Journal of Sustainability Science and Management
Volume 18 Number 2, February 2023: 159-178

eISSN: 2672-7226

SUSTAINABLE DEVELOPMENT OF STRATEGIC ECONOMIC AREA WEST-EAST CORRIDOR WEST SUMATRA BASED ON SERVICE FACILITIES COMPLETENESS INDEX

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Submitted final draft: 28 September 2022 *Accepted: 25 October 2022* http://doi.org/10.46754/jssm.2023.02.012

Abstract: Regional development is a fundamental change in the socio-economic, cultural, and institutional structure to overcome income inequality and alleviate poverty. Regional development aims to formulate and apply theoretical frameworks into policies and programs by integrating social and environmental aspects to realise optimal and sustainable welfare. Learning the role of strategic areas and regional sustainability is necessary to support complete service facilities. The construction of good service facilities ensures efficiency, facilitates the movement of goods and services and increases the added value of the economy. This study looks at the spatial diversity of the factors that influence the Service Facility Index to develop a sustainable west-east corridor strategic economic area. The method used in this research is the scalogram method and Geographically Weighted Regression, with the unit of analysis being the sub-district. The analysis results show that the spatial pattern of the Service Facility Index based on the investigation of Moran I is random along the west-east corridor. The factors that significantly affect the sustainable development of the west-east corridor are the area's population and altitude.

Keywords: Sustainable development, regional development, service facilities, Geographically Weighted Regression.

Introduction

Regional development attempts to determine the right steps to take for the future with a series of choices (Kuncoro, 2018; Jhingan, 2016). Regional development aims to increase economic growth, increase competitiveness, reduce regional inequality, improve people's welfare, and reduce poverty levels (Kumari & Devadas, 2017).. Regional development is a fundamental change in the socioeconomic, cultural, and institutional structure to overcome income inequality and alleviate poverty (Todaro & Smith, 2012). Regional development is directed towards realising balanced equity, efficiency, and sustainability (Rustiadi, Saefulhakim, & Panuju, 2018).

Regional development aims to formulate and apply theoretical frameworks into policies and programs by integrating social and environmental aspects to realise optimal and sustainable welfare (Nugroho & Dahuri, 2004). It is necessary to develop a program of integrated and synergised development based on local resources to acknowledge and recognise the acceleration of regional development (Friedmann & Alonso, 2008). One of the efforts to accelerate development by utilising local resources is establishing strategic areas (Ministry of National Development Planning/ Bappenas, 2016; Bappenas, 2014) and local economic development (Saragih, 2015).

Strategic areas are prioritised in developing commodities that can improve people's welfare

(Bozhko, 2018; Komarovskiy & Bondarusk, 2013; Sosnovskh, 2017). Strategic areas are economic areas that have the potential to have a multiplier effect across sectors, regions, and actors (Ministry of National Development Planning/Bappenas, 2016). A strategic economic area is a territory with characteristics that distinguish it from other areas (Komarovskiy & Bondarusk, 2013).

Conceptually, the role of strategic areas can encourage the regional economy (Anwar, 2014; Glinskiy, Serga, & Zaykov, 2017). Strategic economic areas are expected to act as growth centres or growth corridors that drive economic growth in the surrounding area (Muta'ali, 2015; Babkin, Vertakova, & Plotnikov, 2017). As an implementation of the concept of growth centres or growth corridors, strategic economic areas are expected to be the prime movers of development that can drive the surrounding area's economy. Strategic economic areas such as growth centres are areas where the population is concentrated with various economic and social activities and has a fairly strong influence on the development of the surrounding area.

Realising the role of strategic areas and regional sustainability, the site needed to be supported by complete service facilities (Sosnovskh, 2017; Rustiadi *et al*., 2018). The construction of good service facilities will ensure efficiency, facilitate the movement of goods and services and increase the added value of the economy (Sutriadi, Safrianty, & Ramadhan, 2015; Hasselgren & Englen, 2016; Skorobogatova & Kuzmina- Merlino, 2017; Jurgelane-Kaldava, Ozolina, & Auzina-Emsina, 2019). Service facilities have a broad role in the context of development, whether environmental, economic, social, cultural, political, or other contexts. Limited service facilities will cause regional inequality (Rustiadi *et al*., 2018).

Various factors influence the existence of service facilities in the West-East Corridor. This research is carried out with the assumption and understanding that each observation unit has a different character. Although each observation unit has its nature, it will be directed to become growth corridors. As the corridor grows, the West-East Corridor has different characteristics and typologies, so the factors that influence its development will also be various for each region. As part of this study, the GWR approach is used to construct a growth corridor; however, the hypothesis is that the corridor is developed utilising a variety of policies and processes. After all, the assumption is that the east-west corridor has multiple characteristics and typologies.

The East-West Corridor is one of eleven strategic economic areas in West Sumatra. The potential for the development of the West Sumatra region has developed quite rapidly in the last five years, including the provincial Human Development Index (HDI) which is above the national HDI (West Sumatra = 72.65, Indonesia = 72.29 in 2021), the local government's work plan has contained a policy for the recovery of COVID-19. Another success that has been achieved is the reduction of inequality, which is supported by the program for handling disadvantaged areas. This success can be used as a strong capital to accelerate the development of West Sumatra in the future, especially in the West-East Corridor. Although West Sumatra has achieved progress and success, West Sumatra still faces various development problems and challenges that must be addressed through a series of policies, programs, and activities in sustainability. One of the problems is the weakness of planning and supervision in implementing regional development.

Another problem is the loss of Minangkabau identity among the younger generation of *Perantau Minang*. In overcoming these problems, *Perantau Minang* is very much needed in supervising development in West Sumatra. This development potential can be used as capital to accelerate the construction of the West-East Corridor. The development of this potential must be accompanied by a series of strategies, policies, programs, and activities (Todaro & Smith, 2017) that are adapted to the conditions and needs of each region. The existence of adequate service facilities indicates a good regional economy to improve the welfare of the community. Improving the economic welfare of the community is one of the principles of sustainable development. Areas with a high Service Facility Index (SFI) value indicate that the region has a fairly high level of economic welfare. Based on the description above, this study aims to see the spatial diversity of the factors that affect the SFI to develop a sustainable west-east corridor strategic economic area.

Materials and Methods

Study Area

This research is in the west-east corridor of West Sumatra (Figure 1). The west-east corridor is one of eleven strategic economic areas in West Sumatra, one of the main corridors connecting West Sumatra with other provinces. The West-East Corridor covers nine regencies/ municipalities (*kabupaten/kota*) and sixty-five sub-districts (*kecamatan*), namely Tanah Datar, Lima Puluh Kota, Padang Pariaman, Agam, Padang municipal, Padang Panjang, Pariaman, Bukittinggi, and Payakumbuh.

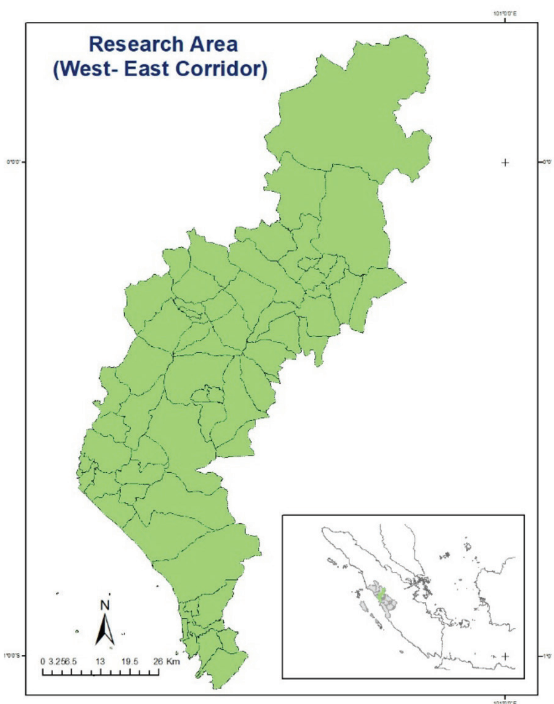

Figure 1: Research area

Research Method

The research method used in this study is a combination of qualitative and quantitative methods. The data used in this study are secondary data and primary data. Secondary data in District data in 2020 was obtained from the Central Statistics Agency (West Sumatra Statistical Agency, 2020). Primary data were obtained from field observations and interviews. The unit of analysis observed is the sub-district in the west-east corridor.

This research is in two stages: the first stage by calculating the SFI. The second stage looks at the spatial diversity of the factors that affect the sustainability of the developments of the west-east corridor based on the SFI. The first stage was carried out using the scalogram method (Pribadi, Rustiadi, Panuju, & Pravitasari, 2018), and the second stage was carried out using the Geographically Weighted Regression (GWR) method. The GWR method is a spatial regression model using weighting for each observation location (Wheeler & Paez, 2010) and can see spatial diversity (Mao, Yang, & Deng, 2018).

The Service Facility Index is calculated using a scalogram based on the analysis of indicators per 1000 population (Pribadi *et al*., 2018). The indicators used in this study are the number of elementary schools, the number of high schools, the number of universities, the number of sports facilities, the number of markets, the number of minimarkets/ supermarkets, the number of hotels/inns/motels, the number of private banks/government/Rural Banks, the number of restaurants, number of cooperatives, number of Base Transceiver Stations (BTS), number of hospitals, number of puskesmas, length of roads, length of roads in good condition. These indicators are variables that represent basic community service facilities.

The spatial diversity of the factors that affect the sustainability of the development of the West-East Corridor is based on the Service Facility Index using the GWR method. The GWR method can see the spatial diversity along the West-East Corridor. The Geographically

Weighted Regression (GWR) model develops the classical regression model. The general form of the GWR model can be written as follows: description:

$$y_i = \pi r^2 = \alpha\,(u_i, v_i) + \sum_{k=1}^{p} \beta_k\,(u_i, v_i) x_{ki} + \delta_i \qquad (1)$$

yi = the observation value of the response variable at the i-th location
xki = value of the k-th explanatory variable at the i-th location (i=1,2…,n)
(*ui,vi*) = coordinates of geographical location of observation location i (ui,vi)
α(*ui,vi*) = constant/intercept GWR
βk(*ui,vi*) = the value of the k-th parameter in the location coordinates (ui,vi)
i = i-th observation error which is assumed to be identical, independent and normally distributed with zero mean and constant variance 2

The model that looks at the factors that influence the development of the strategic area of the west-east corridor of the economic province based on the SFI are:

$$Y_i = \beta_0\,(u_i, v_i) + \beta_1\,(u_i, v_i) lnx_{1i} + \beta_2\,(u_i, v_i) lnx_{2i} + \beta_3\,(u_i, v_i) lnx_{3i} + \beta_4\,(u_i, v_i) lnx_{4i} + \beta_5\,(u_i, v_i) lnx_{5i} + \beta_6\,(u_i, v_i) lnx_{6i} + \beta_7\,(u_i, v_i) lnx_{7i} + \beta_8\,(u_i, v_i) lnx_{8i} + \delta_i \qquad (2)$$

To see the factors that affect the SFI using eight independent variables (Table 1). The determination of the independent variables is based on previous research results (Anwar, 2014; Glinskiy *et al*., 2017) and the problems in West Sumatra. The operational definition of each variable is:

Table1: Operational definition of variables

No.	Variables	Units	Operational Definition
1	The SFI (Y_i)	value	Value of The SFI
2	Residential area (x_1)	Ha	The total area of residential
3	Industry (x_2)	value	Number of large, medium, and medium industries
4	The role of *perantau* (x_3)	per cent	Percentage of involvement and participation of Minang immigrants in developing the region
5	The role of LKAAM (x_4)	per cent	Percentage of involvement and participation of LKAAM (traditional institutions) to develop the region
6	The role of the Camat (x_5)	per cent	Percentage of involvement and participation of camat (sub-district head) to develop the region
7	Population (x_6)	person	Total population
8	Regional security (x_7)	value	Regional security levels based on the number of disasters
9	Altitude area (x_8)	masl	The altitude of the area as measured from the sea level

The partial parameter significance test was conducted to determine which independent variables affected the dependent variable at each research location. The hypothesis of partial significance is:

H_0: = 0 (Independent Variable X_i at location-i has no significant effect)

H_1: 0 (Independent variable X_i at i-location has a significant effect)

The statistical test used in testing this hypothesis is a test for the k-variable at location -i, which is obtained from the following equation: $t_k(u_i, u_i)$

$$t_k(u_i, u_i) = \frac{\beta_k(u_i.v_i)}{s.e[\hat{\beta}_k(u_i,v_i)]} \qquad (3)$$

The test is performed n x p times for each variable. The null hypothesis is rejected if it is greater than the t table. Where the degrees of freedom are and S is the matrix each row consists of $t_k(u_i, u_i)\left(t\alpha_{/2;df}\right) n - 2v_i + v_2, v_1 = t_r(S)v_2$ $= t_r(S^T S). r_i = X_i(X'W(u_i, v_i)X)^{-1}X'W(u_i, v_i)$.

Results and Discussion

Service Facility Index

The SFI is calculated using the scalogram method based on the analysis of indicators per 1,000 population. The indicators used in the total of service facilities are the number of high schools (A), the number of universities (B), the number of elementary schools (C), the number of sports facilities (D), the number of markets (E), the number of minimarkets/supermarkets (F), number of restaurants (G). Other variables used are the number of hotels/inns/motels (H), the number of private banks/government/Rural Banks (I), the number of cooperatives (J), the number of BTS (K), the number of hospitals (L), the number of health centres (M), the length of the road (N), the size of the road in good condition (O).

Each data is divided by per thousand population. The first step: the information on each indicator will be divided by the total population multiplied by 1,000. The second step: Calculate the weight of each indicator for each region by calculating the total number of sub-districts divided by the number of sub-districts that have facilities. The third step: Calculate the standardised values by subtracting the weight of each indicator from the minimum value. The result is divided by the standard deviation. The SFI is obtained by adding all indicator values in each region. The index value of service facilities shows that the higher the index value, the more complete the service facilities in an area.

Figure 2 shows the results of the calculation of the SFI. Based on the spatial pattern calculated by the Moran Index (Moran Index 0.029, p-value 0.332), service facilities are randomly distributed along the West-East Corridor. Moran's Index (Moran's I) is the most widely used method to calculate global spatial autocorrelation. This method can detect clustered patterns or form trends in space. The sub-district service facility index results show that three sub-districts have a high diversity value (29.5-46.9), namely East Padang District, Central Pariaman District, and Guguak Panjang District. Areas with a low diversity value between 7.3 to 12.6 are Kuranji District, Koto Tangah, Batang Anai, Sintuak Toboh Gadang, Sungai Pua, Banuhampu, Canduang, Ampek Angkek, Luak District, Lareh Sago Halaban District, Harau District, Payakumbuh District, Mungka District.

Spatial Diversity of Factors Affecting the West-East Corridor Service Facility Index

The data processing results show the spatial diversity of the SFI factors. The eight independent variables used were: the area of settlements, the number of industries, the role of *perantau*, the role of LKAAM, the function of the sub-district head, the number of residents, regional security, and altitude. This research is under observation in the same period, namely 2020.

Geographically Weighted Regression (GWR) modelling produces local regression equations and varies in each regional unit. Figure 3 shows the local coefficient value of

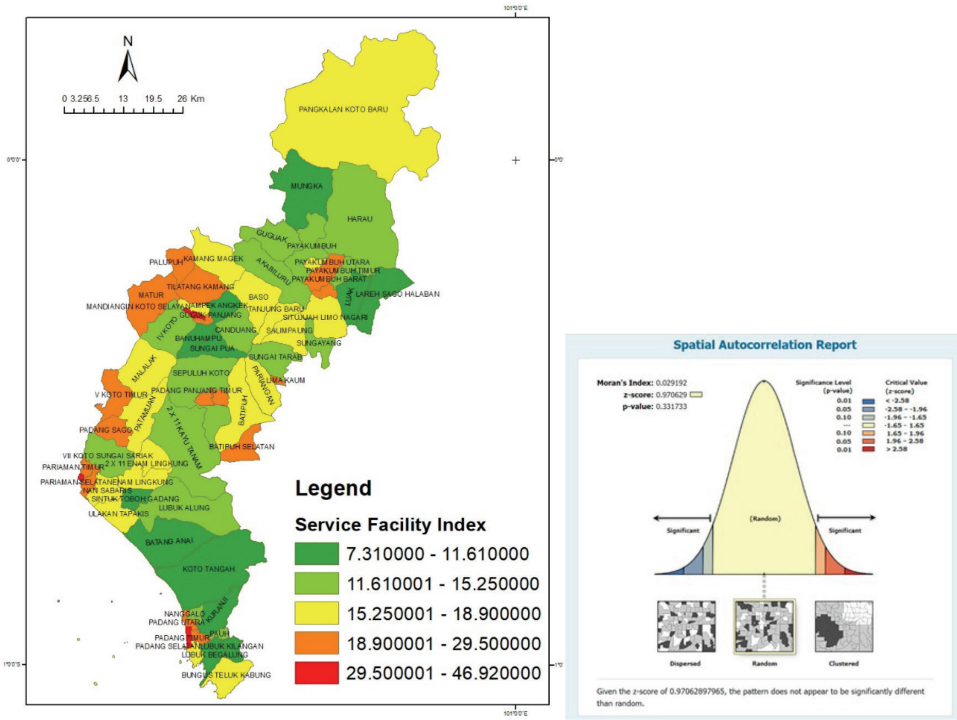

Figure 2: Service facility completeness index and Moran's Index

the R^2 Service Facility Index (SFI) for the West-East Corridor. The spatial pattern of the local coefficient R^2 shows a clustered pattern. The local value of R^2 for each observation area has different results. The sub-districts with a high R^2 value are in the southern part of the west-east corridor (Padang municipal, Padang Pariaman municipal and Pariaman Regency), while the R^2 value is in some sub-districts in the northern part of the East-West Corridor. Most sub-districts with a low R2 value are in Agam Regency and Bukit Tinggi municipal.

Testing the coefficients of the GWR model is carried out to determine the factors that influence it (Li, Zhang, Xu, Xue, & Ren, 2020; Bhattacharya & Nakamura, 2021)in regions where coastal tourism is the primary industry, the implementation of such strategies have been low due to fear of negative economic impact related to loss of coastal view and accessibility. Therefore, this paper examines the influence of coastal amenities to hotel room rates alongside

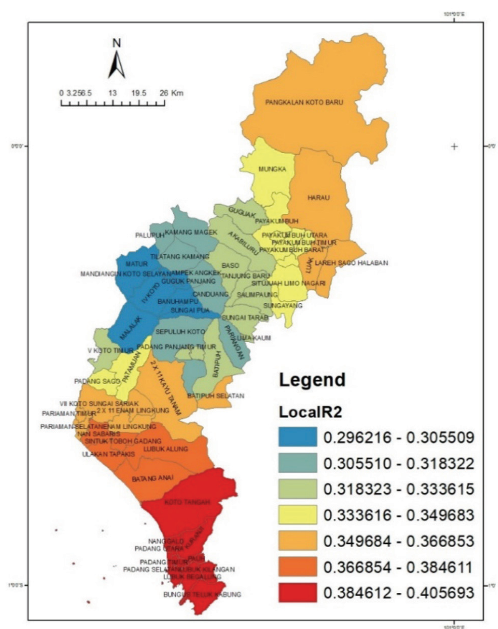

Figure 3: Value of local coefficient R^2

other attributes through hedonic analysis. Specifically, it investigates whether rooms with coastal views, accessibility to beaches, and those located on higher elevations are priced higher than other rooms, in order to quantify the associated values of Japanese coastal areas where tourism is a key economic driver. Subsequently, it suggests the geographical market boundaries to guide the management and risk-mitigation of coastal areas. Findings reveal that: Semi-parametric Geographically Weighted Regression (S-GWR). SFI for each sub-district in the West-East Corridor. The results of the coefficient test using the t-test with a confidence interval of 90% indicate that independent variables have a spatial effect on the sustainability of regional development based on the SFI (reject H_0 and accept H_1).

The test results of the Ordinary Least Square (OLS) model show that the significant variables are the population variable, with a p-value of 0.0007 and the height of the area, with a p-value of 0.0379 (p-value<0.05). In contrast, the variable settlement area, number of industries, role *perantau*, the role of LKAAM, the position of the sub-district head, and regional security were not significant (p-value>0.05). The GWR analysis results show the variable number of significant industries in 30 sub-districts, *perantau* and significant population in all sub-districts, regional security in 1 sub-district, and area height in 38 sub-districts (Table 2).

Based on the results of OLS modelling, the residential area variable has a p-value of 0.3696 (p-value>0.05). The residential area variable did not significantly affect the Service Facility Index (SFI) for the West-East Corridor (Table 2). The residential area variable is not important in increasing the SFI for the west-east corridor.

Based on the results of GWR modelling, the effect of residential areas on the SFI for each sub-district has a negative coefficient (Figure 4a). The addition of a residential area is not followed by expanding service facilities (Adimagistra & Pigawati, 2016) because this study was carried out in one observation. The construction of service facilities is not carried out simultaneously as the construction of residential areas in the west-east corridor and West Sumatra in general. The results of the GWR model's coefficient test show that the residential area variable is not a factor affecting the SFI of the West-East Corridor. The results of the t-test showed that none of these variables was significant in the East-West Corridor (Figure 4b).

Table 2: Coefficient of OLS and GWR estimation results

Variables	OLS Coefficient			GWR Coefficient (α = 0.1)		
	Coef.	t stat	p-value	Max.	Min.	Significant Sub-District
C	22.3626	4.6195	0.0000*	23.3301	21.1507	65
Residential Area	-0.0003	-0.9045	0.3696	-0.0002	-0.0004	-
Number of industries	0.0045	1.6154	0.1119	0.0049	0.0021	30
The role of *perantau*	0.0969	1.9921	0.0512	0.1134	0.0905	65
The role of LKAAM	-0.0235	-0.5304	0.5979	-0.0272	-0.0519	-
The role of the Camat	-0.0586	-0.5933	0.5554	-0.0409	-0.0688	-
Population	-0.0001	-3.6030	0.0007*	-8.7E-05	-0.0002	65
Regional security	0.0976	1.1572	0.2521	0.14299	0.0738	1
Altitude area	-0.0053	-2.1261	0.0379*	-0.0019	-0.0058	38

Description: * variables in the model are significant.

The variable number of industries based on the results of OLS modelling has a p-value of 0.1119 (p-value>0.05). The variable number of industries does not significantly affect the Service Facility Index (SFI) for the west-east corridor. The variable number of industries is not important in increasing the SFI of the west-east corridor (Table 2). Based on the results of the coefficient test of the GWR model, it shows that the variable number of industries is not a factor that affects the SFI of the West-East Corridor.

The coefficient on the number of industries shows a positive value, meaning that the number of industries can increase SFI (Figure 5a). The influence of several industries can be seen from the number of significant variables in the sub-districts in the East-West Corridor. The results of the t-test show that the number of industries is significant in 30 sub-districts of the West-East Corridor (Figure 5b). The number of industries in the West-East Corridor creates a variety of economic activities (Tian *et al*., 2021), impacting the SFI. The more diverse industries in the region, the more diverse the economic activities (Jiang, Liao, & Jin, 2021).

The *perantau* variable, based on the results of OLS modelling, has a p-value of 0.0512 (p-value>0.05). The variable of the nomad role has no significant effect on the SFI of the West-East Corridor (Table 2). The role of immigrants has no significant impact on the model in increasing the SFI for the West-East Corridor. Based on the results of GWR modelling for the influence of the role of *perantau* on the SFI for each sub-district, the coefficient is positive (Figure 6a), meaning that the role of immigrants can increase SFI.

The role of *perantau* has an important effect on SFI in the West-East Corridor; the higher the role of *perantau*, the higher the SFI. It illustrates the role of Minang immigrants in supporting the development and economy of their region of origin. Minang people who migrate do not forget their area; *perantau* always helps the community, especially those with family relationships. The assistance provided by migrants includes

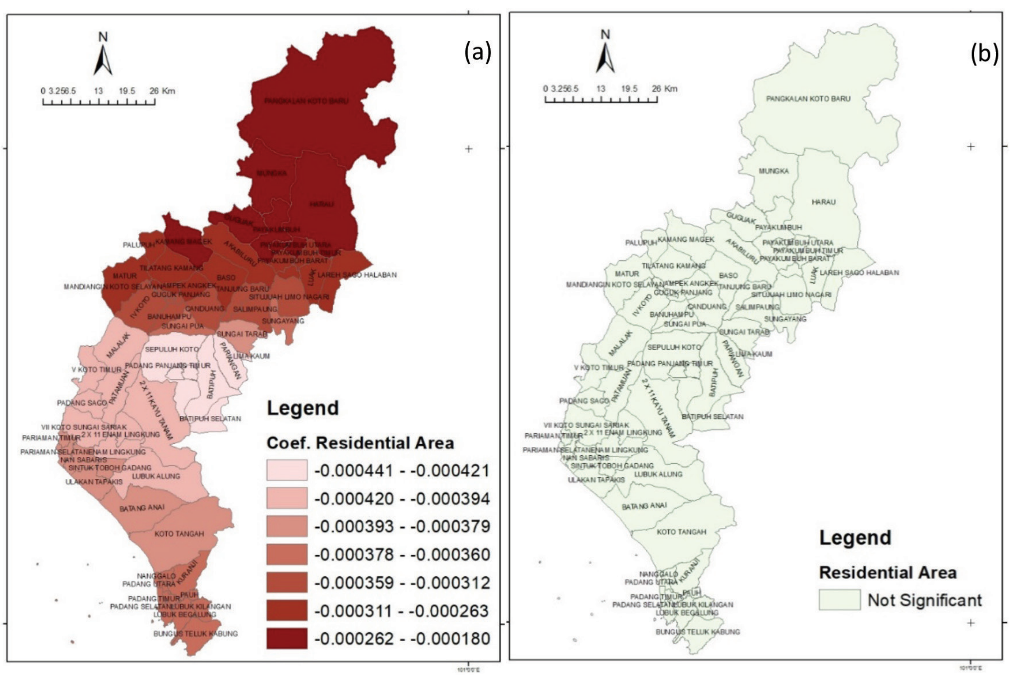

Figure 4: Spatial diversity of factors influencing SFI based on Residential area variable (a) coefficient, (b) t-test

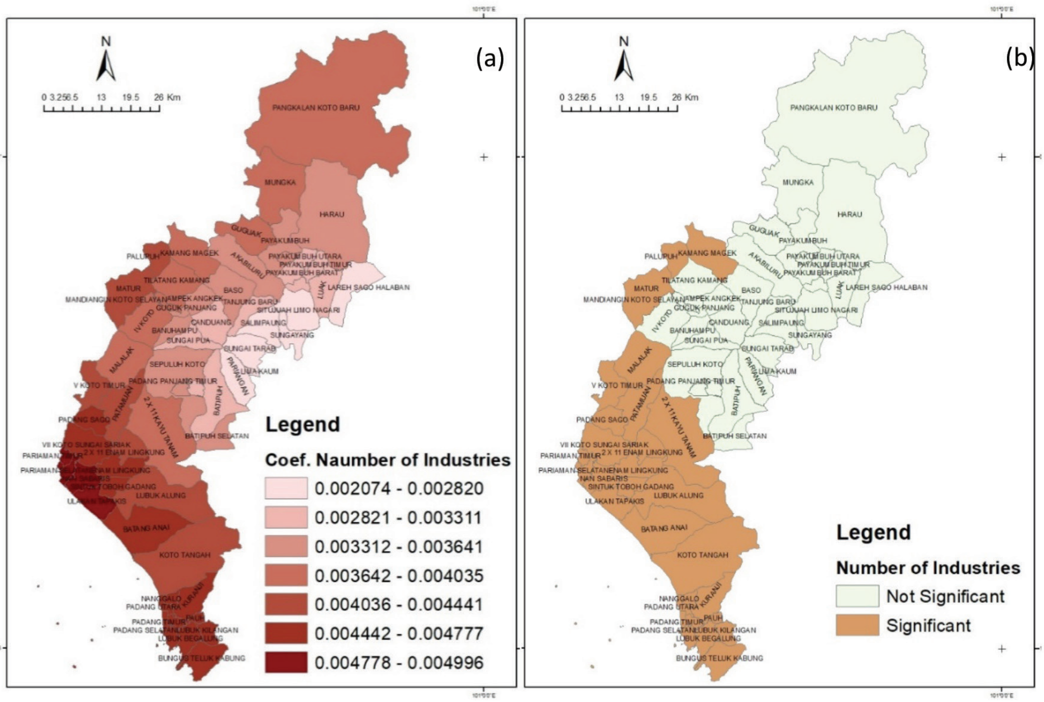

Figure 5: Spatial diversity of factors influencing SFI based on the number of industries variable (a) coefficient, (b) t-test

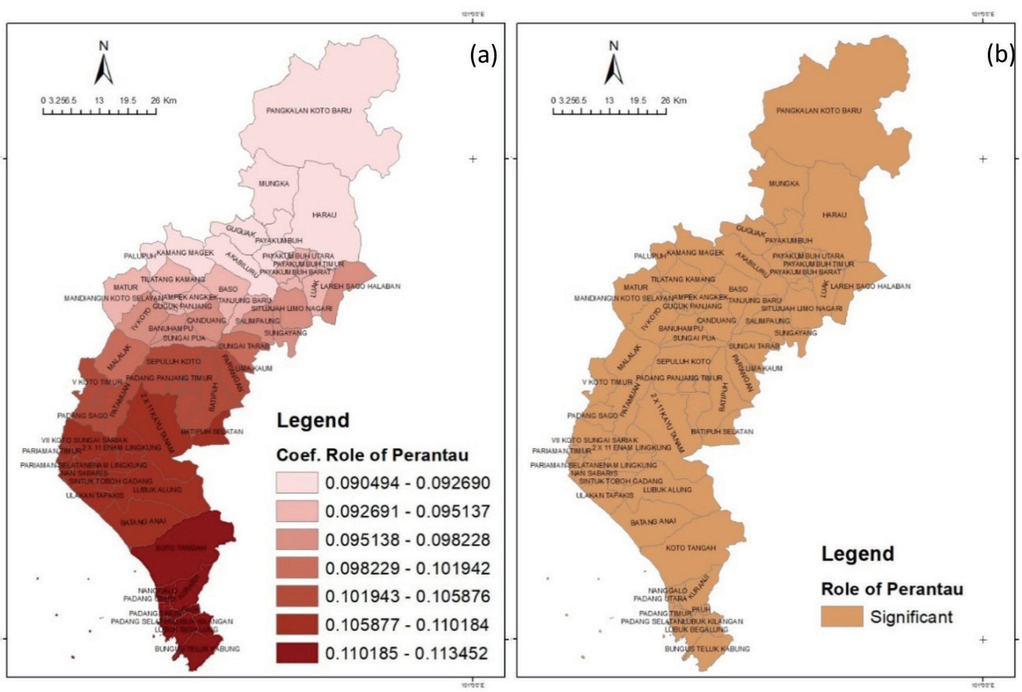

Figure 6: Spatial diversity of factors influencing SFI based on the role of perantau variable (a) coefficient, (b) t-test

building/renovating mosques or prayer rooms, building Early Childhood Education (PAUD), renovating schools, and building/renovating other public facilities. The assistance provided by the Minang migrants increased the SFI in the West-East Corridor. Based on the significance test results from 65 sub-districts, the role of the *perantau* variable was significant for all sub-districts.

This significant influence illustrates the role of Minang migrants in supporting sustainable development and improving the regional economy. The culture of wandering the Minang community where Minang people who are teenagers and adults tend to go out of their areas of origin to other places to find a new life, study, trade, seek work experience, and want to return to their hometown when successful (Navis, 1986). Migrating and leaving one's hometown is sometimes not a personal decision but is often a group decision, for example, family, neighbours or friendship (Damsar & Indrayani, 2016). The decision to migrate is related to the capital and the network of socio-cultural and political relations they have. Minang people who migrate do not forget their area; migrants help the community, especially those with family relationships (Navis, 1986).

The culture of wandering is a form of local wisdom in the Minang community. The involvement and role of Minang immigrants in the area is a form of innate local wisdom. Local wisdom is the basis for sustainable development (Putri & Damayanti, 2017) and become the basis for regional development (Surur, Sitorus, & Agusta, 2014) and is one of the driving forces of the economy (Mungmachon, 2012) for regional development (Vitasurya, 2016).

The LKAAM role variable based on the results of OLS modelling has a p-value of 0.5979 (p-value>0.05). The role of LKAAM does not significantly affect the SFI for the west-east corridor (Table 2). The role of LKAAM is not an important factor in increasing SFI for the west-east corridor.

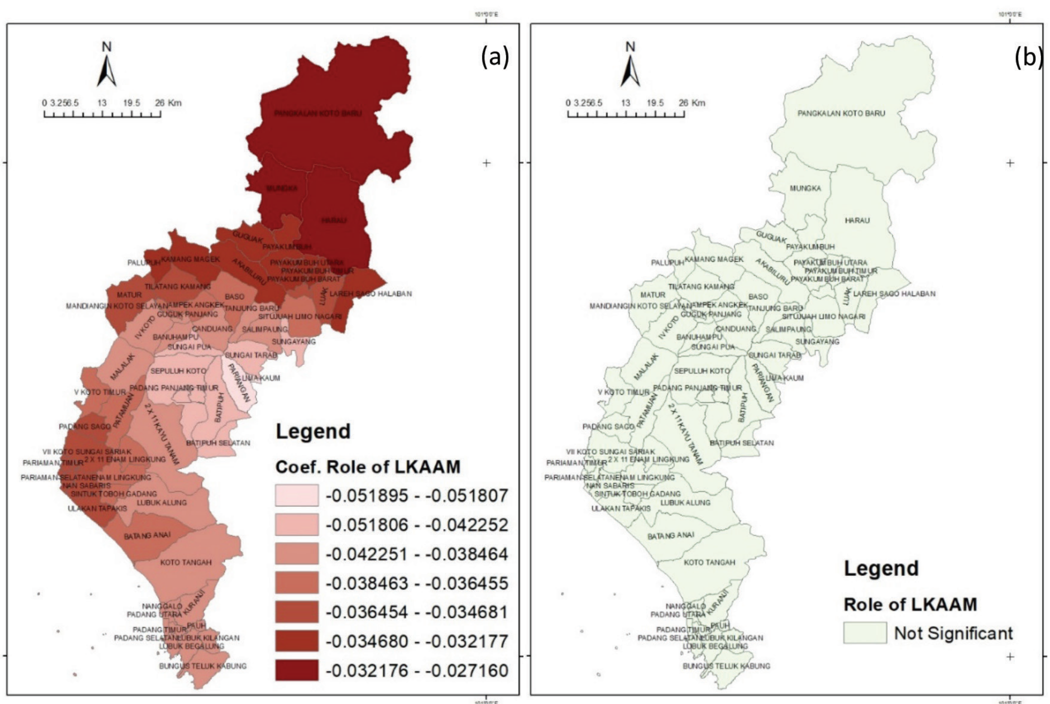

Figure 7: Spatial diversity of factors influencing SFI based on the role of LKAAM variable (a) coefficient, (b) t-test

Based on the results of GWR modelling, the effect of the role of LKAAM on the SFI for each sub-district has a negative coefficient (Figure 7a). Based on the significance test results from 65 sub-districts, no LKAAM role variable has a significant effect in each sub-district (Figure 7b). This significant negative effect does not mean that the role of LKAAM reduces the value of SFI in the West-East Corridor. It happens because, in many areas in the West-East Corridor and the West Sumatra region, the role of LKAAM has not been running properly. LKAAM members of ninik mamak have not been involved in the planning or development process. The roles and functions of LKAAM have not yet been implemented as stated in the AD-ART LKAAM. LKAAM is a functional organisation of ninik mamak of adat stakeholders with strong roots in the nagari as the backbone, which has gathered institutionally in the Kerapatan Adat Nagari (KAN) which has existed for generations. Another cause is that there are still some ninik mamak in West Sumatra who still seem anti-globalisation.

The sub-district role variable based on the results of OLS modelling has a p-value of 0.5554 (p-value>0.05). The role of the sub-district head variable has no significant effect on the East-West Corridor SFI (Table 2). The role of the sub-district head has no significant impact on increasing the SFI of the West-East Corridor.

Based on the results of GWR modelling for the role of the sub-district head on the SFI for each sub-district, the coefficient is negative (Figure 8a). Based on the significance test results from 65 sub-districts, no sub-district role variable significantly affects the East-West Corridor (Figure 8b). The involvement of the sub-district head in the fulfilment of service facilities in an area in a government structure does not play a significant role because the district government is responsible for the fulfilment of service facilities. By policy, the camat is not responsible for making policies related to investment. The camat only plays a role in providing information related to his area to the district government. Regarding land use

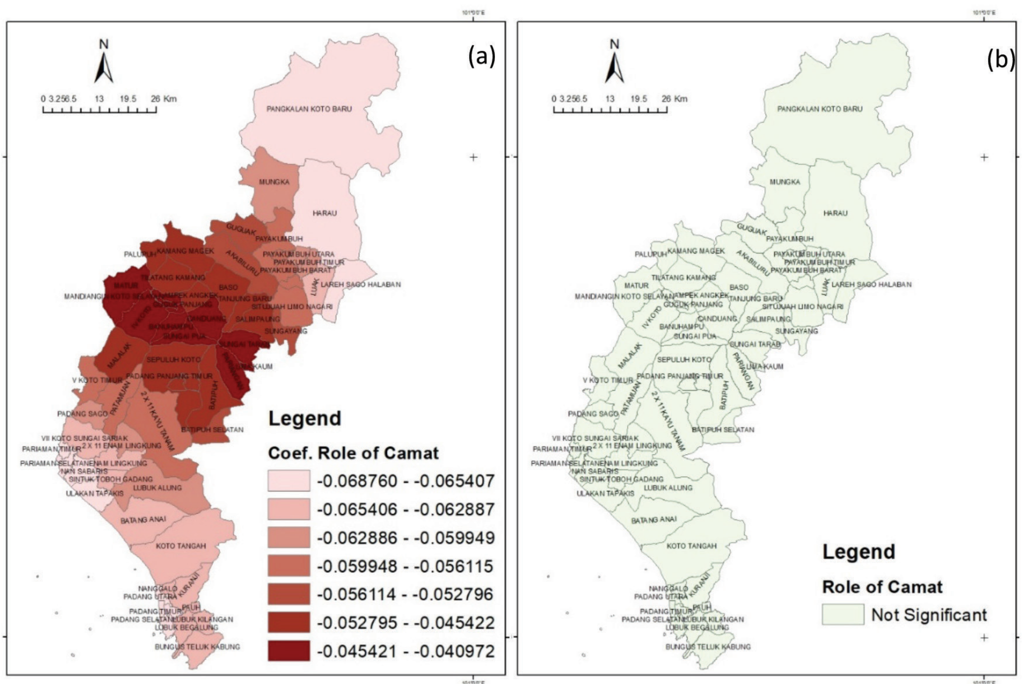

Figure 8: Spatial diversity of factors influencing SFI based on the role of Camat variable (a) coefficient, (b) t-test

permits, ninik mamak is more entitled to give licenses to tribal lands (Schoneveld, 2017).

The population variable based on the results of OLS modelling has a p-value of 0.0007 (p-value <0.05). The population variable significantly affects the SFI of the West-East Corridor (Table 2). The population has an important effect on increasing the Service Facility Index (SFI) for the west-east corridors.

Based on the results of GWR modelling, the effect of population on the SFI for each sub-district has a negative coefficient (Figure 9a). The population has a significant negative impact on the SFI of the West-East Corridor, meaning that the addition of service facilities in the same year does not follow the increase in population. The availability of service facilities has not accommodated and served the entire population (Junianto & Lumbantoruan, 2013; Misnaniarti *et al*., 2018; Luqman & Khan, 2021). The rise does not follow the increase in population in service facilities (Afroj *et al*., 2021). Based on the significance test results from 65 sub-districts, the population variable significantly affects all sub-districts (Figure 9b).

The regional security variable based on the results of OLS modelling has a p-value of 0.2521 (p-value>0.05). The regional security variable has no significant effect on the SFI of the West-East Corridor (Table 2). Regional security has no significant impact on increasing the SFI for the west-east corridor.

The coefficient is positive based on the results of GWR modelling for the effect of regional security on the SFI for each sub-district (Figure 10a). Regional security has an important effect on the SFI of the West-East Corridor. Based on the significance test results from 65 sub-districts, the regional security variable significantly positively impacts the Pangkalan Koto Baru sub-district (Figure 10b). The higher the regional security, the higher the SFI (Yu, 2020). Regional security has a significant positive effect, meaning that the higher the level of regional security in the west-east corridor, the more service facilities that can build.

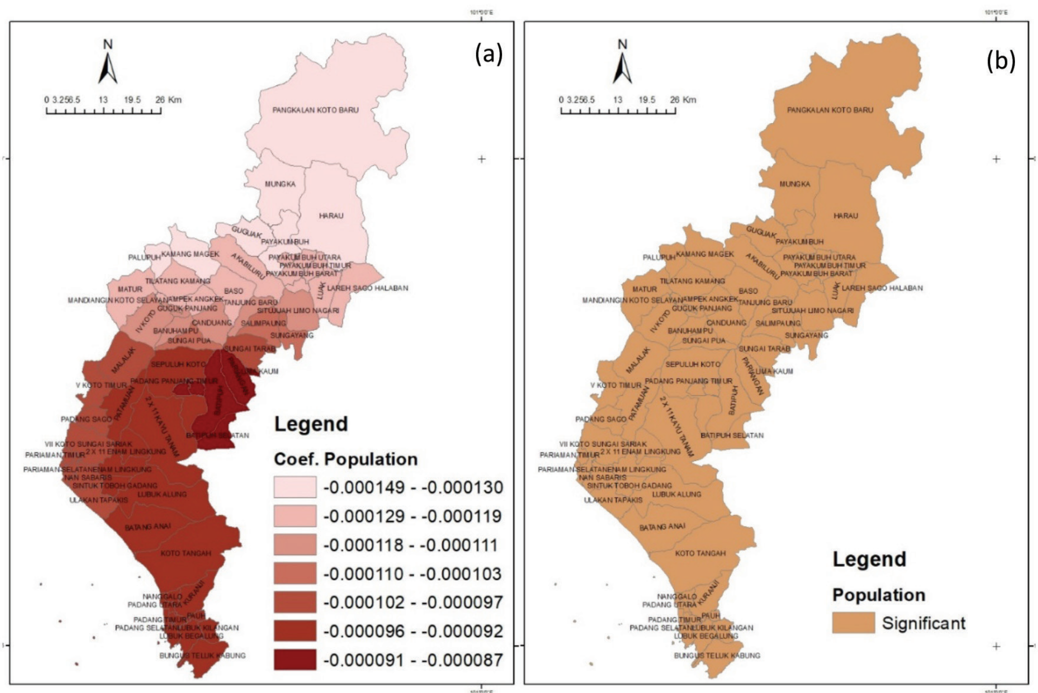

Figure 9: Spatial diversity of factors influencing SFI based on population variable (a) coefficient, (b) t-test

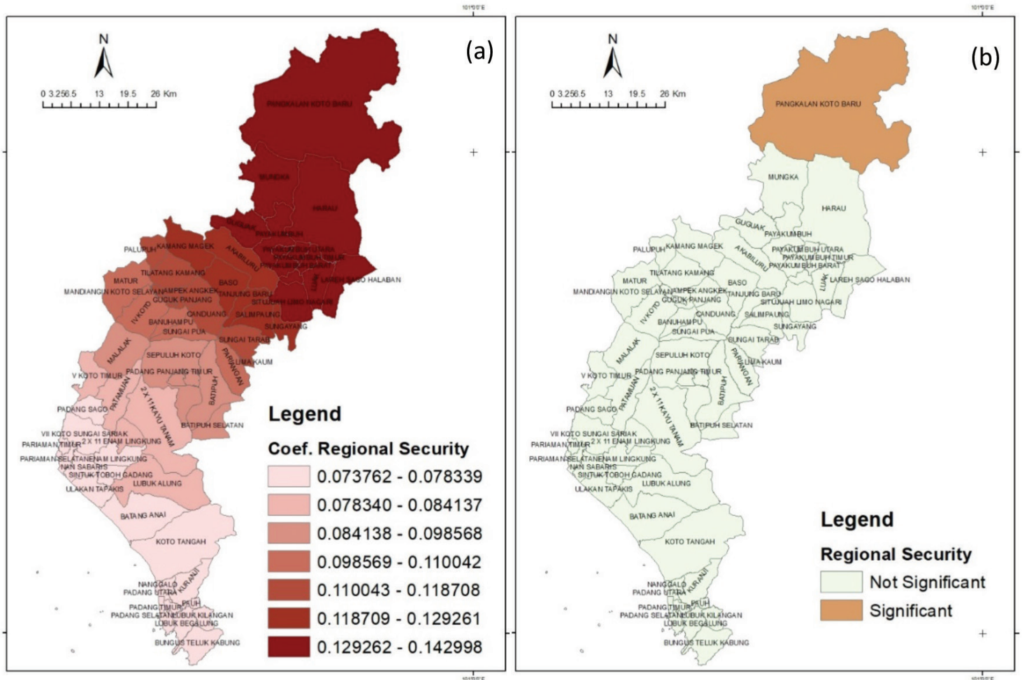

Figure 10: Spatial diversity of factors influencing SFI based on regional security variable (a) coefficient, (b) t-test

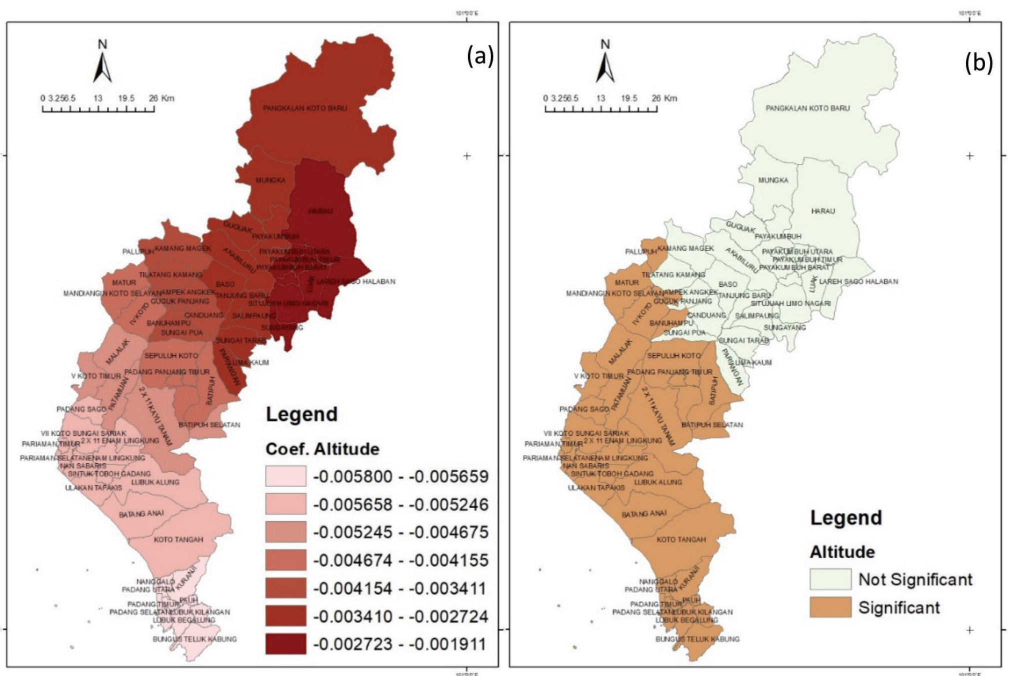

Figure 11: Spatial diversity of factors influencing SFI based on altitude area variable (a) coefficient, (b) t-test

The regional elevation variable based on the results of OLS modelling has a p-value of 0.0379 (p-value<0.05). Variable altitude area significantly affects the SFI of the West-East Corridor. The area's height has an important effect on increasing the SFI for the West-East Corridor. Based on the results of GWR modelling, the effect of area height on the SFI for each sub-district has a negative coefficient (Figure 11a). The higher an area is, the smaller the SFI value. The higher an area above sea level, the less diverse the land use (Apollo, Andreychouk, Moolio, Wengel, & Myga-Piątek, 2020) and meeting the needs of activity facilities will be more difficult to fulfil (Rukmini, Rosihermiatie, & Nantabah, 2012; Yin, Su, Fan, & Li, 2020). It is due to land use limitations in areas with large slopes and the limited ability of land in areas with slopes.

Conclusion

As a strategic economic area, the East-West Corridor is expected to act as a growth centre that will drive economic growth in the hinterland. In realising the sustainable development of the East-West Corridor, it needs to be supported by complete service facilities. This study wants to see the spatial diversity of the factors that affect the SFI in developing a sustainable strategic area of the West-East Corridor. The variables observed were the area of settlements, the number of industries, the role of *perantau*, the role of traditional institutions (LKAAM), the role of the sub-district head, the number of residents, and regional security and altitude. Variable areas of the residential area, number of industries, *perantau*, the role of LKAAM, the role of sub-district head, and regional security have no significant effect in the model on SFI.

Population and area height variables proved to have a significant negative effect on the SFI in all sub-districts of the West-East Corridor. The population has a significant negative effect, meaning that the availability of service facilities has not served the entire population. The addition of service facilities in the West-East Corridor does not follow the increase in population.

The regional altitude variable significantly negatively affects SFI in 38 sub-districts of the West-East Corridor. This negative effect means the higher an area above sea level, the less land use diversity. East-West Corridors are generally located at an altitude of >700 meters above sea level with a fairly large slope, so land use is limited.

Based on the results of GWR modelling, the variable number of industries has a significant positive effect in 30 sub-districts, meaning that the number of industries can increase the SFI. The existence of industry creates a variety of economic activities that impact increasing the number of service facilities in the West-East Corridor.

Based on the GWR modelling results, the perantau role variable has significant positive effects in 65 sub-districts in the West-East Corridor. The role of *perantau* has an important effect on increasing SFI, meaning that the higher the role of *perantau*, the higher the SFI. Minang migrants have a major role in supporting the development and the economy in the West-East Corridor.

Based on the GWR modelling results, the regional security variable has a significant positive effect in Pangkalan Koto Baru District. The higher the security of an area, the higher the SFI. The higher the level of regional security in the East-West Corridor, the more service facilities are built.

Planning and supervision in regional development and completeness of service facilities are needed to realise sustainable development. Local governments can use *Perantau Minang* to develop their regions to create sustainable development, especially in the West-East Corridor. The assistance provided by *Perantau Minang* includes building/renovating mosques or prayer rooms, building Early Childhood Education (PAUD), renovating schools, and building/renovating other public facilities.

Acknowledgements

The author is grateful to all who have helped carry out this research. Thank you to the stakeholders for the discussion.

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Appendix

The results of the calculation of the index of service facilities

Sub-District	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	Index
Ten Koto	1,507	0.437	1,533	0.334	1,402	0.166	0.748	0.135	0.625	0.829	2,604	0.000	1,631	1,419	0.835	14,206
Batipuh	1,264	0.000	2,091	0.490	3.087	0.244	0.549	0.000	1.147	1.105	1,912	0.000	1,589	2.182	1.242	16,901
South Batipuh	3,623	0.000	2,830	2.807	1.475	0.000	0.175	0.000	0.000	1,590	4.263	0.000	2.438	2.871	2.290	24,361
Pariangan	1.455	0.985	2,757	0.752	0.790	0.749	1.311	0.457	0.705	1,597	1,630	0.000	1.133	1,659	1,694	17,673
Five Clans	1.026	1.562	1,670	1.391	0.835	1.387	1,930	0.403	1,863	3.030	2,586	2.486	1,220	1.333	1,276	23,999
love	1.100	0.000	1,674	0.853	2,688	0.000	0.000	0.000	1,199	0.996	1,110	0.000	1.335	1,624	1,380	13,959
Tarab . River	0.635	0.000	1992	0.246	1.552	0.245	0.429	0.000	0.692	0.948	2.135	0.000	2,583	1,829	1,677	14,965
Salimpaung	1.344	0.000	1970	0.000	2,919	0.000	0.000	0.000	0.976	1.454	3.013	0.000	1.019	2.272	2,395	17.363
New Cape	1,470	0.000	2,351	1,139	2,395	0.000	1.135	0.000	1.068	0.287	0.989	0.000	1.909	3.164	2,967	18,875
Stem Anai	1,410	0.000	1.141	1,561	0.984	0.778	0.194	0.127	0.585	1.070	1.354	0.000	0.255	1.114	1.032	11,606
Lubuk Alung	1,461	2.118	1,604	0.162	0.680	0.484	0.282	0.131	0.909	0.903	2.104	0.674	0.924	1.369	1.447	15.253
Sintuak Toboh Gadang	1,506	0.000	1977	1,945	1,635	0.388	0.097	0.000	0.000	0.236	1,350	0.000	1.186	0.295	0.000	10,614
Do Tapakis	0.956	0.970	2.176	2,592	1,557	0.738	0.553	0.000	1.041	0.952	0.964	0.000	1.111	1,734	1.516	16,860
Nan Sabari	0.670	0.680	2.163	1,557	0.545	1.293	0.065	0.000	0.486	1.015	0.901	0.000	0.668	3.057	3.328	16,427
2 X 11 Six Circles	0.986	0.000	1.383	0.000	0.803	0.381	0.666	0.310	1.075	1,756	2,985	0.000	4.217	1.503	0.623	16,689
Six Circles	0.942	0.000	2,302	0.365	0.767	0.000	0.091	0.000	1.027	1,908	1,267	0.000	1.090	3.553	3.426	16,738
2 X 11 Planting Wood	1.406	0.713	1,299	0.272	0.572	0.814	0.271	0.110	0.511	0.897	1.181	0.000	2.898	1,570	0.890	13.406
Vii Koto Sungai Sariak	0.803	0.543	2.477	1.037	0.436	0.000	0.258	0.000	0.583	0.754	0.360	0.000	1,289	2,922	2,328	13,791
Patamuan	0.567	0.000	1966	0.439	1,847	0.876	0.000	0.000	0.412	0.596	3,430	0.000	1.387	2.121	2004	15,645
Sago Field	1.114	0.000	3,741	0.000	1,814	0.000	0.000	0.000	1.618	0.292	2,995	0.000	3.082	3,413	3.361	21,429
V Koto Timur	1,265	0.000	4.636	1,470	3.090	0.000	0.122	0.000	1.378	0.861	3.827	0.000	3.551	4.448	4.855	29,504
mature	1.187	0.000	4.062	3.678	3.866	0.917	0.916	0.560	0.862	1.097	4.389	0.000	1,470	1,951	2,100	27.055
Iv Koto	1,645	0.000	2.464	1,274	2009	0.000	0.952	0.000	0.597	0.567	2.211	0.000	0.905	0.762	1.054	14,440

Sub-District	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	Index
Malalak	0.000	0.000	4.064	3.396	3,570	0.000	0.000	0.000	0.000	0.000	0.737	0.000	3.027	0.777	1,264	16,834
Banuhampu	1.126	1.372	0.835	1.222	0.734	0.522	0.739	0.212	0.327	0.182	1969	0.000	0.328	0.174	0.381	10,124
Pua River	1.144	0.000	1.089	1.182	1.242	0.000	0.736	0.000	0.554	0.308	1,282	0.000	0.812	0.506	0.751	9,607
Ampek Angkek	0.925	0.000	0.955	1.003	0.603	0.286	1.071	0.174	0.672	1.008	1,741	0.000	0.204	0.295	0.597	9.535
opium	1,689	0.000	1,636	0.000	0.000	0.000	1,223	0.133	0.000	0.372	1987	0.000	0.939	1,630	2,359	11,967
meatball	1,131	0.574	1,751	0.438	2,302	0.655	2.237	0.178	0.821	0.812	3.040	0.000	1.382	1,290	1,659	18,271
Kamang	2,799	0.000	2,311	1,627	1,140	0.541	0.878	0.440	0.762	1.344	3.293	0.000	1,799	1,881	2,688	21.502
Kamang Magek	1920	0.000	2,894	1,860	3.128	1,854	0.556	0.151	0.697	0.709	1,291	0.000	1.118	1.272	1.396	18,847
Palupuh	0.714	0.000	3.812	0.553	2,324	0.000	0.413	0.000	0.000	1.377	4.318	0.000	1.842	3.938	3,422	22,713
Payakumbuh	0.808	0.000	1,713	1.252	0.877	0.832	0.104	0.085	0.782	1.109	2,535	0.000	0.465	0.808	0.797	12.165
Akabiluru	0.693	0.000	2.276	1.073	1,692	0.803	0.201	0.000	0.503	0.880	2.095	0.000	1,777	1.173	0.920	14,086
Badger	1.031	0.000	1,747	1.065	0.000	0.531	0.199	0.000	0.250	1.049	1.155	0.000	0.695	0.835	0.411	8,967
Lareh Sago Halaban	0.501	0.000	2,062	1,941	0.816	0.580	0.000	0.000	0.910	0.688	1.010	0.000	1.183	1.038	0.728	11,457
Situjuah Limo Nagari	0.863	0.000	2,644	1.338	3.515	0.667	0.083	0.000	0.941	1,279	1,741	0.000	0.968	1,236	0.937	16,213
Harau	0.872	0.354	1,407	1.351	0.852	0.404	0.101	0.384	0.886	1.474	3.047	0.000	0.711	0.489	0.268	12,597
Guguak	1.544	0.000	2,715	1.396	1,677	0.398	0.000	0.000	0.561	1.047	2.076	0.000	1.226	0.854	0.382	13,875
maybe	0.348	0.000	1,533	0.810	1,702	0.000	0.000	0.000	0.759	0.797	2,576	0.000	0.710	1.126	0.631	10,993
New Koto Base	0.926	0.000	2,354	0.956	3.015	0.238	0.119	0.097	0.448	0.594	3.319	0.000	2,499	2,334	1.999	18,898
Wrap the Bay of Mourning	0.374	0.000	1.322	2,901	0.610	1,735	0.650	0.471	0.272	1,749	2,769	0.000	0.791	1.331	1.253	16,226
Refinery Ground	0.500	0.339	0.384	1.422	0.543	1.675	0.773	0.000	1.333	1.183	0.673	0.000	0.147	0.297	0.407	9,677
Lubuk Begalung	0.533	0.155	0.000	0.708	0.496	1,881	1.087	0.096	0.332	0.680	1.023	0.000	0.102	0.208	0.332	7,632
South Field	1.581	0.963	1.055	1.960	0.000	1,954	0.885	0.497	0.919	2,332	1,701	0.511	1.100	0.334	0.426	16,220
East Desert	1.909	0.727	1.083	2.496	0.389	3,410	0.898	0.637	1,733	2,553	1,524	2,699	0.000	0.467	0.685	21,208
West Desert	4.128	5.447	1.197	2,399	0.672	2.870	4.621	4,800	5.846	6.064	1,665	5.336	0.270	0.755	0.854	46,924
North Field	2007	2.173	0.571	1.555	0.436	2,997	1,679	1.093	1,846	3,520	1.079	1,729	0.874	0.652	1.078	23,291

Sub-District	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	Index
Nanggalo	0.767	2.181	0.430	1,783	1,000	3.319	0.652	0.096	0.669	0.946	1,651	0.000	0.581	0.494	0.653	15,223
Kuranji	0.689	0.382	0.233	0.728	0.612	1,500	0.314	0.039	0.501	0.721	1.516	0.405	0.213	0.662	0.569	9.085
Pauh	0.757	0.769	0.013	1,467	0.206	2.145	1.145	0.040	1,283	1.152	1,867	0.816	0.021	0.791	0.900	13,371
Koto Tangah	0.773	0.784	0.060	0.561	0.157	0.709	0.168	0.030	0.351	0.915	0.032	0.468	0.379	1.144	0.781	7.313
West Long Field	1,622	2,634	1,467	2010	1.057	1.503	3.506	0.918	1,885	1,896	1.090	1.048	1,641	0.463	0.394	23.135
East Long Field	5.077	1,586	1.428	1.513	0.000	0.905	1,885	0.614	0.567	1,837	1,838	1.262	2.051	0.590	0.520	21,673
Lambau	3,473	3.085	0.684	2018	2.474	2.850	1,299	5,731	5.360	2,746	1,459	2.104	0.976	0.000	0.029	34,287
Bathing in Koto Selayan	1,813	1,841	0.649	1,405	0.295	2,382	1,400	1.311	0.263	0.467	1.585	0.586	1,879	0.327	0.397	16,600
Aur Birugo Tigo Baleh	1,410	2,147	0.663	1,638	0.574	3.539	0.204	1,108	1,536	1,812	2,369	2.278	0.723	0.339	0.411	20,750
West Payakumbuh	1,608	0.363	0.361	1,938	1.455	1,794	4,551	0.393	1,427	2,071	2,402	1.154	1,291	0.278	0.170	21.255
South Payakumbuh	5.005	1,694	0.688	2,585	0.000	1,289	1.610	0.262	2.424	2,519	1.122	0.000	4,801	1.070	0.634	25,703
East Payakumbuh	2,673	0.678	0.813	1.035	0.544	0.258	0.387	0.735	1,213	2,998	0.000	2.159	0.666	0.342	0.349	14,852
North Payakumbuh	1.474	0.599	1.660	2,513	1.441	0.683	2,333	0.463	1,499	2,993	2.180	1.906	0.544	0.397	0.468	21,155
Lamposi Tigo Nagori	2.811	1.902	0.914	2,904	0.000	0.000	0.362	0.294	0.681	1,654	0.000	0.000	2,534	1.342	1.293	16,690
South Pariaman	1.434	0.000	1.305	5.186	0.779	2,586	1,753	0.451	0.695	2,312	2.893	1.545	2,594	2.259	2.246	28.038
Central Pariaman	2,402	1,219	1.383	3.257	1,956	3.015	3.071	3,492	2.835	3.286	2018	2,911	0.561	1.509	1,781	34,696
East Pariaman	1.513	2,047	1991	2,734	1,642	1.168	1.070	0.475	0.000	0.499	1.356	1,629	2,756	2,564	2,666	24.111