EVALUATION OF EDUCATIONAL FACILITY ACCESSIBILITY BASED ON THE ZONING SYSTEM IN TARUTUNG DISTRICT: A SPATIAL ANALYSIS AND ITS IMPLICATIONS FOR STUDENT ADMISSION POLICIES

Abstract
This study aims to evaluate the accessibility of Junior High School (SMP) educational facilities in Tarutung District, North Tapanuli Regency, using spatial analysis methods based on the SNI 03-1733-2004 standard and the Neighborhood Unit theory. The research reveals that a significant portion of Tarutung District, specifically 77.41%, is outside the ideal school accessibility radius, leading to inequitable educational access for students. Spatial analysis indicates that many areas, especially rural regions, lack sufficient access to public transportation, further exacerbating inequality. The zoning system used in the New Student Enrollment Policy (NSEP), which considers the distance between students' homes and schools, intensifies this injustice, particularly for students living in remote areas. Based on these findings, this study recommends the redistribution of educational facilities, improvements in transportation infrastructure, and revisions to the zoning policy to incorporate geographic factors and accessibility in student enrollment assessments. The results are expected to contribute to more equitable and inclusive educational planning in North Tapanuli Regency**.**
Keywords: Educational Facility Accessibility, Zoning System, Student Admission Policy, Spatial Analysis

I. INTRODUCTION

Education is a fundamental pillar for improving human resource quality, which in turn contributes to sustainable development. In Indonesia, the government continues to strive for equitable access to education through various strategic policies, one of which is the zoning system. This policy was introduced via Ministerial Regulation No. 1 of 2021, which sets new student admissions based on the distance between students' residences and the target school. The aim is to promote educational equity by ensuring that every student has equal access to educational facilities (Kemendikbud, 2021).

However, the implementation of the zoning policy faces various challenges, particularly regarding the uneven distribution of educational facilities. Idrus (2012) noted that educational equity is often hindered by socio-economic disparities, unequal distribution of educational infrastructure, and the incomplete implementation of fair policies. In Tarutung District, North Tapanuli Regency, this imbalance is particularly evident. Despite being the most densely populated district in the regency, the distribution of the seven public junior high schools (SMP) in the area is disproportionate, making it difficult for students in certain regions to access schools (BPS Tapanuli Utara, 2024).

To address the issue of educational facility accessibility, Clarence Perry's (1929) Neighborhood Unit theory provides a relevant conceptual framework. This theory emphasizes the importance of neighborhood planning that ensures public facilities, including schools, are easily and efficiently accessible to the local population. Perry proposed that schools should be the center of a residential unit and designed so that they can be accessed without crossing main roads or requiring motor vehicles (Perry, 1929). This concept provides a strong theoretical foundation for evaluating the zoning policy in areas such as Tarutung District.

Previous studies have shown that spatial analysis approaches can offer comprehensive insights into assessing the accessibility of educational facilities. Rustiadi (2022) mentioned that techniques such as buffer analysis and overlay allow for identifying the spatial relationship between school locations and residential areas, providing more accurate

determinations of educational facility needs. Furthermore, Wahyu et al. (2020) found that the implementation of spatially-based zoning can minimize educational access disparities and assist local governments in planning educational infrastructure development.
In addition to spatial approaches, national standards also provide guidelines for educational facility accessibility. The Indonesian National Standard (SNI) 03-1733-2004 stipulates that the ideal distance between residential areas and junior high schools should be 1,000 meters, with guaranteed access through public transportation. This standard aligns with De Chiara and Koppelmen's (1975) view that educational facilities should be designed to maximize accessibility without compromising comfort and efficiency (De Chiara & Koppelmen, 1975).

However, field conditions reveal a gap between policy and implementation. Some villages in Tarutung District have access to more than one school, while others lack any public secondary school options within their zoning area. Maula (2023) noted that such access disparities could result in unequal educational quality for students. Additionally, the absence of district-specific needs-based studies in determining zoning boundaries is a major factor exacerbating the situation (North Tapanuli Regency Government, 2024).

This condition highlights the need for data-driven evaluations to assess the effectiveness of the zoning policy in achieving educational access equity. The combination of the Neighborhood Unit theory and spatial methods offers a suitable approach to identifying the accessibility levels of educational facilities in the district. These methods not only measure distance but also take into account travel time, transportation options, and other environmental factors that affect accessibility.

This study aims to analyze the distance and accessibility of junior high school facilities in Tarutung District based on the Neighborhood Unit theory. The findings of this study are expected to provide practical contributions in formulating more equitable, evidence-based policies for improving educational access. Additionally, the results are anticipated to serve as a reference for planning educational infrastructure development that is more adaptive to regional needs.

II. Research Methodology

This study employs a quantitative approach with spatial analysis methods to evaluate the distance and accessibility of Junior High School (SMP) facilities in Tarutung District, North Tapanuli Regency. This approach was chosen for its ability to depict spatial relationships between school locations and residential areas, and to identify educational access disparities resulting from the zoning policy in place. The spatial analysis, in this case, utilizes overlay and buffer analysis techniques to assess the accessibility of public SMPs in Tarutung District, based on the Neighborhood Unit theory, which serves as the conceptual framework for this study.

Research Location

This study was conducted in Tarutung District, located in North Tapanuli Regency, North Sumatra Province. The district was selected as the research site due to its highest population density within the regency and its imbalanced distribution of educational facilities, particularly public junior high schools (SMPs). The seven public SMPs in Tarutung are unevenly distributed, which allows this study to identify the educational access gaps between different regions.

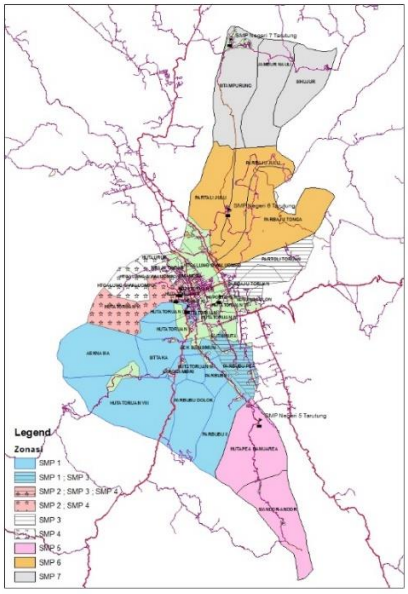

Figure 1. Research Location

Population and Sample

The population in this study consists of all the public junior high schools in Tarutung District, which are seven in total. The analyzed sample includes spatial data regarding the geographic coordinates of each SMP and the zoning areas for new student admissions (PPDB) as outlined in the North Tapanuli Regent Regulation No. 20 of 2021. This study focuses on analyzing the accessibility of each SMP to the residential areas within the designated PPDB zones, considering both distance and travel time from each village/urban village included in the zoning.

Types and Sources of Data

The data used in this study consists of both primary and secondary data:

1. **Primary Data**: Primary data were collected through in-depth interviews with the heads of public junior high schools in Tarutung District. These interviews aimed to gather information about the implementation of the zoning policy, school capacity, and the challenges faced in meeting the educational needs within each zone. Additionally, interviews were conducted to understand the schools' perspectives on the accessibility of educational facilities for local communities.
2. **Secondary Data**: Secondary data includes spatial data obtained from the North Tapanuli Regency Government and other relevant agencies. The spatial data collected includes land use maps, road networks, and the geographic coordinates of school locations, as well as the residential areas within the PPDB zoning. Furthermore, secondary data also includes information about the zoning policies applied in Tarutung District.

Data Collection Techniques

Data collection was carried out through two primary methods:

1. **In-depth Interviews**: Interviews were conducted with school heads and relevant staff to gather information about the zoning policy implementation and the challenges faced in new student admissions. The interviews also included discussions on the level of school accessibility for students from the various villages within the designated zoning areas.
2. **Spatial Data Collection**: Spatial data were collected using Geographic Information System (GIS) software to determine the location and distance between schools and residential areas. Digital maps and geographic coordinates were used to calculate distances and perform more in-depth spatial analysis.

Data Analysis Techniques

The collected data were analyzed using several spatial analysis techniques, including:

1. **Buffer Analysis**: Buffer analysis was used to create influence zones around each school with specific radii (e.g., 1 km, 1.5 km, and 3 km). These radii were chosen based on the distance guidelines established in the Neighborhood Unit theory and the standards set by SNI 03-1733-2004. Each buffer zone was then analyzed to determine whether the areas within it were accessible to the schools.
2. **Overlay Analysis**: Overlay analysis was used to combine the student admission zoning data (PPDB zones) with the results from the buffer analysis. This allowed for mapping the spatial relationship between school locations and residential areas. The outcome of this analysis helps determine whether the zoning policy covers all areas that require access to schools, or whether some areas are left unserved by the schools within the zones.
3. **Accessibility Analysis**: Based on the results of the buffer and overlay analysis, an accessibility analysis was conducted by categorizing regions according to their level of accessibility to schools. Accessibility categories were defined based on distance, travel time, and the availability of public transportation to reach the schools. Regions were classified as "accessible" or "hard to access" based on criteria set by De Chiara and Koppelmen (1975) and SNI 03-1733-2004.

Validity and Reliability of Data

To ensure the validity and reliability of the data, the study employed source triangulation, which involved comparing data from different sources, such as interviews with school heads, spatial data from GIS, and policy documents from the North Tapanuli Regency Government. Data validation was also carried out by cross-referencing spatial data with field observations and interviews with relevant stakeholders.

Research Procedure

This study was carried out in several phases as follows:

1. **Data Collection**: Spatial and primary data were collected through interviews with school heads and staff, as well as from relevant government agencies.
2. **Data Processing**: Spatial data were processed using GIS software to generate distance and zoning maps and to perform buffer and overlay analyses.
3. **Accessibility Analysis**: The accessibility of educational facilities was analyzed based on the results of the spatial analyses.
4. **Report Preparation**: The findings and recommendations were compiled into a research report based on the analysis

III. Result and Discussion

Spatial Analysis Results

The spatial analysis conducted in this study aimed to evaluate the distance and accessibility of public Junior High Schools (SMP) in Tarutung District. Using buffer analysis and overlay techniques, this study mapped the areas accessible from each school based on specific distance radii. The results of this analysis provide a clear depiction of the school accessibility distribution in the region.

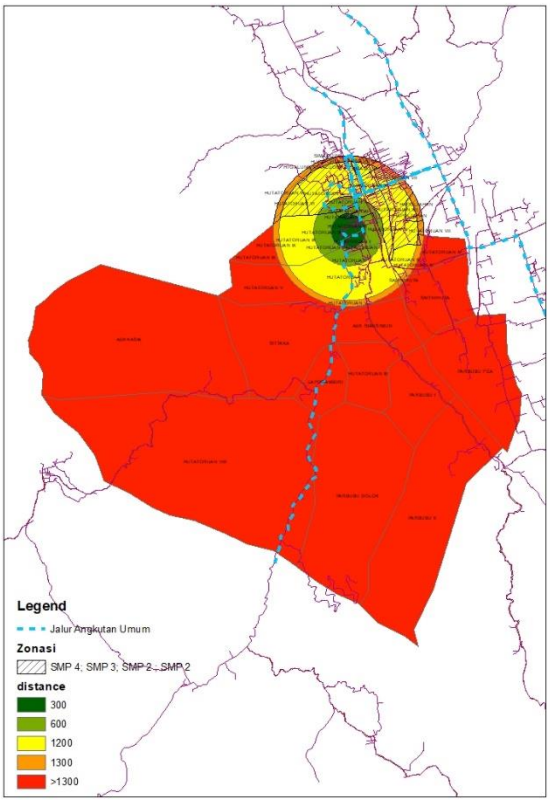

Figure 2. Spatial Analysis Map of SMP Negeri 1 Tarutung Accessibility
This map shows the spatial analysis results for SMP Negeri 1 Tarutung, one of the largest schools in the district. The analysis reveals that most of the school's zoning area is within an accessible range, with a radius of about 1 km to 1.5 km. However, there are areas in the "fairly distant" zone (greater than 1.2 km), indicating that although SMP Negeri 1 has a larger capacity, some villages or urban areas are still quite far from the school.

This study analyzes the accessibility of public middle schools (SMP) in Tarutung District, Tapanuli Utara, based on distance and zoning criteria. The data in the table reveals that villages categorized as "Near" (300 meters) meet the ideal standards of SNI 03-1733-2004, with schools easily accessible within walking distance. For example, *Hutatoruan V*, *Hutatoruan IX*, and *Hutatoruan I* are all within 300 meters of SMP 1, providing optimal accessibility. These areas comply with the Neighborhood Unit theory, where schools are ideally located at the center of residential areas, ensuring that they are easily accessible by local residents.

The "Moderate" category (600 meters) still falls within an acceptable range, but the larger area coverage in these villages presents challenges in accessibility. For instance, *Hutatoruan IX* (32.93 km²) and *Hutatoruan V* (19.74 km²) are within 600 meters of SMP 1, but larger geographical areas may face difficulty accessing transport, especially in the more remote parts of the villages. Though they meet SNI standards, some remote areas might require additional transportation solutions to improve accessibility for students living in those areas.
However, for areas in the "Far" (1300 meters) and "Very Far" (>1300 meters) categories, the distance exceeds the ideal range set by SNI 03-1733-2004, with significant barriers to accessibility. These areas, such as *Parbubu Dolok* and *Parbubu I*, are located more than 1,300 meters from the nearest school, and many of these villages are not served by public transportation. These long distances, combined with challenging terrain, make it difficult for students in these regions to access schools, despite being technically within the zoning area according to the theoretical models.

The zoning policy, which prioritizes proximity between students' homes and schools, may result in inequality, especially for students in remote villages. The current distribution of schools, concentrated in certain areas, does not address the needs of those in more distant regions. Therefore, expanding zoning boundaries or establishing new schools in underserved areas would improve educational accessibility for all students. Additionally, enhancing transportation infrastructure, particularly in remote areas, and revising the zoning policy to include factors like transportation availability and geographic challenges would contribute to a more equitable educational system

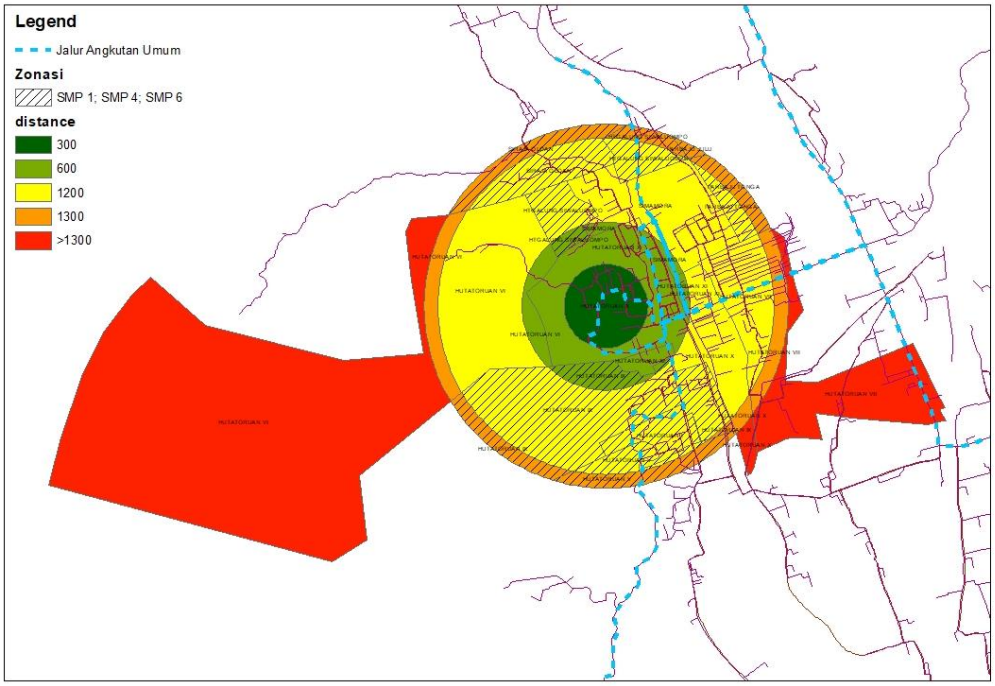

Figure 3. Spatial Analysis Map of SMP Negeri 2 Tarutung Accessibility

This figure illustrates the spatial analysis results for SMP Negeri 2 Tarutung. Although the school has a substantial capacity and serves several villages in the area, the analysis shows that some areas are more than 1,500 meters away from the school, categorized as "hard to reach." These areas often lack adequate public transportation, making it difficult for students from these regions to access the school efficiently.

The analysis of school accessibility in Tarutung District reveals that the proximity of schools significantly impacts students' access to education. Villages categorized as "Very Near" (300 meters) and "Near" (600 meters) to their respective schools, such as *Hutatoruan X* and *Simamora*, align with the standards set by SNI 03-1733-2004, ensuring easy access for students. These areas fall within the ideal "walking distance" to schools, consistent with the principles of *Neighborhood Unit*, where schools should serve as the central point of residential communities. In these cases, students can easily reach schools without needing transportation, making these areas highly accessible.

However, the "Moderate" (1200 meters) category presents more challenges, even though it still complies with the guidelines of De Chiara and Koppelmen (1975). Villages such as *Hutatoruan VII* and *Simamora* remain accessible but are at the threshold where walking may not always be feasible, especially for students living in the more distant parts of these areas. While still considered within range according to the standards, the larger area coverage and potential lack of transportation options create accessibility issues for some students.

The "Quite Far" (1300 meters) and "Far" (>1300 meters) categories reveal significant challenges in accessibility. Villages such as *Hutatoruan VI* and *Hutatoruan X* face greater difficulty due to both their distance from schools and the lack of adequate transportation infrastructure. Although theoretically within reach under De Chiara and Koppelmen's criteria, these areas are harder to serve due to their remote locations, which often lack public transportation routes. These villages, with large coverage areas and difficult terrain, require urgent attention to ensure equitable access to education.

To address these disparities, it is recommended that the zoning policy be revised to include more remote areas within school zones, expanding access for students living in "Quite Far" and "Far" categories. Improving public transportation infrastructure and offering subsidized transport for students in distant areas would alleviate the challenges caused by long distances. Furthermore, the zoning policy should be revised to account for transportation access and geographic barriers, ensuring a more equitable and inclusive educational system. These changes would help ensure that all students, regardless of location, have equal opportunities to access quality education.

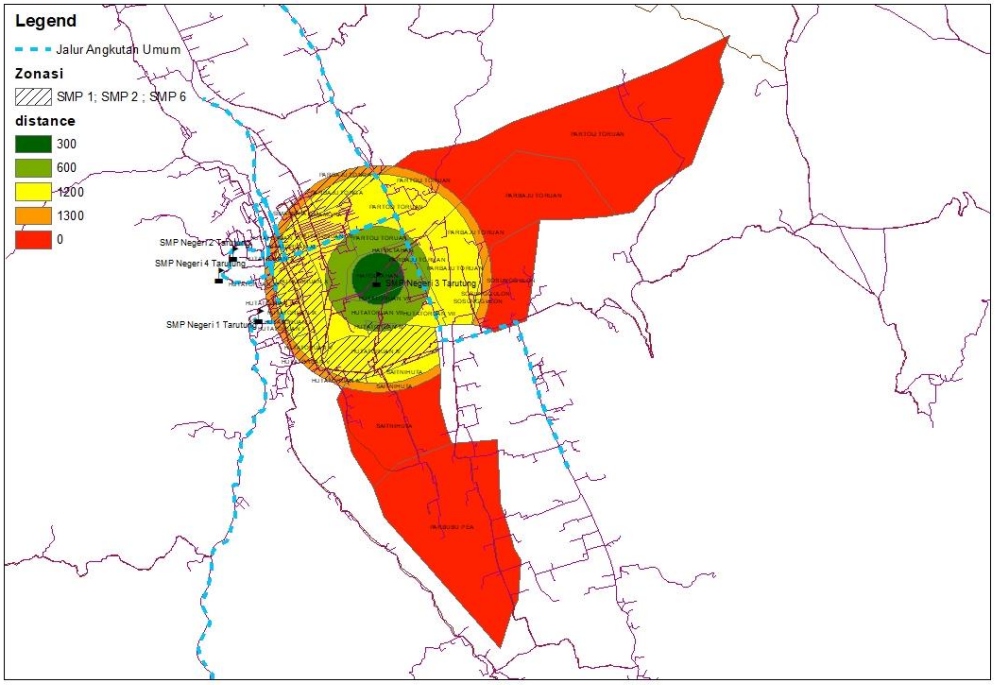

Figure 4. Spatial Analysis Map of SMP Negeri 3 Tarutung Accessibility

Spatial analysis for SMP Negeri 3 Tarutung shows that most of the zoning area is within an accessible range, between 1,000 meters and 1,200 meters. However, several villages still fall beyond 1,200 meters and are categorized as "fairly distant" or "hard to reach." This indicates that although SMP Negeri 3 has better accessibility compared to other schools, there are still gaps in equitable access to education.

Accessibility Based on Distance and Zoning Standards

The analysis of school accessibility in Tarutung District, based on the data provided, reveals significant differences in the accessibility of schools depending on the distance between residential areas and the schools. The distance is divided into five categories: "Very Near" (300 meters), "Near" (600 meters), "Moderate" (1200 meters), "Quite Far" (1300 meters), and "Far" (>1300 meters). Areas categorized as "Very Near" and "Near" show excellent accessibility to schools. For example, villages like *Hutatoruan VII* and *Hapoltahan*, both within 300-600 meters of their respective schools (SMP 2, SMP 3, and SMP 4), are easily accessible and comply with SNI 03-1733-2004 standards for school proximity. These villages are within walking distance, which aligns with the concept of

Neighborhood Unit where schools should be at the heart of residential areas, facilitating easy access for local residents.

The "Moderate" category (1200 meters) still meets the standards of De Chiara and Koppelmen (1975), but challenges begin to appear, particularly in larger areas with less direct access. Villages such as *Partoli Toruan* and *Hutatoruan VII* are within 1200 meters of their designated schools, and while still theoretically accessible, they face challenges such as greater area coverage and potential lack of transport services for remote areas. For instance, *Partoli Toruan* (61.99 km²) and *Hutatoruan VII* (50.81 km²) may have larger population distributions, meaning that while they fall within the moderate zone, some residents, especially those living further from the school, may experience difficulty accessing the facilities.

"Quite Far" and "Far" Categories
For areas categorized as "Quite Far" (1300 meters) and "Far" (>1300 meters), the accessibility to schools becomes more difficult. These regions are more distant from the nearest schools and may not be adequately served by public transportation. Villages such as *Hutatoruan X* (1300 meters) and *Hutatoruan V* (1300 meters) demonstrate the challenges posed by distance. While still theoretically accessible based on the De Chiara and Koppelmen model, the lack of transport options and challenging geography, especially in larger areas like *Partoli Toruan* (292.70 km²), exacerbates the issue. These areas face significant barriers in terms of both physical distance and lack of infrastructure, making access to schools much more difficult for students.

Moreover, villages that fall into the "Very Far" category, such as *Saitnihuta* and *Partoli Toruan*, show even greater challenges, with some areas having difficulty being reached at all due to extreme distances and lack of adequate transport options. These regions are classified as "Hard to Reach" under the zoning system, as the distances exceed the 1300-meter threshold and face significant logistical issues in terms of accessibility to educational facilities.

Implications for Zoning Policy
The zoning policy, which determines school assignments primarily based on proximity, often results in inequities, particularly for students residing in more distant areas. While the current zoning system works well for those living near schools, it disadvantages students who live in remote regions such as *Partoli Toruan* and *Saitnihuta*, where access to schools is difficult, and transport options are limited. This raises concerns about the fairness of the zonal system, as students in these remote areas may not be able to compete fairly for school placements. The lack of consideration for transportation availability and geographic barriers means that some students are unfairly excluded from local school zones, despite being within the overall geographical catchment area.

Recommendations for Policy Revisions and Infrastructure Development
To address these challenges, several policy revisions and infrastructure improvements are recommended. First, the zoning system should be expanded to include more remote areas and account for factors such as transportation accessibility and terrain. Additionally, increasing the availability of public transportation, particularly in more remote areas, would improve access for students who are otherwise hindered by geographic and logistical barriers. Moreover, creating more schools in underserved areas, especially in regions like *Partoli Toruan* and *Saitnihuta*, would help balance the educational opportunities for students across the district. By taking these factors into account, the zoning system can be adjusted to create a more equitable and inclusive educational environment for all students, regardless of their location.

Accessibility Analysis Based on Standards

The spatial analysis results for the accessibility of SMP facilities in Tarutung District can be seen in the map below:

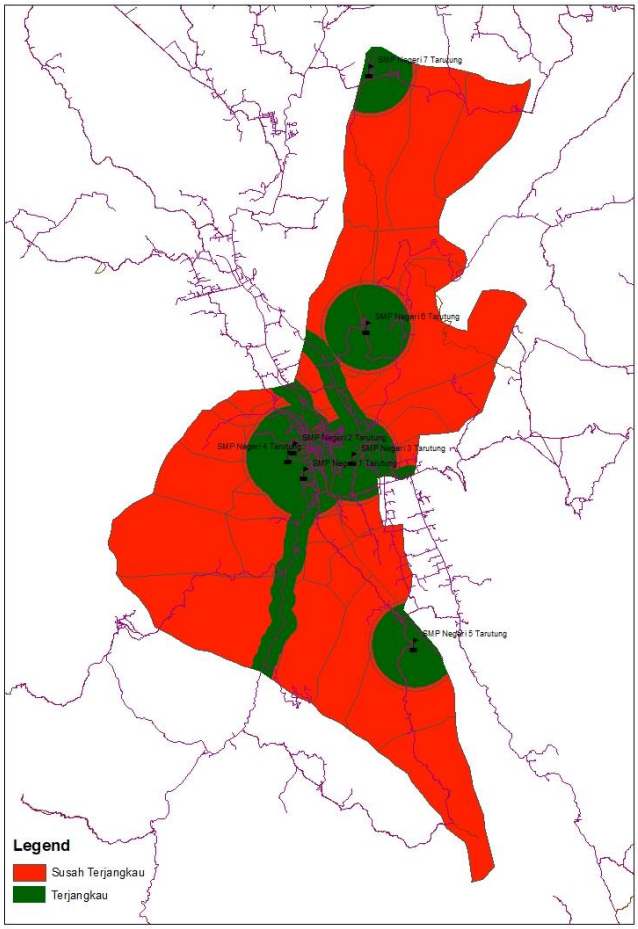

***Figure 5**: Accessibility Map of SMP Facilities in Tarutung District*

Based on the map, it is evident that the majority of the Tarutung District is categorized as "hard to reach" for SMP facilities. The data in the map can be further clarified in the following table:

Table 1: Accessibility Data

No	Description	Area (km^2)	Percentage
1	Hard to Reach	8465.03	77.41%
2	Reachable	2470.24	22.59%
Grand Total	10935.28	100%	

It is clear that the percentage of areas that are "hard to reach" is significantly higher than the areas that are accessible. The "hard to reach" areas cover 77.41% of the total area, while the accessible areas account for only 22.59%. The following table provides a comparison of accessibility at the village level, further highlighting these disparities:

Table 2. Accessibility Levels by Village According to Their Zoning in Tarutung District

	Village	Hard to reach (km²)	%	Reachable (km²)	%	Grand Total (km²)
1	AEK SIANSIMUN	73.78	79.58	18.93	20.42	92.71
2	AEKNASIA	671.73	100.00	0.00	0.00	671.73
3	HAPOLTAHAN	0.00	0.00	39.84	100.00	39.84
4	HTGALUNG SIWALUOMPO	184.45	85.01	32.53	14.99	216.99
5	HUTAPEA BANUAREA	438.82	59.62	297.16	40.38	735.99
6	HUTATORUAN I	0.00	0.00	14.13	100.00	14.13
7	HUTATORUAN III	86.94	94.26	5.30	5.74	92.23
8	HUTATORUAN IV	1.51	2.47	59.81	97.53	61.33
9	HUTATORUAN IX	23.01	16.36	117.67	83.64	140.67
10	HUTATORUAN V	103.84	43.72	133.69	56.28	237.53
11	HUTATORUAN VI	338.18	76.79	102.22	23.21	440.41
12	HUTATORUAN VII	0.00	0.00	101.92	100.00	101.92
13	HUTATORUAN VIII	738.36	84.98	130.47	15.02	868.83
14	HUTATORUAN X	0.00	0.00	110.05	100.00	110.05
15	HUTATORUAN XI	0.00	0.00	13.60	100.00	13.60
16	HUTAURUK	61.38	86.54	9.55	13.46	70.92
17	JAMBUR NAULI	618.01	99.92	0.51	0.08	618.52
18	LAPOGAMBIRI	8.03	10.84	66.01	89.16	74.04
19	PARBAJU JULU	337.55	58.23	242.16	41.77	579.71
20	PARBAJU TONGA	873.45	89.09	107.00	10.91	980.45
21	PARBAJU TORUAN	114.79	62.88	67.77	37.12	182.56
22	PARBUBU DOLOK	398.30	91.08	39.03	8.92	437.32
23	PARBUBU I	122.97	100.00	0.00	0.00	122.97
24	PARBUBU II	415.98	96.39	15.58	3.61	431.56
25	PARBUBU PEA	224.42	99.22	1.76	0.78	226.18
26	PARTALI JULU	349.98	53.83	300.22	46.17	650.20
27	PARTOLI TORUAN	299.45	79.27	78.31	20.73	377.77

28	SAITNIHUTA	109.36	89.14	13.32	10.86	122.68
29	SIANDOR-ANDOR	570.64	100.00	0.00	0.00	570.64
30	SIHUJUR	476.43	100.00	0.00	0.00	476.43
31	SIMAMORA	0.01	0.02	52.90	99.98	52.91
32	SIRAJA OLOAN	81.18	70.72	33.61	29.28	114.79
33	SITAMPURUNG	486.78	68.82	220.53	31.18	707.31
34	SITTAKA	213.72	90.02	23.70	9.98	237.42
35	SOSUNGGULON	42.00	66.73	20.94	33.27	62.93
	Grand Total	**8465.03**		**2470.24**		**10935.28**

From the 35 villages in Tarutung, only 9 villages have more than 60% of their areas considered "reachable," namely *Hapoltahan*, *Hutatoruan I*, *Hutatoruan IV*, *Hutatoruan X*, *Hutatoruan XI*, *Lapogambiri*, and *Simamora*. Additionally, 7 villages are completely "hard to reach" and are not served by SMP facilities, including *Aeknasia*, *Jambur Nauli*, *Parbubu I*, *Parbubu II*, *Parbubu Pea*, *Siandor-andor*, and *Sihujur*.

Zoning Discrepancies Between Regulations and Accessibility Analysis

The spatial analysis has revealed that SMP facilities in Tarutung are concentrated in certain locations, leading to inequities in the admission process. Since the primary factor for student acceptance is proximity to the school, some students in villages near SMPs are excluded from the zoned areas despite being geographically close to these schools. The following table compares the zoning based on the *Peraturan Bupati* (Regulation of the Regent) with the zoning derived from spatial analysis and the *Neighborhood Unit* theory.

Table 3. Comparison of Zoning Between Regulations and Accessibility Analysis

No	Name of SMP Educational Unit	Zoning According to Tapanuli Utara Regent Regulation No. 20 of 2021	Zoning According to Distance and Accessibility Analysis
1	SMP N 1 Tarutung	Kelurahan Hutatoruan V, Desa Aek Siansimun, Desa Hutatoruan, Desa Parbubu I, Desa Parbubu II, Desa Lapogambiri, Desa Sitakka, Desa Aeknasia, Desa Saitnihuta, Desa Parbubu Pea	Hapoltahan, Hutagalung Siwaluompu, Hutatoruan I, Hutatoruan IV, Hutatoruan IX, Hutatoruan V, Hutatoruan VI, Hutatoruan VII, Hutatoruan X, Hutatoruan XI, Saitnihuta, Simamora
2	SMP N 2 Tarutung	Kelurahan Hutatoruan VI, Kelurahan Hutatoruan VII, Kelurahan Hutatoruan X, Kelurahan Hutatoruan IX, Kelurahan Hutatoruan XI, Desa Simamora	Hutagalung Siwaluompu, Hutatoruan I, Hutatoruan IX, Hutatoruan V, Hutatoruan VI, Hutatoruan VII, Hutatoruan X, Hutatoruan XI, Parbaju Julu, Parbaju Tonga, Simamora, Sirajaoloan

3	SMP N 3 Tarutung	Desa Hapoltahan, Desa Parbaju Toruan, Desa Sosunggulon, Desa Hutagalung, Kelurahan Hutatoruan VII, Desa Saitnihuta, Desa Parbubu Pea	Hapoltahan, Hutatoruan I, Hutatoruan IV, Hutatoruan IX, Hutatoruan V, Hutatoruan VII, Hutatoruan X, Hutatoruan XI, Parbaju Tonga, Parbaju Toruan, Partali Toruan, Saitnihuta, Simamora, Sosunggulon
4	SMP N 4 Tarutung	Kelurahan Hutatoruan VI, Kelurahan Hutatoruan VII, Kelurahan Hutatoruan X, Kelurahan Hutatoruan IX, Kelurahan Hutatoruan XI, Desa Simamora, Desa Hutagalung, Desa Hutatoruan X Parbubu, Desa Siraja Oloan, Desa Hutauruk	Hutagalung Siwaluompu, Hutatoruan I, Hutatoruan IX, Hutatoruan V, Hutatoruan VI, Hutatoruan VII, Hutatoruan X, Hutatoruan XI, Simamora, Sirajaoloan
5	SMP N 5 Tarutung	Desa Siandorandor, Desa Hutapea Banuarea	Hutapea Banuarea, Parbubu II, Parbubu Pea
6	SMP N 6 Tarutung	Desa Parbaju Tonga, Desa Parbaju Julu, Desa Partali Julu	Parbaju Tonga, Parbaju Julu, Partali Julu
7	SMP N 7 Tarutung	Desa Sitampurung, Desa Jamburnauli, Desa Paronggitan, Desa Sihujur	Jambur Nauli, Sitampurung

Discussion

Standards for Educational Facility Accessibility

According to SNI 03-1733-2004, the ideal distance between junior high schools (SMP) and residential areas should not exceed 1,000 meters. However, the location of educational facilities in Tarutung District does not meet this standard. Spatial analysis shows that only a small portion of residential areas falls within the "accessible" category. With the implementation of the zoning system for new student admissions (PPDB), students living in areas outside of the accessible zones have lower chances of being accepted due to the primary consideration of distance between home and school. This disparity highlights the need to reassess the zoning policy in the region.

In addition to SNI 03-1733-2004, De Chiara and Koppelmen (1975) offer an extended standard for educational accessibility, allowing up to 1,200 meters. Although this standard offers more flexibility, spatial analysis reveals that many residential areas in Tarutung still remain difficult to reach by the available schools. This reinforces the fact that the current distribution of schools does not meet accessibility standards based on either SNI or De Chiara and Koppelmen.

Transportation Infrastructure Limitations

De Chiara (1975) emphasized that for low-density areas like Tarutung, public transport is a crucial component in determining educational accessibility. Tarutung has three city transport routes, but these only serve specific villages and fail to reach all residential

areas. Schools like SMP Negeri 5, SMP Negeri 6, and SMP Negeri 7 are not served by public transport, creating significant barriers for students.

Evaluation Based on the Neighborhood Unit Theory

The Neighborhood Unit theory stresses that schools should serve as central hubs within residential neighborhoods, ideally located within walking distance. However, in low-density areas like Tarutung, schools located far from residential centers indicate that this theory is not fully realized. Spatial analysis shows that SMP Negeri 5, SMP Negeri 6, and SMP Negeri 7 are located far from the main residential areas, while three other schools are concentrated around the central urban area. This uneven distribution not only affects the PPDB zoning system but also creates educational access inequities for students in rural areas.

Inequality in the Zoning System

With 77.41% of residential areas being hard to access, many students in these regions have a lower chance of being admitted to schools based on the zoning system. This stands in contrast to places like Cimahi, which according to Ruuhulhaq (2024), has a more equitable distribution of educational facilities near residential areas, ensuring better educational access.

Recommendations for Zoning Policy

Kosasih (2020) emphasizes the need to revise PPDB zoning policies with flexibility in determining quotas and mapping areas. Based on the analysis in Tarutung, policy revisions could focus on:

1. **Integrating Transportation Factors**: Including public transportation availability as a key consideration in zoning decisions. Areas without transport access should be prioritized in the zoning policy.
2. **Redistributing Educational Facilities**: The placement of new schools or the relocation of existing ones to bring facilities closer to residential centers, particularly in the "hard to reach" areas.
3. **Mapping Educational Resources**: Local governments should develop a comprehensive educational resources map that includes geographic, demographic, and spatial data to guide zoning policy decisions

IV. Conclusion and Recommendations

This study demonstrates that the distribution of public Junior High Schools (SMP) in Tarutung District does not meet the accessibility standards set by SNI 03-1733-2004 and the Neighborhood Unit theory. A significant portion of the residential areas, specifically **77.41%**, falls into the "hard to reach" category, primarily due to the concentration of schools in the city center, the lack of adequate public transportation, and challenging geographical conditions. The zoning system for new student admissions (PPDB), which prioritizes the distance between students' homes and schools, creates inequities for students living in areas with limited accessibility. As a result, there is a clear need for a more comprehensive evaluation of the zoning policy.

To address these issues, it is recommended that the local government focus on redistributing educational facilities, which could involve building new schools in rural areas or relocating schools that are too concentrated in urban centers. In addition, expanding public transport routes to reach remote areas would greatly improve student access to schools. The PPDB zoning policy should be revised to incorporate geographic factors, the availability of public transport, and road conditions in order to ensure more equitable access

to education for all students. Moreover, the local government should create a comprehensive educational resource map, based on demographic, geographic, and infrastructural data, to guide future zoning decisions. This should be accompanied by improvements to supporting infrastructure, ensuring that students in remote areas can easily access educational facilities.

These recommendations are essential for creating a more equitable and inclusive educational system, ensuring that all students, regardless of their geographic location, have equal opportunities to access quality education.

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