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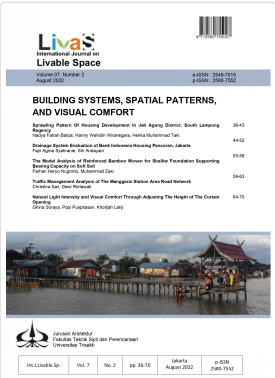

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Articles

SPRAWLING PATTERN OF HOUSING DEVELOPMENT IN JATI AGUNG DISTRICT, SOUTH LAMPUNG REGENCY (https://e-journal.trisakti.ac.id/index.php/livas/article/view/16723)

Nadya Fatrah Balqis, Hanny Wahidin Wiranegara, Herika Muhammad Taki
36-43

PDF (https://e-journal.trisakti.ac.id/index.php/livas/article/view/16723/10341)

| Abstract views: 25 | PDF Download: 34 |

DRAINAGE SYSTEM EVALUATION OF BANK INDONESIA HOUSING PANCORAN, JAKARTA (https://e-journal.trisakti.ac.id/index.php/livas/article/view/16800)

Fajri Agma Syahranie, Sih Andayani
44-52

PDF (https://e-journal.trisakti.ac.id/index.php/livas/article/view/16800/10532)

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https://doi.org/10.25105/livas.v7i2.16800 (https://doi.org/10.25105/livas.v7i2.16800)

THE MODEL ANALYSIS OF REINFORCED BAMBOO WOVEN FOR SHALLOW FOUNDATION SUPPORTING BEARING CAPACITY ON SOFT SOIL (https://e-journal.trisakti.ac.id/index.php/livas/article/view/16806)

Farhan Heryo Nugroho, Muhammad Zaki
53-58

PDF (https://e-journal.trisakti.ac.id/index.php/livas/article/view/16806/10533)

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Christina Sari, Dewi Rintawati
59-63

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NATURAL LIGHT INTENSITY AND VISUAL COMFORT THROUGH ADJUSTING THE HEIGHT OF THE CURTAIN OPENING
(Case: Room C.608-609, FTSP, Trisakti University, Jakarta)

(https://e-journal.trisakti.ac.id/index.php/livas/article/view/16725)

Ghina Soraya, Popi Puspitasari, Khotijah Lahji
64-70

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SPRAWLING PATTERN OF HOUSING DEVELOPMENT IN JATI AGUNG DISTRICT, SOUTH LAMPUNG REGENCY

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Abstract

In Jati Agung Subdistrict, South Lampung Regency is a sprawling housing development. This subdistrict is directly adjacent to Bandar Lampung, the province's capital city. This study aims to identify the sprawling pattern of housing development in the sub district of Jati Agung due to its unfavorable impacts such as land use irregularities, infrastructure inefficiencies, and environmental problems. There are three patterns of sprawling: clustered, random, and uniform. The analytical method used to identify the patterns is nearest neighbor analysis. This analysis was to measure the housing distribution pattern by calculating the size of the nearest neighbor (T) parameter. The nearest neighbor distribution index (T) is calculated using the variable distance of the nearest point (Ju), the number of settlement points (N), and the area (A). The results are as follows: the sprawling pattern in majority villages is random and uniform. To control this sprawl, local governments can use permits, incentives/disincentives, and ratification of detailed spatial planning.

Keywords: Sprawling Pattern; Housing Development; Nearest Neighbour Analysis; Jati Agung Sub district

INTRODUCTION

Jati Agung Sub District has an area of 164.47 km^2, with most of the topography being lowlands with an altitude of 110 m above sea level. It has a population of 116,687 people and a density of 709 people/km^2. Most of its population is immigrants. The majority come from the island of Java (Banten, West Java, Central Java, East Java and Yogyakarta). Others came from Bali, Sulawesi, West Sumatera, North Sumatera and South Sumatera.

The location of Jati Agung Sub District in South Lampung Regency is directly adjacent to the city of Bandar Lampung as the capital and center of activity in Lampung Province. The average distance from all villages in Jati Agung to the provincial capital is 22.95 km. Jati Agung is located in the buffer area of Bandar Lampung City, as shown by the increasing population growth rate. Growth population rates in the suburbs soared beyond the center cities whose growth rates were stagnant or declining (Kent B. Barnes, 2012).

Based on data from the Central Statistics Agency (BPS), the population growth of Jati Agung was 5.3% from 2015 until 2020. There is a New City development in the Lampung Province government area such as a new campus (Sumatera Institute of Technology), as an activity center, and the new toll road of the Trans Sumatera which increase the accessibility of this subdistrict. As a consequence, there is an intensive housing development in Jati Agung. As a buffer for the capital, Jati Agung subdistrict has sprawled housing developments, especially after the toll road is in operation. The development of new housing areas by developers and the community itself shows that it is out of control (Axel, 2021). The condition is due to the high demand for housing in the City

of Bandar Lampung without being matched by the availability of land.

The housing developments that have taken place appear to have neglected the spatial use allocation as stipulated in the Regional Spatial Plan (RTRW). In the RTRW of South Lampung Regency for 2011-2031, the Jati Agung Subdistrict is designated as land for oil palm and rubber plantations, aquaculture, medium-density housing, and the center of government for Lampung Province.

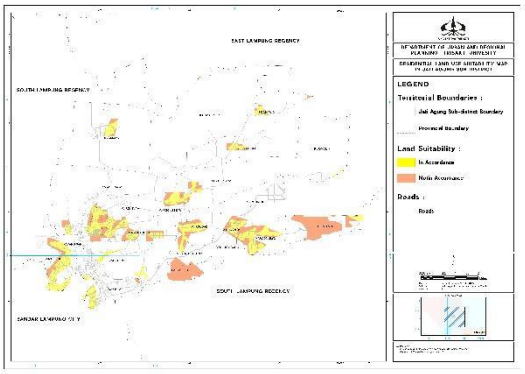

Figure 1. Deviations in the use of existing land compared to the use in spatial plan

Jati Agung Subdistrict, in the buffer zone of Bandar Lampung City, is a crucial concern with the housing sprawl phenomenon which has negative impacts. The first impact is inefficiency in the provision of infrastructure. Second is the large number of fertile agricultural lands has become built-up areas, thus disrupting food production. Third, there is compaction/densification. And last, there is an impact of air pollution that extends to suburban areas.

This study examines the distribution pattern of housing developments in the Jati Agung District. There are as many as 112 housing complexes spread across the villages in a distributed manner. Accordingly, it is necessary to conduct research related to the sprawling pattern of housing development to prevent the growth of city irregularity.

THE SPRAWLING PATTERN OF HOUSING DEVELOPMENT

Population growth affects settlement growth, which in turn will create distribution patterns (Yunus, 1989 in Sutomo, 2019). The increase in population and their activities demands more space to accommodate settlements and buildings accommodating activities (Saraswati, 2016).

In general, there are two patterns of housing sprawl: concentrating and spreading. Quantitatively (Hagget in Widodo, 2019), the housing sprawl pattern can be calculated using the nearest neighbor analysis method. Based on the calculation, the housing sprawl pattern is divided into three types: 1) uniform, 2) random, and 3) clustered. The uniform pattern explains that housing spreads out at regular and uniform distances. Random pattern shows an irregular distribution with different distances among housing or irregular spacing between housing. Clustered patterns form groups on a large scale and are concentrated at a central point. The characteristic of a centralized pattern is that housing patterns are interconnected. The disadvantage of this pattern is that the distance between housing and agricultural land is too far, while the advantage of the clustered pattern is that residential areas are concentrated so that non-residential areas such as agricultural areas, plantations and others are maintained.

The distribution of housing developments depends on the selection of housing construction sites. The location of the housing development is influenced by the criteria for selecting the location of the residence. The theory of housing location is a theory that explains the criteria for choosing a place to live (Purbasari, 2012). Those criteria are (1) Accessibility from easy transportation and distance to the city center. (2) The social and physical environment that provides comfort for its residents. (3) Ease of access to work, where the location of residence is located

in an area with a high level of employment opportunities. (4) The level of service, in this case the completeness of existing infrastructure at the location of residence.

METHOD

The nearest neighbor analysis is deployed to identify the spatial distribution of geographic phenomena. This quantitative method limits the distribution pattern on a scale of a particular space or area. The pattern of distribution diverges into three types, namely uniform, not evenly distributed (random), and clustered (Octorio, 2014).

The nearest neighbor analysis method is used to identify housing distribution patterns. The research variables include the area, the number of residential points, the density of residential points, and the average distance to the nearest housing. These data were secondary from various agencies such as administrative boundaries maps, area data, and housing locations. Residential location data is processed into a format according to the needs of the analysis technique used to describe the locations so that their distribution is visible.

Nearest neighbor analysis techniques are used to identify housing distribution patterns using calculations that include variables of distance, number of housing location points and area (Pelambi, 2016). The steps in this method are as follows: 1) determine the boundaries of the area to be studied; 2) change the object distribution pattern to a point distribution pattern; 3) measure the shortest distance, namely the straight-line distance between two points as the closest neighbor; and 4) calculating the size of the nearest neighbor parameter using the formula:

$$T = \frac{Ju}{Jh}$$

Information:
T: Nearest Neighbor Distribution Index
Ju: The average distance measured between one point and the nearest point
Jh: The average distance obtained if all points with neighboring points have a random pattern which is calculated by the formula:

$$Ju = \frac{1}{2\sqrt{P}} \qquad P = \frac{N}{A}$$

Information:
P: Density of dots per square kilometer
N: The number of residential points
A: Area in square kilometers

Housing sprawling pattern based on the T value obtained. Clustered patterns if T = 0-1, random if T = 1-2.5, and uniform if T > 2.5.

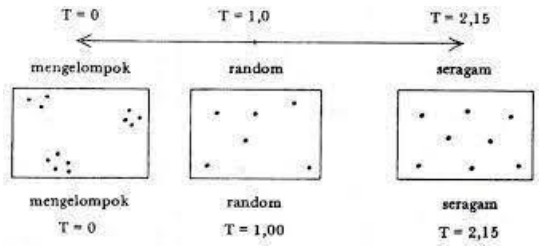

Figure 2. Housing Sprawling Pattern (Source: Sutomo, Faza and Sriwanto, 2019:3)

RESULT

The first step in identifying sprawling housing development is measuring the distance to the nearest by measuring the straight-line distance between one point and another, which is the closest neighbor. Figure 3 describes the housing distribution in Jati Agung. The average distance to the nearest is the result of calculating the total distance of the whole sample housing divided by the number of housing points. See Table 1.

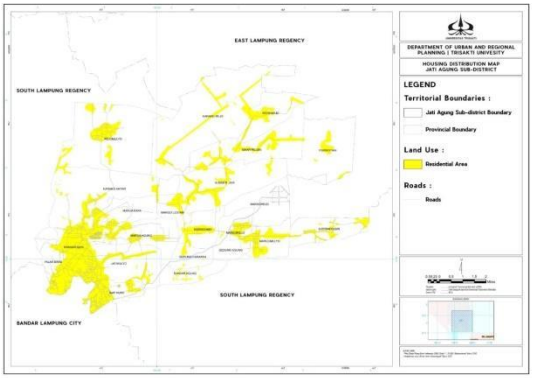

Figure 3. Distribution of Housing in Jati Agung Subdistrict

Table 1 Distance Measurement of the Nearest Housing in Jati Agung

No	Village	N. H	A.D
1	Way Huwi	17	0,54
2	Jatimulyo	21	0,68
3	Banjar Agung	8	0,08
4	Gedung Harapan	7	Q,23
5	Gedung Agung	1	3,77
6	Margomulyo	1	0,52
7	Sidodadi Asri	3	2,8
8	Purwotani	1	37,3
9	Sumber Jaya	3	7,8
10	Margodadi	2	1,4
11	Margo Lestari	4	3,85
12	Marga Agung	3	3,03
13	Marga Karya	2	3,7
14	Sinar Rezeki	1	37,3
15	Sidoharjo	2	3,8
16	Rejomulyo	5	1,34
17	Karang Anyar	11	1,79
18	Fajar Baru	10	0,83
19	Karang Sari	3	0,8
20	Karang Rejo	3	0,98
21	Margo Rejo	1	0,41

N.H = number of Housing
A.D = Average Distance to Nearest Housing

The next step in determining the pattern of housing distribution is to calculate the average distance obtained if all points have a random pattern, that is, find the value of Jh first. The P value is the density of points in square kilometers obtained by calculating the number of points divided by the area in square kilometers. Next, the nearest neighbor distribution index (T) is calculated to expose the distribution pattern of housing in Jati Agung subdistrict. The results are described in Table 2. The results of the calculation of T (the housing distribution index) for the 21 villages obtained the pattern as follows: clustered found in 4 villages (T= 0-1), random in 7 (T = 1-2,5) and a uniform found in 10 (T >2.5).

Table 2 Results of Nearest Neighbor Analysis for Housing in Jati Agung

V	A	N	P	Ju	Jh	T	Pa
1	4,93	17	3,45	0,54	0,7	0,77	C
2	10,6	21	1,98	0,68	0,36	1,9	R
3	5,86	8	1,37	0,08	0,43	0,2	C
4	4,65	7	1,72	1,23	0,39	3,1	U
5	5,33	3	0,38	3,77	0,8	4,7	U
6	9,16	2	0,11	0,52	1,52	0,34	C
7	4,81	3	0,21	2,8	1,1	2,5	U
8	6,4	1	0,16	37,3	1,25	29,8	U
9	6	3	0,17	7,8	1,22	6,3	U
10	6,48	2	0,15	1,4	1,31	1	R
11	6,25	4	0,64	0,93	0,63	1,5	R
12	5,76	3	0,52	3,03	0,07	43,3	R
13	7,15	2	0,28	3,7	0,94	2,9	U
14	29,3	1	0,03	37,3	2,9	12,9	U
15	6,1	2	0,33	3,8	0,87	4,4	U
16	7,15	5	0,7	1,34	0,6	2,23	U
17	10,8	11	1	1,79	0,5	3,58	U
18	6,4	10	1,56	0,83	0,4	2,1	R
19	7,25	3	0,41	0,8	0,77	1	R
20	7,42	3	0,4	0,98	0,77	1,3	R
21	6,69	1	0,15	0,41	1,28	0,32	C

V = village name the same as in table 1
Pa= housing sprawling pattern
C= clustered, R= random, U=uniform

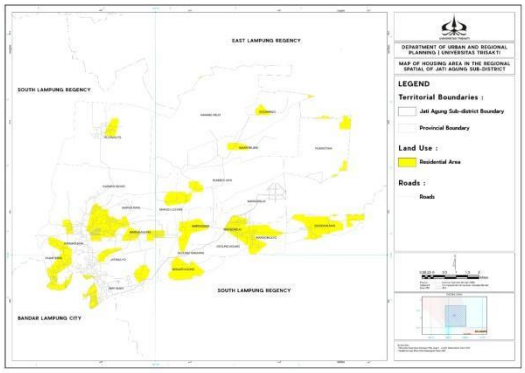

Figure 4. Map of Housing Area in The Regional Spatial of Jati Agung

Factors that influence housing distribution patterns are physical conditions such as the slope of the land and the road network (Triana, 2012). Meanwhile, from the demand aspect, the infrastructure condition and the ease of reaching various facilities also affects the selection of housing locations (Kalesaran, 2013). In this study, the factors that considerably influence the housing distribution pattern are the slope of the land, accessibility and availability of facilities shown in Table 3.

Table 3 Factors Influence the Distribution Pattern of Housing in Jati Agung District

F	Pa	N	Mean	Std. Dev
Slope	C	15	16.000	105.506
	R	15	18.000	101.419
	U	15	25.333	.51640
Accessibility	C	15	29.333	.79881
	R	15	22.667	.70373

	U	15	20.000	.65465
Availability of Facilities	C	15	22.000	.77460
	R	15	25.333	.74322
	U	15	17.333	109.978

F= factor influence
Pa= housing sprawling pattern
C= clustered, R= random, U= uniform
Std. Dev= standard deviation

The results of the statistical analysis of multiple housing regressions in recognizing the factors causing the distribution pattern in Jati Agung District are presented in Table 3. Table 3 demonstrates that accessibility becomes an influential factor for clustered patterns, facilities for random patterns, and slope for uniform patterns.

DISCUSSION

Based on the nearest neighbor analysis results, most villages are uniform (10), seven villages are random, and four villages are clustered. The uniform and random patterns are more dispersed than the clustered ones, so these patterns are more inefficient in providing housing infrastructures.

Other studies that use the nearest neighbor analysis method are Hakim (2019) and Riadhi and Aidid (2020). The housing distribution pattern in Bandung City is a cluster pattern (Hakim, 2019). Riadhi and Aidid (2020) showed the calculation results (T) in Kendari City is a random pattern with an analysis unit at the sub district level. This means that the distance between housing locations is irregular. Axcel (2020) showed the housing distribution pattern is a leapfrog, which is remarkably inefficient growth. In contrast to above studies, this research in Jati Agung Subdistrict used an analysis unit at the village level, and it is more spatially detailed. It showed three kinds of sprawling housing development patterns.

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Based on the results of this study, we expect that the local government will pay attention to the random distribution of housing developments in Jati Agung. It is advisable that the local government of South Lampung Regency provides an opportunity for socialization regarding spatial planning to the individual community and developers. They are also responsible to maintain the orderly land use that complies with the spatial plan. With accelerating development in Jati Agung, it is time to compile the Jati Agung District Detailed Spatial Plan (RDTR) as a direction in controlling spatial land use so that infrastructure provision becomes more efficient.

CONCLUSION

The results showed that out of 112 housing spots in 21 villages in Jati Agung Subdistrict, only four villages had a clustered pattern and 17 villages had uniform and random patterns that tended to be inefficient in providing infrastructure. Furthermore, there were deviations in land use (67%) from the Regional Spatial Plan (RTRW) and reduced fertile agricultural land. As a result, the local government needs to control the land use through permission, incentives/disincentives mechanisms, and the procurement of Detailed Spatial Plans (RDTR) which apply zoning regulation techniques that are in accordance.

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SPRAWLING PATTERN OF HOUSING DEVELOPMENT IN JATI AGUNG DISTRICT, SOUTH LAMPUNG REGENCY

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Abstract

In Jati Agung Subdistrict, South Lampung Regency is a sprawling housing development. This subdistrict is directly adjacent to Bandar Lampung, the province's capital city. This study aims to identify the sprawling pattern of housing development in the sub district of Jati Agung due to its unfavorable impacts such as land use irregularities, infrastructure inefficiencies, and environmental problems. There are three patterns of sprawling: clustered, random, and uniform. The analytical method used to identify the patterns is nearest neighbor analysis. This analysis was to measure the housing distribution pattern by calculating the size of the nearest neighbor (T) parameter. The nearest neighbor distribution index (T) is calculated using the variable distance of the nearest point (Ju), the number of settlement points (N), and the area (A). The results are as follows: the sprawling pattern in majority villages is random and uniform. To control this sprawl, local governments can use permits, incentives/disincentives, and ratification of detailed spatial planning.

Keywords: Sprawling Pattern; Housing Development; Nearest Neighbour Analysis; Jati Agung Sub district

INTRODUCTION

Jati Agung Sub District has an area of 164.47 km^2, with most of the topography being lowlands with an altitude of 110 m above sea level. It has a population of 116,687 people and a density of 709 people/km^2. Most of its population is immigrants. The majority come from the island of Java (Banten, West Java, Central Java, East Java and Yogyakarta). Others came from Bali, Sulawesi, West Sumatera, North Sumatera and South Sumatera.

The location of Jati Agung Sub District in South Lampung Regency is directly adjacent to the city of Bandar Lampung as the capital and center of activity in Lampung Province. The average distance from all villages in Jati Agung to the provincial capital is 22.95 km. Jati Agung is located in the buffer area of Bandar Lampung City, as shown by the increasing population growth rate. Growth population rates in the suburbs soared beyond the center cities whose growth rates were stagnant or declining (Kent B. Barnes, 2012).

Based on data from the Central Statistics Agency (BPS), the population growth of Jati Agung was 5.3% from 2015 until 2020. There is a New City development in the Lampung Province government area such as a new campus (Sumatera Institute of Technology), as an activity center, and the new toll road of the Trans Sumatera which increase the accessibility of this subdistrict. As a consequence, there is an intensive housing development in Jati Agung. As a buffer for the capital, Jati Agung subdistrict has sprawled housing developments, especially after the toll road is in operation. The development of new housing areas by developers and the community itself shows that it is out of control (Axel, 2021). The condition is due to the high demand for housing in the City

of Bandar Lampung without being matched by the availability of land.

The housing developments that have taken place appear to have neglected the spatial use allocation as stipulated in the Regional Spatial Plan (RTRW). In the RTRW of South Lampung Regency for 2011-2031, the Jati Agung Subdistrict is designated as land for oil palm and rubber plantations, aquaculture, medium-density housing, and the center of government for Lampung Province.

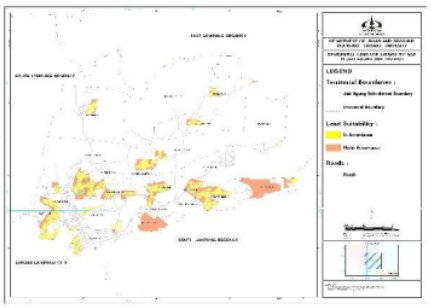

Figure 1. Deviations in the use of existing land compared to the use in spatial plan

Jati Agung Subdistrict, in the buffer zone of Bandar Lampung City, is a crucial concern with the housing sprawl phenomenon which has negative impacts. The first impact is inefficiency in the provision of infrastructure. Second is the large number of fertile agricultural lands has become built-up areas, thus disrupting food production. Third, there is compaction/densification. And last, there is an impact of air pollution that extends to suburban areas.

This study examines the distribution pattern of housing developments in the Jati Agung District. There are as many as 112 housing complexes spread across the villages in a distributed manner. Accordingly, it is necessary to conduct research related to the sprawling pattern of housing development to prevent the growth of city irregularity.

THE SPRAWLING PATTERN OF HOUSING DEVELOPMENT

Population growth affects settlement growth, which in turn will create distribution patterns (Yunus, 1989 in Sutomo, 2019). The increase in population and their activities demands more space to accommodate settlements and buildings accommodating activities (Saraswati, 2016).

In general, there are two patterns of housing sprawl: concentrating and spreading. Quantitatively (Hagget in Widodo, 2019), the housing sprawl pattern can be calculated using the nearest neighbor analysis method. Based on the calculation, the housing sprawl pattern is divided into three types: 1) uniform, 2) random, and 3) clustered. The uniform pattern explains that housing spreads out at regular and uniform distances. Random pattern shows an irregular distribution with different distances among housing or irregular spacing between housing. Clustered patterns form groups on a large scale and are concentrated at a central point. The characteristic of a centralized pattern is that housing patterns are interconnected. The disadvantage of this pattern is that the distance between housing and agricultural land is too far, while the advantage of the clustered pattern is that residential areas are concentrated so that non-residential areas such as agricultural areas, plantations and others are maintained.

The distribution of housing developments depends on the selection of housing construction sites. The location of the housing development is influenced by the criteria for selecting the location of the residence. The theory of housing location is a theory that explains the criteria for choosing a place to live (Purbasari, 2012). Those criteria are (1) Accessibility from easy transportation and distance to the city center. (2) The social and physical environment that provides comfort for its residents. (3) Ease of access to work, where the location of residence is located

in an area with a high level of employment opportunities. (4) The level of service, in this case the completeness of existing infrastructure at the location of residence.

METHOD

The nearest neighbor analysis is deployed to identify the spatial distribution of geographic phenomena. This quantitative method limits the distribution pattern on a scale of a particular space or area. The pattern of distribution diverges into three types, namely uniform, not evenly distributed (random), and clustered (Octorio, 2014).

The nearest neighbor analysis method is used to identify housing distribution patterns. The research variables include the area, the number of residential points, the density of residential points, and the average distance to the nearest housing. These data were secondary from various agencies such as administrative boundaries maps, area data, and housing locations. Residential location data is processed into a format according to the needs of the analysis technique used to describe the locations so that their distribution is visible.

Nearest neighbor analysis techniques are used to identify housing distribution patterns using calculations that include variables of distance, number of housing location points and area (Pelambi, 2016). The steps in this method are as follows: 1) determine the boundaries of the area to be studied; 2) change the object distribution pattern to a point distribution pattern; 3) measure the shortest distance, namely the straight-line distance between two points as the closest neighbor; and 4) calculating the size of the nearest neighbor parameter using the formula:

$$T = \frac{Ju}{Jh}$$

Information:
Nearest Neighbor Distribution Index
Ju: The average distance measured between one point and the nearest point
Jh: The average distance obtained if all points with neighboring points have a random pattern which is calculated by the formula:

$$Ju = \frac{1}{2\sqrt{P}} \qquad P = \frac{N}{A}$$

Information:
P: Density of dots per square kilometer
N: The number of residential points
A: Area in square kilometers

Housing sprawling pattern based on the T value obtained. Clustered patterns if T = 0-1, random if T = 1-2.5, and uniform if T > 2.5.

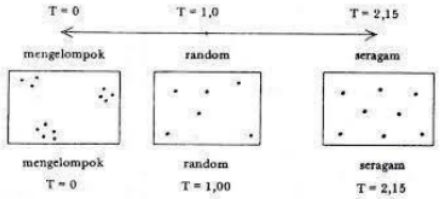

Figure 2. Housing Sprawling Pattern (Source: Sutomo, Faza and Sriwanto, 2019:3)

RESULT

The first step in identifying sprawling housing development is measuring the distance to the nearest by measuring the straight-line distance between one point and another, which is the closest neighbor. Figure 3 describes the housing distribution in Jati Agung. The average distance to the nearest is the result of calculating the total distance of the whole sample housing divided by the number of housing points. See Table 1.

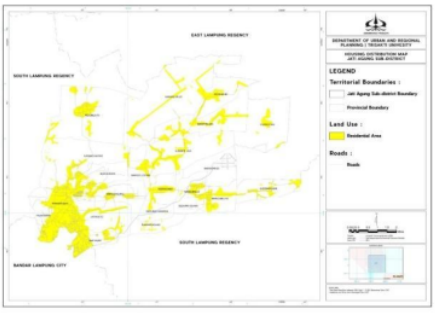

Figure 3. Distribution of Housing in Jati Agung Subdistrict

Table 1 Distance Measurement of the Nearest Housing in Jati Agung

No	Village	N. H	A.D
1	Way Huwi	17	0,54
2	Jatimulyo	21	0,68
3	Banjar Agung	8	0,08
4	Gedung Harapan	7	Q,23
5	Gedung Agung	1	3,77
6	Margomulyo	1	0,52
7	Sidodadi Asri	3	2,8
8	Purwotani	1	37,3
9	Sumber Jaya	3	7,8
10	Margodadi	2	1,4
11	Margo Lestari	4	3,85
12	Marga Agung	3	3,03
13	Marga Karya	2	3,7
14	Sinar Rezeki	1	37,3
15	Sidoharjo	2	3,8
16	Rejomulyo	5	1,34
17	Karang Anyar	11	1,79
18	Fajar Baru	10	0,83
19	Karang Sari	3	0,8
20	Karang Rejo	3	0,98
21	Margo Rejo	1	0,41

N.H = number of Housing
A.D = Average Distance to Nearest Housing

The next step in determining the pattern of housing distribution is to calculate the average distance obtained if all points have a random pattern, that is, find the value of Jh first. The P value is the density of points in square kilometers obtained by calculating the number of points divided by the area in square kilometers. Next, the nearest neighbor distribution index (T) is calculated to expose the distribution pattern of housing in Jati Agung subdistrict. The results are described in Table 2. The results of the calculation of T (the housing distribution index) for the 21 villages obtained the pattern as follows: clustered found in 4 villages (T= 0-1), random in 7 (T = 1-2,5) and a uniform found in 10 (T >2.5).

Table 2 Results of Nearest Neighbor Analysis for Housing in Jati Agung

V	A	N	P	Ju	Jh	T	Pa
1	4,93	17	3,45	0,54	0,7	0,77	C
2	10,6	21	1,98	0,68	0,36	1,9	R
3	5,86	8	1,37	0,08	0,43	0,2	C
4	4,65	7	1,72	1,23	0,39	3,1	U
5	5,33	3	0,38	3,77	0,8	4,7	U
6	9,16	2	0,11	0,52	1,52	0,34	C
7	4,81	3	0,21	2,8	1,1	2,5	U
8	6,4	1	0,16	37,3	1,25	29,8	U
9	6	3	0,17	7,8	1,22	6,3	U
10	6,48	2	0,15	1,4	1,31	1	R
11	6,25	4	0,64	0,93	0,63	1,5	R
12	5,76	3	0,52	3,03	0,07	43,3	R
13	7,15	2	0,28	3,7	0,94	2,9	U
14	29,3	1	0,03	37,3	2,9	12,9	U
15	6,1	2	0,33	3,8	0,87	4,4	U
16	7,15	5	0,7	1,34	0,6	2,23	U
17	10,8	11	1	1,79	0,5	3,58	U
18	6,4	10	1,56	0,83	0,4	2,1	R
19	7,25	3	0,41	0,8	0,77	1	R
20	7,42	3	0,4	0,98	0,77	1,3	R
21	6,69	1	0,15	0,41	1,28	0,32	C

V = village name the same as in table 1
Pa= housing sprawling pattern
C= clustered, R= random, U=uniform

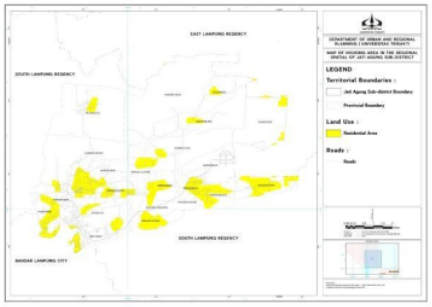

Figure 4. Map of Housing Area in The Regional Spatial of Jati Agung

Factors that influence housing distribution patterns are physical conditions such as the slope of the land and the road network (Triana, 2012). Meanwhile, from the demand aspect, the infrastructure condition and the ease of reaching various facilities also affects the selection of housing locations (Kalesaran, 2013). In this study, the factors that considerably influence the housing distribution pattern are the slope of the land, accessibility and availability of facilities shown in Table 3.

Table 3 Factors Influence the Distribution Pattern of Housing in Jati Agung District

F	Pa	N	Mean	Std. Dev
Slope	C	15	16.00	105.506
	R	15	18.00	101.419
	U	15	25.33	.51640
Accessibility	C	15	29.33	.79881
	R	15	22.66	.70373

	U	15	20.000	.65465
Availability of Facilities	C	15	22.000	.77460
	R	15	25.333	.74322
	U	15	17.333	109.978

F= factor influence
Pa= housing sprawling pattern
C= clustered, R= random, U= uniform
Std. Dev= standard deviation

The results of the statistical analysis of multiple housing regressions in recognizing the factors causing the distribution pattern in Jati Agung District are presented in Table 3. Table 3 demonstrates that accessibility becomes an influential factor for clustered patterns, facilities for random patterns, and slope for uniform patterns.

DISCUSSION

Based on the nearest neighbor analysis results, most villages are uniform (10), seven villages are random, and four villages are clustered. The uniform and random patterns are more dispersed than the clustered ones, so these patterns are more inefficient in providing housing infrastructures.

Other studies that use the nearest neighbor analysis method are Hakim (2019) and Riadhi and Aidid (2020). The housing distribution pattern in Bandung City is a cluster pattern (Hakim, 2019). Riadhi and Aidid (2020) showed the calculation results (T) in Kendari City is a random pattern with an analysis unit at the sub district level. This means that the distance between housing locations is irregular. Axcel (2020) showed the housing distribution pattern is a leapfrog, which is remarkably inefficient growth. In contrast to above studies, this research in Jati Agung Subdistrict used an analysis unit at the village level, and it is more spatially detailed. It showed three kinds of sprawling housing development patterns.

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