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EVALUATION OF PUBLIC ELEMENTARY SCHOOL LOCATION SUITABILITY IN WAY TENONG DISTRICT WEST LAMPUNG

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ABSTRACT

The purpose of this study is to analyze the distribution pattern of public elementary schools (SD Negeri) and to evaluate the suitability of their locations in Way Tenong District, West Lampung Regency. This research employs a quantitative descriptive method. The study population comprises all public elementary schools in Way Tenong District, and total sampling was applied, making the entire population the study sample. Data were collected through observation, field measurement, and documentation. Data analysis was conducted using scoring and percentage techniques. The results indicate that the distribution pattern of public elementary schools in Way Tenong District is clustered, as reflected by an R-value of 0.24 (within the clustered category of 0.00–0.70). Among the 22 schools evaluated, 1 school (4.5%) was classified as highly suitable (final score: 30), 20 schools (91%) were classified as moderately suitable (final scores: 22–28), and 1 school (4.5%) was classified as marginally suitable (final score: 20).

INTRODUCTION

Education is a conscious and planned effort to create a conducive learning environment and process, enabling students to actively develop their spiritual, religious, self-regulatory, personality, intellectual, moral, and vocational potential for themselves, society, the nation, and the state (Law No. 20 of 2003 on the National Education System). The law further stipulates that the goal of education is to develop students into individuals who are faithful and devoted to God Almighty, morally upright, healthy, knowledgeable, capable, creative, independent, and democratic citizens who are also responsible.

The quality of education directly influences the standard of living and human development in any region. Therefore, educational facilities—particularly schools—are fundamental infrastructure that must be strategically and equitably distributed. The placement of schools should consider population distribution to ensure that available institutions can adequately serve all residents in a given area.

Good educational services must be supported by the provision of facilities that are accessible to all residents. The location of a school is expected to be optimal, meaning that it should be easily reachable, safe, and appropriate for learning activities. According to Regulation of the Minister of National Education (Permendiknas) No. 24 of 2007, school locations must meet specific land-related criteria: sites must be located outside disaster-prone areas; must be free from potential hazards to health and safety; must have access for emergency evacuation; and must have legally secured land status with a minimum tenure of 20 years.

Beyond physical land requirements, school placement must also account for population distribution. Each school within a district should be able to provide educational services proportional to the local population. Schools should not be located too far from residential settlements—ideally reachable within 30 minutes on foot (Jayadinata, p. 160). When school placement does not align with population distribution, it creates disparities in enrollment and unequal access to education.

Way Tenong District (Kecamatan Way Tenong) is one of the sub-districts within West Lampung Regency (Kabupaten Lampung Barat), officially designated as a definitive sub-district in 2001, covering an area of 11,667 hectares. According to the 2022 Central Statistics Agency (BPS) data, the district has a total population of 31,074 with an annual growth rate of 0.89% and a sex ratio of 104.73. The population breakdown by village and sex is presented in Table 1.

Table 1. Population of Way Tenong District by Village and Sex (2022)

No.	Village/Pekon	Male (L)	Female (P)	Total
1	Fajar Bulan	3,895	3,952	7,847
2	Puralaksana	1,892	1,671	3,563
3	Karang Agung	1,206	1,105	2,311
4	Mutar Alam	1,390	1,439	2,829
5	Tanjung Raya	892	874	1,766
6	Sukananti	1,806	1,779	3,585
7	Sukaraja	1,460	1,361	2,821
8	Padang Tambak	1,932	1,801	3,733
9	Tambak Jaya	1,313	1,306	2,619
Total		**15,794**	**15,280**	**31,074**

Source: Central Statistics Agency (BPS), West Lampung Regency, 2022

Based on researcher observation, Way Tenong District has 22 public elementary schools (SD Negeri). To project the required number of school units, the school-age population must be considered. Table 2 presents the population by school-age group.

Table 2. Population of Way Tenong District by School-Age Group (2022)

No.	Age Group	School Level	Population
1	7–12 years	Elementary School (SD)	4,069
2	13–15 years	Junior High School (SMP)	1,343
3	16–18 years	Senior High School (SMA)	1,355
Total			**6,767**

Source: Central Statistics Agency (BPS), West Lampung Regency, 2022

Table 3 shows the total number of public schools across all levels in Way Tenong District based on data from the Ministry of Education and Culture (Kemendikbud).

Table 3. Number of Public Schools in Way Tenong District by Level (2022)

No.	Level of Education	Number of Schools
1	Elementary School (SD)	22
2	Junior High School (SMP)	4
3	Senior High School / Vocational (SMA/SMK)	3
Total		**29**

Source: Ministry of Education and Culture (Kemendikbud) Reference Data, 2022

With a school-age population (7–12 years) of 4,069 in Way Tenong District, 22 elementary schools are theoretically sufficient according to Permendiknas No. 24 of 2007. However, adequate quantity alone does not guarantee equitable access. Schools must also be spatially distributed in alignment with residential patterns. Table 4 presents enrollment data by school, revealing significant disparities.

Table 4. Student Enrollment by Public Elementary School in Way Tenong District (2022)

No.	NPSN	School Name	Village/Pekon	Students
1	10803617	SD Negeri Tanjung Raya	Tanjung Raya	90
2	10803616	SD Negeri Tambak Jaya	Tambak Jaya	99
3	10803426	SD Negeri Mutar Alam	Mutar Alam	69
4	10803498	SD Negeri 1 Fajar Bulan	Fajar Bulan	145
5	10809962	SD Negeri 1 Karang Agung	Karang Agung	225
6	10803852	SD Negeri 1 Padang Tambak	Padang Tambak	131
7	10803828	SD Negeri 1 Puralaksana	Puralaksana	229
8	10803837	SD Negeri 1 Sukananti	Sukananti	176
9	10803741	SD Negeri 1 Sukaraja	Sukaraja	318
10	10803751	SD Negeri 2 Fajar Bulan	Fajar Bulan	119
11	10809966	SD Negeri 2 Karang Agung	Karang Agung	111
12	10803782	SD Negeri 2 Padang Tambak	Padang Tambak	52
13	10803781	SD Negeri 2 Puralaksana	Puralaksana	83
14	10803502	SD Negeri 2 Sukananti	Sukananti	90
15	10803480	SD Negeri 2 Sukaraja	Sukaraja	69
16	10803471	SD Negeri 3 Fajar Bulan	Fajar Bulan	134
17	10803679	SD Negeri 3 Karang Agung	Karang Agung	30
18	10803508	SD Negeri 3 Padang Tambak	Padang Tambak	87
19	10803511	SD Negeri 3 Puralaksana	Puralaksana	77
20	10803501	SD Negeri 3 Sukaraja	Sukaraja	138
21	10803495	SD Negeri 4 Fajar Bulan	Fajar Bulan	150
22	10803498	SD Negeri 4 Padang Tambak	Padang Tambak	132

Source: Data Pokok Pendidikan, Ministry of Education, Culture, Research and Technology, 2022

Among the 22 elementary schools, 9 schools had fewer than 100 students, 10 schools had between 100 and 200 students, and only 3 schools had more than 200 students. This disparity in enrollment is partly attributable to the geographic placement of schools relative to population centers. A spatially equitable school distribution system should ensure that each school serves an appropriate and roughly equal proportion of the local school-age population. As Iskandar (2009) notes, the government must provide educational facilities that can serve all residents with equal accessibility and cost of access, ensuring equal educational opportunity.

Given these empirical disparities, this study aims to: (1) analyze the distribution pattern of public elementary schools in Way Tenong District using the Nearest Neighbor Analysis method, and (2) evaluate the location suitability of each school based on seven criteria derived from Permendiknas No. 24 of 2007. The findings are expected to inform policy recommendations for improving school placement and increasing school participation rates.

METHODS

This study employs a quantitative descriptive research method. Quantitative descriptive research aims to objectively describe a condition or phenomenon using numerical data—from data collection and interpretation to presentation of findings (Arikunto, 2006). The research procedure involved three main stages: (1) collection of all data required for school location evaluation; (2) classification and spatial analysis of geographic data containing information on each school's location; and (3) synthesis and reporting to objectively characterize location conditions for each elementary school in Way Tenong District.

The study population comprised all 22 public elementary schools in Way Tenong District. A total sampling technique was applied, meaning the entire population served as the study sample. Data were collected through field observation, GPS-based coordinate measurement, and documentation. Each school's absolute position was recorded using a GPS Essential device to obtain latitude and longitude coordinates, which were subsequently imported into Microsoft Excel and converted into shapefile format using Quantum GIS (QGIS) software.

Two primary analytical approaches were employed. First, the Nearest Neighbor Analysis was used to determine the spatial distribution pattern of elementary schools. This method calculates the R value—a scale indicating whether the distribution pattern is clustered, random, or dispersed—based on the following formula:

$$R = 2D \times \sqrt{n} / a$$

Where: R = Nearest neighbor scale D = Observed mean distance between nearest neighbors n = Total number of schools a = Total area of the study region (in km²)

The resulting R value is interpreted using the classification scheme shown in Table 5.

Table 5. Nearest Neighbor Distribution Pattern Classification

R Value Interval	Distribution Pattern
0.00 – 0.70	Clustered (Mengelompok)
0.71 – 1.40	Random (Tersebar Tidak Merata)
1.41 – 2.1491	Dispersed/Uniform (Tersebar Merata)

Source: Ramdan (2014)

Second, a location suitability scoring (skoring) technique was applied to evaluate each school against seven parameters derived from Permendiknas No. 24 of 2007. Each parameter was scored on a scale, and the aggregate score per school determined its suitability classification. The seven parameters include: (1) land use function per the Regional Spatial Plan (RDTR/RTRW); (2) land slope; (3) freedom from landslide and flood hazards; (4) accessibility; (5) setback distances from roads, railways, and rivers; (6) educational service radius; and (7) noise level.

RESULTS AND DISCUSSION

Geographic Profile of Way Tenong District

Way Tenong District is an integral part of West Lampung Regency, officially designated as a definitive sub-district in 2001. The district is administratively bordered by Way Kanan Regency to the north, Suoh District to the south, Sumber Jaya and Gedung Surian Districts to the east, and Sekincau District to the west. The district is characterised by mountainous and hilly topography with relatively undulating terrain, as shown in Table 6.

Table 6. Topographic Conditions of Way Tenong District

No.	Condition	Slope (°)	Slope Classification	Area (Ha)	Percentage (%)
1	Hilly (Berbukit)	15–39°	Steep	1,855	12%
2	Undulating (Bergelombang)	2–8°	Gently sloping	12,871	68%

Source: BPS Kecamatan Way Tenong, 2020

Slopes range from gentle to steep (15°–45°). The dominant soil types are Andosol and Red-Yellow Podzolic, with high erosion potential. The primary agricultural commodities include rice, secondary crops, highland vegetables, coffee, cocoa, and vanilla. Land use is predominantly coffee plantation and forestry areas.

Relative humidity is generally low, ranging from 70–80%, while annual rainfall is high (2,500–3,500 mm), with an average of 22 rainy days per month during the wet season (September–April). The district is drained by five major rivers: Way Besai, Air Hitam, Air Keruh, Campang Limau, and Air Putih. Temperature ranges from 18°C to 30°C.

Distribution Pattern of Public Elementary Schools

GPS coordinates collected for each of the 22 public elementary schools were imported into QGIS to generate a spatial distribution map. Based on the Nearest Neighbor Analysis, the R value was calculated as follows:

$$R = 2 \times (3.07) \times \sqrt{22} / 116.67 \approx 0.24$$

The computed R value of 0.24 falls within the clustered range (0.00–0.70), indicating that public elementary schools in Way Tenong District are spatially clustered rather than uniformly dispersed. This clustering pattern is consistent with the residential settlement pattern of the district. Bintarto (1983) noted that highland and mountainous regions typically exhibit nucleated (concentrated) settlement patterns, as communities tend to cluster around accessible plateaus or valley floors. Since school placement generally follows population distribution, the clustered pattern of schools reflects the clustered distribution of residential settlements in Way Tenong District.

3.3 Evaluation of School Location Suitability

The location suitability of each school was evaluated against seven parameters in accordance with Permendiknas No. 24 of 2007. Table 7 presents the individual scores for each school across all parameters.

Table 7. Location Suitability Evaluation Scores by School and Parameter

No.	School Name	1 (Land Use)	2 (Slope)	3 (Hazard-Free)	4 (Accessibility)	5 (Setback Lines)	6 (Coverage Radius)	7 (Noise Level)	Final Score
1	SD Negeri Tanjung Raya	5	4	3	4	5	2	2	**25**
2	SD Negeri Tambak Jaya	5	4	3	5	5	5	3	**30**
3	SD Negeri Mutar Alam	5	4	3	5	5	3	3	**28**
4	SD Negeri 1 Sukaraja	5	4	3	4	5	3	3	**27**
5	SD Negeri 1 Sukananti	5	4	3	5	5	3	3	**28**
6	SD Negeri 1 Puralaksana	5	4	3	4	5	3	2	**26**
7	SD Negeri 1 Padang Tambak	5	4	3	5	5	3	3	**28**

8	SD Negeri 1 Karang Agung	5	4	3	5	5	3	2	**24**
9	SD Negeri 1 Fajar Bulan	5	4	3	5	5	3	3	**28**
10	SD Negeri 2 Fajar Bulan	5	4	3	4	5	3	3	**27**
11	SD Negeri 2 Karang Agung	1	3	3	1	5	3	4	**20**
12	SD Negeri 2 Padang Tambak	5	1	3	2	5	3	3	**22**
13	SD Negeri 2 Puralaksana	5	4	3	4	5	3	3	**27**
14	SD Negeri 2 Sukananti	5	1	3	1	5	5	4	**24**
15	SD Negeri 2 Sukaraja	5	4	3	2	5	3	4	**26**
16	SD Negeri 3 Fajar Bulan	5	4	3	2	5	3	3	**25**
17	SD Negeri 3 Karang Agung	1	4	3	2	5	5	4	**24**
18	SD Negeri 3 Padang Tambak	5	1	3	4	5	5	3	**26**
19	SD Negeri 3 Puralaksana	5	4	3	4	5	3	3	**27**
20	SD Negeri 3 Sukaraja	5	4	3	4	5	1	3	**25**
21	SD Negeri 4 Fajar Bulan	5	4	3	5	5	3	3	**28**
22	SD Negeri 4 Padang Tambak	5	4	3	1	5	5	3	**26**

Source: Researcher's Field Data Processing, 2023

Parameter 1 – Land Use Function (RDTR/RTRW): The majority of schools received a score of 5, indicating that their sites are located in areas designated for educational use under the regional spatial plan and hold valid land use permits from the local government. Exceptions were noted for SD Negeri 2 Karang Agung (score: 1) and SD Negeri 3 Karang Agung (score: 1), whose land-use designations are inconsistent with the RDTR.

Parameter 2 – Land Slope: Permendiknas No. 24 of 2007 requires schools to be built on land with an average slope of less than 15%. Most schools received a score of 4, reflecting slopes in the 8–15% range, which is classified as 'suitable.' This outcome is an inherent consequence of Way Tenong's mountainous geography. Schools with a score of 1 (SD Negeri 2 Padang Tambak, SD Negeri 2 Sukananti, SD Negeri 3 Padang Tambak) are located on land with slopes exceeding 15%, which warrants attention for structural safety.

Parameter 3 – Freedom from Landslide and Flood Hazards: All 22 schools received a score of 3. While the district's topography (15–45° slopes) and high rainfall create significant landslide risk, the schools are generally situated on more stable terrain within their villages. The district's highland location virtually eliminates flood risk. However, ongoing monitoring of landslide-prone areas remains necessary.

Parameter 4 – Accessibility: Most schools are accessible via collector roads with paved (asphalt or concrete) surfaces, earning scores of 4 or 5. A small number of schools received lower scores due to limited road conditions in more remote locations. SD Negeri 2 Karang Agung (score: 1) had the lowest accessibility rating.

Parameter 5 – Setback Lines from Roads, Railways, and Rivers: All 22 schools achieved the maximum score of 5. Way Tenong District is not traversed by railway lines. River crossings are limited to the Way Besai River

in Fajar Bulan and Puralaksana villages. All schools maintain adequate setback distances from existing roads and waterways.

Parameter 6 – Educational Service Radius (Coverage): The clustered settlement pattern in the district means that inter-school distances are generally less than 3 km, which satisfies the coverage requirement. Most schools scored 3, while SDN Tambak Jaya and SDN 2 Sukananti received higher scores. SDN 3 Sukaraja received the minimum score due to its proximity to other schools, raising the question of whether it serves a distinct catchment area.

Parameter 7 – Noise Level: Way Tenong District has no industrial zones, railways, or airports, resulting in generally low noise levels. Potential noise sources are limited to vehicle traffic on the main collector road (the Trans-Sumatera western corridor route). Schools located in close proximity to this road received lower noise scores. Overall, noise was not found to significantly disrupt teaching and learning activities.

The aggregated scores and corresponding suitability classifications for all 22 schools are summarised in Table 8.

Table 8. Final Location Suitability Classification of Public Elementary Schools in Way Tenong District

No.	Category	Final Score Range	Number of Schools	Percentage
1	Highly Suitable	29–35	1	4.5%
2	Moderately Suitable	22–28	20	91.0%
3	Marginally Suitable	14–21	1	4.5%
4	Not Suitable	7–13	0	0%

Source: Researcher's Data Processing, 2023

The evaluation reveals that the location of the 22 public elementary schools in Way Tenong District is broadly in accordance with government policy as stipulated in Permendiknas No. 24 of 2007. Specifically, 1 school (4.5%) — SD Negeri Tambak Jaya — was classified as Highly Suitable with a final score of 30; 20 schools (91.0%) were classified as Moderately Suitable with final scores ranging from 22 to 28; and 1 school (4.5%) — SD Negeri 2 Karang Agung — was classified as Marginally Suitable with a final score of 20.

SD Negeri 2 Karang Agung received the lowest score primarily due to non-conforming land use (Parameter 1, score: 1) and poor accessibility (Parameter 4, score: 1). These findings suggest that this school's location requires urgent review and potential remediation, either through land reclassification, road improvement, or relocation feasibility assessment. The government should prioritise addressing these deficiencies to ensure equitable and safe access to education for all students in the district.

4. CONCLUSIONS

This study evaluated the distribution pattern and location suitability of 22 public elementary schools in Way Tenong District, West Lampung Regency, using Nearest Neighbor Analysis and a multi-parameter scoring method based on Permendiknas No. 24 of 2007. The following conclusions are drawn:

First, public elementary schools in Way Tenong District are distributed across all nine villages/pekon, with at least one school per village. The villages of Padang Tambak and Fajar Bulan each have four schools; Sukaraja, Puralaksana, and Karang Agung each have three; Sukananti has two; and Tanjung Raya, Tambak Jaya, and Mutar Alam each have one. The Nearest Neighbor Analysis yielded an R value of 0.24, confirming a clustered distribution pattern (R = 0.00–0.70). This clustering is consistent with the district's nucleated residential settlement pattern, which is typical of mountainous regions.

Second, the location suitability of schools across Way Tenong District is broadly comparable due to the similar physical land conditions (slope, hazard exposure, and land use) shared by neighbouring schools. Evaluation of 22 schools against seven parameters under Permendiknas No. 24 of 2007 produced the following results: 1

school (4.5%) classified as Highly Suitable (SD Negeri Tambak Jaya; final score: 30); 20 schools (91%) classified as Moderately Suitable (final scores: 22–28); and 1 school (4.5%) classified as Marginally Suitable (SD Negeri 2 Karang Agung; final score: 20). No school fell in the Not Suitable category.

These findings indicate that the majority of public elementary school locations in Way Tenong District conform to national standards. Nevertheless, the marginal suitability of SD Negeri 2 Karang Agung—primarily due to land-use non-compliance and poor accessibility—warrants immediate policy attention. Future research should incorporate spatial accessibility analysis (e.g., GIS-based buffering and network analysis) to further assess service coverage equity, and longitudinal monitoring is recommended to track changes in school enrollment relative to location suitability.

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