptive typology suited to the land's incline. The strategy of utilizing vertical space aims for efficiency and considers visual comfort, accessibility, and the harmonious relationship between buildings and their surrounding environment (Figure 6).

These findings are supported by recent Ardiyanto (2024), research, highlighting the importance of a contextual approach in architectural design for hillside areas. The study emphasizes that an in-depth understanding of site characteristics, including slope gradient, natural drainage, and visual orientation toward the surrounding landscape, greatly influences the success of building design on contoured land. Strategic utilization of the terrain can create adaptive living spaces while maintaining aesthetic value and environmental sustainability.

Thus, building adaptation to challenging topographical conditions reflects an architectural response that addresses physical land limitations and emphasizes the importance of integrating spatial functionality, visual potential, and sustainability principles in area planning.

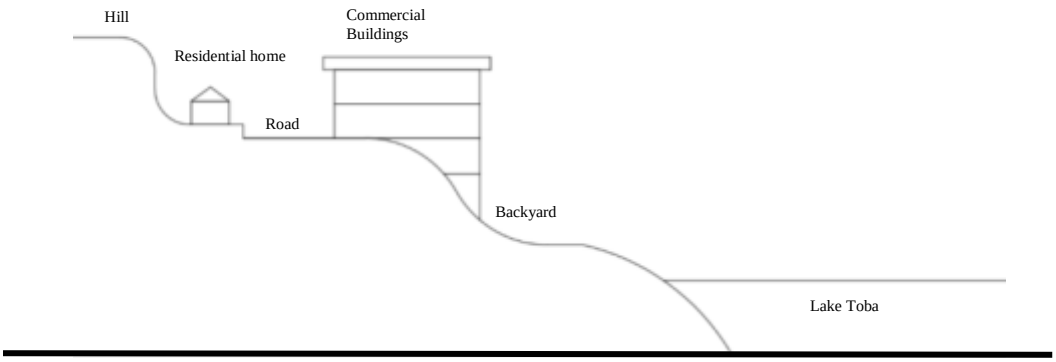

Figure 6. Corridor Section of the Simarjarunjung Area
Source: Personal Analysis, 2024

C. Building Facade

Thus, building adaptation to challenging topographical conditions reflects an architectural response that addresses physical land limitations and emphasizes the importance of integrating spatial functionaliThe façade elements of buildings along the Simarjarunjung corridor exhibit a variety of forms and configurations that align with the area's functions and character. Generally identifiable elements include roofs, walls, columns, windows, doors, and ventilation. These elements serve as visual markers that shape the spatial character while also reflecting the functional dynamics of buildings in an area that is both developing as a tourist destination and situated within a hilly geographical context.y, visual potential, and sustainability principles in area planning.

Windows are one of the most visually diverse elements of building façades. In most buildings, windows appear in configurations of one, two, or even three openings. Nevertheless, their sizes remain proportional

neither too large nor too small to ensure adequate natural lighting and air circulation. In a highland area with cooler temperatures and higher humidity, such window openings reflect an adaptation to the local climate, balancing the need for cross ventilation and thermal comfort. A study by Penelitian oleh Hermawan et al. (2023) emphasizes that natural air circulation significantly contributes to achieving thermal comfort in residential buildings, especially in highland regions. Strategically planned ventilation considering wind orientation and access to natural light can enhance spatial efficiency without causing temperature imbalances inside the building. Doors, as another key element of the façade, also display a variety of forms corresponding to the building's function. Residential buildings typically use hinged doors as the main access point, appropriate for their private function and occupants' needs. Meanwhile, folding doors are commonly found in shop houses with commercial functions on the ground floor. These folding doors facilitate easier goods movement, allow wider openings during business operations, and provide greater flexibility in transitioning between indoor and outdoor spaces. A study by (Saputra & Raidi, 2023) notes that folding doors are still widely used as a façade design element in shop houses, as they effectively accommodate both functional requirements and aesthetic considerations in commercial buildings in such areas.

Columns also serve as significant elements of the façade, especially in buildings on sloped terrain. These columns are generally designed as free-standing structural supports, not only to bear the vertical load of the building but also to provide flexibility in the spatial arrangement of both upper and lower levels. Such columns create open spaces beneath the structures, which can be utilized for circulation paths, parking areas, or service zones, while enabling the building to adapt to the sloping land. A study by Kurniatullah & Hasyuar, (2023) supports this observation, indicating that using columns as structural supports effectively maintains the stability of buildings constructed on uneven ground contours. Columns function as structural elements that distribute loads evenly, thereby reducing the risk of soil displacement and ensuring the long-term integrity of the building.

The forms used in roofing also vary, reflecting both responses to contemporary developments and sensitivity to local cultural contexts. Many residential buildings adopt gable (gable roof) and hipped roof types, which are well-suited to hilly terrains for effectively channeling rainwater. Other buildings display the influence of contemporary architecture through flat roofs. Nevertheless, local distinctiveness remains evident, especially in public buildings such as mosques, which often combine domed roofs with tiered gable roofs characteristic of Batak architecture. This composition represents an effort to preserve cultural identity while expressing religious symbolism. A study by (Angkasa et al., 2024) states that the form of a mosque roof in a particular region is not merely a matter of fulfilling aesthetic or technical functions but also reflects the local community's cultural diversity and social dynamics. Another study further emphasizes that variations in roof form serve not only technical purposes, such as protecting the building from environmental conditions and managing the climate, but also play a vital role as cultural symbols and local identity markers. Therefore, preserving roof diversity and uniqueness is an essential aspect of safeguarding cultural heritage, particularly in contemporary architectural development and globalization (H & Rolalisasi ,2023).

Thus, the diversity of façade elements in the Simarjarunjung area reflects a synthesis of functional needs, adaptation to geographical context, and expression of local culture. Understanding the configuration of these elements is essential in designing an area that is not only spatially efficient but also visually and culturally meaningful.

D. Use of Materials

Wood, for instance, is still commonly found in elements such as doors and windows and, in some cases, is also used for walls and columns, particularly in buildings that retain the traditional Batak architectural character. Local materials like wood are chosen due to their abundant availability in the surrounding environment and their inherent aesthetic and cultural value. Wood also exhibits a strong capacity to adapt to local climatic conditions, making it an ideal material for sustainable construction that preserves local identity (Mustafa, 2024).Moreover, a study conducted by Ismoyo & Wibowo (2020) emphasizes that wood is often selected as a building material because it is readily available, culturally significant, and aesthetically valuable. In addition, its adaptability to local environmental conditions makes it suitable for construction that aligns with both sustainability principles and the local context.

However, concrete has become increasingly prevalent alongside technological advancement and the growing demand for more permanent structures that can withstand extreme weather conditions in hilly regions. Concrete is now widely used in structural elements such as walls, columns, stairs, and roofs, indicating a shift in material preference among residents and builders toward stronger, more durable, and lower-maintenance options. This trend is supported by a study conducted by Septianto et al. (2023)which emphasizes that concrete can absorb energy before cracking or failing, making it resistant to dynamic loads and pressure. Concrete's strength and durability are influenced by its material composition and curing process, making it a reliable choice for high-performance structural needs. Similarly, Poerwodihardjo & Rustendi (2021)highlight that concrete is a superior construction material due to its fire resistance, high compressive strength, excellent durability, low maintenance requirements, and moldability when fresh, making it an efficient solution for various structural applications.

In addition to wood and concrete, steel is selectively used for secondary elements such as railings or balustrades on the second floor, particularly in commercial buildings and accommodations. Meanwhile, glass is applied to windows and doors to maximize natural lighting. Tile and corrugated metal sheets (zinc/steel roofing) are the primary choices for roofing materials. Corrugated metal roofing is often preferred due to its economical cost and ease of installation. However, this material has limitations related to durability under extreme weather conditions, such as potential corrosion and damage from heavy rainfall if not properly maintained. Therefore, selecting corrugated metal roofing requires balancing cost considerations with long-term durability (Fitriyanti & Ismawati, 2024). On the other hand, tiles made from durable materials, featuring attractive designs in color and shape, and ease of installation and maintenance offer various advantages such as longer lifespan, enhanced aesthetic appeal of the house, efficiency in installation and upkeep, and economic benefits for homeowners (Prihatin & Rahman, 2022).

Thus, the pattern of material usage reflects a balanced architectural adaptation that harmonizes local values, sustainability principles, and the demands of modern needs. This, in turn, serves as an important reflection for understanding the dynamics of development in tourist areas based on the natural landscape and local culture.

To facilitate understanding, the researcher summarizes the findings of this study's analysis in the following table (Table 2).

Table 2. Building Typology of Simarjarunjung

Aspect	Findings
Building Function	- The area is predominantly residential but is expanding to include commercial functions, shophouses, religious facilities, healthcare, and tourism. - The development of the tourism sector influences the transformation of building typologies. - The emergence of homestays and open design concepts caters to the needs of tourists. - Social facilities adapt to serve both residents and visitors. - Building functions are adaptive to social and economic dynamics.
Number of floors of the building	- Due to the sloping terrain, buildings have 1–3 floors on the street side and 3–5 floors on the lake side. - The steep topography encourages vertical space optimization. - Designs adapt to land slope, considering visual comfort and sustainability. - Strategic use of terrain contours supports spatial

	efficiency and landscape aesthetics. .
Building Facade	- Key elements: windows, doors, columns, and roofs. - Windows are proportionate, supporting cross ventilation and natural lighting. - Conventional doors are used in residences, while folding doors are common in shop-houses for flexibility. - Free-standing columns enable buildings to adapt to the slope. - Roof types vary, such as gable, hip, dome, flat, reflecting function, local culture, and climate. - Local cultural expression remains dominant.
Use of Materials	- Combination of traditional and modern materials: wood, concrete, steel, glass, tiles, and zinc. - Wood is dominant in door and window elements, reflecting local culture. - Concrete is used in the main structural components for durability and efficiency. - Steel and glass are applied in secondary elements for aesthetics and lighting. - Tiles and zinc are roofing materials; zinc is economical but requires extra maintenance. - Adaptive to climate and modern needs.

4. Conclussion

The building typology along the Simarjarunjung corridor reflects architectural adaptations to the geographical characteristics of the hilly area as well as the social, economic, and cultural dynamics of the local community. The functional transformation of buildings from predominantly residential to a mix of commercial, lodging, and public facilities has occurred alongside the area's development as a tourist destination, which has driven an increased demand for economic spaces and social interaction. The steep topography encourages vertical space utilization, resulting in multi-story buildings with façade elements adapted accordingly, such as proportionally sized windows, folding doors on shop-houses, free-standing columns for spatial flexibility, and various roof forms combining traditional Batak styles with modern influences. The selection of materials including wood, concrete, glass, steel, and zinc reflects a balance between utilizing local resources, structural efficiency, and meeting aesthetic and functional requirements. This study has certain limitations, as it remains qualitatively descriptive and does not include measurements of spatial quality or user perception. Therefore, further research incorporating quantitative and participatory approaches is necessary to support comprehensive area development. The recommendations focus on formulating contextual design guidelines that consider land contours, climatic comfort, preservation of local cultural values, and strengthening the community economy through sustainable design principles based on local potentials.

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