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Level of Accessibility, Connectivity of Existing Road Networks in Supporting Mobility of Productive Area (Case Study: Sidenreng Rappang District)

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Abstract
Sidenreng Rappang Regency, South Sulawesi Province, Indonesia, is one of the regions with significant potential in the agricultural sector. Improving the economy through the agricultural sector needs to be balanced with the role of infrastructure, especially road networks. The purpose of this research is to determine the potential of the area based on the accessibility, connectivity and mobility of the road network with a focus on the distribution of agricultural products. The descriptive quantitative research method uses SWOT analysis with data collection from 30 respondents from the stakeholder side using a questionnaire survey. The research results based on the regional potential analysis show that rice, coconut and laying hens are the leading commodities. The analysis of the road network for the accessibility aspect shows that five out of eleven sub-districts still have poor accessibility, the connectivity aspect shows that each area is already connected, and the mobility aspect shows that the mobility index has not yet been achieved in three out of eleven sub-districts. The results of the SWOT analysis of the strategy for improving the road network based on the strengths and opportunities (SO) are as follows: improving the road network according to its roles and functions, maximising technical programmes according to the role of the regional budget (APBD), and making investments in infrastructure strengthening adapted to the region's potential.
Keywords: *road network, location quotient (LQ), SWOT*

Abstrak
Kabupaten Sidenreng Rappang, Provinsi Sulawesi Selatan - Indonesia merupakan salah satu daerah yang memiliki potensi sektor pertanian yang cukup besar. Meningkatkan perekonomian melalui sektor pertanian perlu diimbangi dengan adanya peran infrastruktur terutama jaringan jalan. Tujuan penelitian ini untuk mengetahui potensi wilayah, aksesibilitas, konektivitas dan mobilitas jaringan jalan dengan orientasinya dalam mendistribusikan hasil pertanian. Metode penelitian kuantitatif deskriptif menggunakan analisis *SWOT* dengan pengambilan data terhadap 30 responden dari pihak stakeholder menggunakan angket kuesioner. Hasil penelitian berdasarkan analisis potensi wilayah menunjukkan komoditi padi, kelapa dan ayam petelur merupakan komoditi unggulan. Analisis jaringan jalan untuk aspek aksesibilitas memperlihatkan lima dari sebelas kecamatan masih berada dengan aksesibilitas yang kurang baik, aspek konektivitas menunjukkan setiap wilayah sudah terkoneksi, aspek mobilitas menunjukkan belum tercapainya indeks mobilitas pada tiga kecamatan dari sebelas kecamatan. Hasil analisis *SWOT* terhadap strategis peningkatan jaringan jalan berdasarkan kekuatan dan peluang (SO): meningkatkan jaringan jalan berdasarkan peran dan fungsinya, memaksimalkan program teknis sesuai peran APBD, melakukan investasi berupa penguatan infrastruktur disesuaikan dengan potensi wilayah.
Kata Kunci: *jaringan jalan, location quotient (LQ), SWOT.*

1. Introduction

Sidenreng Rappang Regency, South Sulawesi Province. Geographically, it borders Enrekang Regency and Pinrang Regency to the north, Pinrang Regency and Parepare City to the west, Soppeng Regency and Barru Regency to the south and Wajo Regency and Luwu Regency to the east. The topography of Sidenreng Rappang Regency is dominated by land, which certainly allows its use as agricultural land. So that the community is more dominant in working as farmers.

Therefore, to support social and economic activities of the community, adequate supporting infrastructure is needed. One of them is the road network, which is a very vital element in supporting the movement of goods and services. This underlies the utilization of a connected road network, and becomes access to its orientation in the distribution of agricultural products, minimizing operational costs, from the

processing area location to the processing industry to consumers. From that, it is also necessary for government administrators to pay attention so that the available road network can be utilized according to its role and function. Of course, the role of the government is to be more objective in handling the road network so that equitable development can be realized. However, the tendency for development is more focused on cities. This study aims to determine the potential of agricultural, plantation and livestock sector commodities in Sidenreng Rappang Regency and to determine the connectivity, accessibility and mobility index of the road network in the orientation of the distribution of agricultural products, and to determine the strategic development of the road network in accordance with the potential of the region.

2. Material and Methods

Types of research

The type of research implemented by the author is a descriptive quantitative approach, where a participatory approach is carried out by involving 30 stakeholder respondents within the scope of the Sidenreng Rappang Regency Government.

Place and Time of Research

This research was conducted in Sidenreng Rappang Regency and was carried out directly, both data collection and processing for 3 months, starting from August to October 2024.

Population and Sample

a. Data Types

In this study, two data were used, namely primary data and secondary data.

1) Primary data can be interpreted as data that will be obtained from direct observations in the field and also a number of data results from selected respondents who are considered to understand the existing problems.
2) Secondary data is data obtained from documents, related agencies/institutions relevant to the problem being studied. This data consists of area, population, geographic and demographic conditions concerning the conditions and circumstances of the research area.

b. Sampling Techniques

The sampling technique uses *non-probability sampling* , namely each element in the population does not have the same opportunity or chance to be selected as a sample (Sugiyono, 2018). With *Purposive sampling*, sampling is based on certain considerations according to the desired criteria to be able to determine the sample to be studied (Sugiyono, 2018)

Data Analysis Techniques

a. Location Quotient (*LQ)* Analysis

The method for determining the sector base based on the commodities that are the object of research, using the formula:

$$LQ = \frac{si/st}{Si/St} \quad (1)$$

Where:

si = production of commodity type i at the sub-district level
st = the amount of production of commodity type j at the sub-district level
Si = production of commodity type i at district level
St = amount of production of commodity type j at district level

b. Accessibility

The shortest route graph approach below is used to determine the road network accessibility index:

Table 1. Shortest route graph example

No.	Node	A	B	C	D	E	F	G	Amount
1	A	0	1	1	2	2	3	4	13
2	B	1	0	2	1	2	3	4	13
3	C	1	2	0	2	1	2	3	11
4	D	2	1	2	0	1	2	3	11
5	E	2	2	1	1	0	1	2	9
6	F	3	3	2	2	1	0	1	12
7	G	4	4	3	3	2	1	0	17
	Amount	13	13	11	11	9	12	17	

From the graph above, the correlation value is determined using the formula below:

$$\text{Average} = \frac{\text{total number of connections}}{\text{number of node}} \quad (2)$$

$$= \frac{13+13+11+11+9+12+17}{7} = 12.29$$

Table 2. Correlation number

No.	Knot	Correlation number	Accessibility index	Information
1	A	13	Bad	(>)Relationship figure
2	B	13	Bad	(>) Relationship number
3	C	11	Good	(<) Relationship number
4	D	11	Good	(<)Relationship number
5	E	9	Good	(<)Relationship number
6	F	12	Good	(<)Relationship number
7	G	17	Bad	(>)Relationship figure

c. Connectivity

The strength of interaction is determined by the connectivity index, the higher the index value, the more road networks connecting the cities being studied (Kansky, 1963). The formula used to determine the connectivity index is as follows:

$$\beta = \frac{e}{v} \quad (3)$$

Where:
β= connectivity index
e= number of road network sections
v= number of regions

d. Mobility

Identify the mobility index based on the formula below:

$$\text{Mobility Figures} = \frac{\text{Target (100\%)}}{\text{angka mobilitas}} \quad (3)$$

Table 3. Mobility figures based on population density

Category	Population Density (People/ km^2)	Mobility Figures
I	<100	18.50
II	100 ≤ KP <500	11.00
III	500 ≤ KP <1000	5.00
IV	1000 ≤ KP <5000	3.00
V	≥5000	2.00

Source: Minister of PUPR Regulation, 2014

e. *SWOT* Analysis

Conducting internal and external factor analysis, creating internal and external factor analysis tables, creating factor analysis result diagrams and creating strategic road network improvement matrices

3. Results and Discussion

Potential of the Agricultural Sector

Land resources in Sidenreng Rappang Regency are seen from the condition of land cover or land use that is formed. Geographical location, geological and soil structure, climatology of the area, economic activity sector of the community certainly affect the formation and pattern of land use. The following are the results of the analysis of the agricultural sector in Sidenreng Rappang Regency.

a. Sub. Food Crops Sector

The results of the calculation of *the Location Quotient* (*LQ*) of food crops as a whole can be seen in the following table:

Table 4. Analysis results *LQ* Food Crops

Subdistrict	Food Crops (Tons)				
	Paddy	Corn	Cassava	Peanuts	Soybeans
Panca Lautang	0.96	1.23	-	-	-
Tellu Limpoe	0.57	3.09	-	0.65	-
Watang Pulu	0.84	1.73	3.79	9.68	-
Baranti	1.19	0.09	0.60		-
Panca Rijang	0.86	1.68	-		-
Kulo	1.04	0.84	-		-
Maritengngae	1.19	0.11	-		-
Watang Sidenreng	1.05	0.77	0.78	0.41	-
Pitu Riawa	0.97	1.16	-		6.92
Dua Pitue	1.19	0.06	1.63		-
Pitu Riase	1.07	0.62	5.11	0.35	-

Source: Data Processing Results, 2024

The table above shows the results of the analysis where the *LQ value* >1 means that the analyzed area is a sector base and vice versa if the *LQ value* <1 is non-base in the food crop sector.

b. Sub. Plantation Crops Sector

The results of the calculation *of the Location Quotient* (LQ) of plantation crops as a whole can be seen in the following table:

Table 5. Analysis results *LQ* Plantation Crops

Subdistrict	Types of Plantation Crops (Tons)				
	Cocoa	Coconut	Coconut Palm oil	Coffee	Pepper
Panca Lautang	0.51	5.64	-	1.63	-
Tellu Limpoe	0.14	1.14	-	-	-
Watang Pulu	-	7.44	-	-	-
Baranti	0.72	2.68	-	-	-
Panca Rijang	1.03	0.95	-	-	-
Kulo	0.97	3.62	8.45	-	-
Maritengngae	0.07	2.95	-	-	-
Watang Sidenreng	0.90	9.55	-	-	-
Pitu Riawa	1.16	1.93	1.70	0.63	0.42
Dua Pitue	1.15	0.33	-	-	-
Pitu Riase	1.09	0.36	-	1.89	2.15

Source: Data Processing Results, 2024

The table above shows the results of the analysis where the *LQ value* >1 means that the analyzed commodity is a sector base and vice versa if the *LQ value* <1 is non-base in the plantation sector.

c. Sub. Livestock Sector

the overall livestock *Location Quotient (LQ)* calculations can be seen in the following table:

Table 6. Livestock Analysis Results

Subdistrict	Livestock (Tail)				
	Beef cattle	Goat	Buffalo	laying hens	Broiler Chicken
Panca Lautang	3.42	3.60	4.22	1.35	0.25
Tellu Limpoe	0.73	1.76	1.45	1.37	0.27
Watang Pulu	1.43	1.49	2.70	0.70	1.59
Baranti	0.15	0.64	0.04	1.12	0.78
Panca Rijang	0.66	0.48	0.06	1.41	0.20
Kulo	0.50	0.64	0.40	1.33	0.36
Maritengngae	0.29	0.29	0.01	1.39	0.24
Watang Sidenreng	0.46	0.63	0.15	0.61	1.78
Pitu Riawa	0.46	0.75	0.36	0.40	2.21
Dua Pitue	2.41	5.87	11.59	0.77	1.42
Pitu Riase	32.40	10.06	17.69	0.94	0.60

Source: Data Processing Results, 2024

The table above shows the results of the analysis where the *LQ value* >1 means that the analyzed commodity is a sector base and vice versa if the *LQ value* <1 is non-base in the plantation sector.

d. Regional Potential Matrix

The results of the analysis of commodities that are the basis of the sector in Sidenreng Rappang Regency are seen in the following matrix:

Table 7. *Location Quotient* analysis recapitulation matrix*(LQ)*

Subdistrict	Type of commodity		
	Crops	**Plantation Crops**	**Farm**
Panca Lautang	Corn	Coconut Coffee	Beef cattle Goat Buffalo Laying Hens
Tellu Limpoe	Corn	Coconut	Goat Buffalo Laying Hens
Watang Pulu	Corn Cassava Peanuts	Coconut	Beef cattle Goat Buffalo Broiler Chicken
Baranti	Paddy	Coconut	Laying Hens
Panca Rijang	Paddy	Cocoa	Laying Hens
Kulo	Paddy	Coconut Palm oil	Laying Hens
Maritengngae	Paddy	Coconut	Laying Hens
Watang Sidenreng	Paddy	Coconut	Broiler Chicken
Pitu Riawa	Corn Soybeans	Cocoa Coconut Palm oil	Broiler Chicken
Dua Pitue	Paddy Cassava	Cocoa	Beef cattle Goat Buffalo Broiler Chicken
Pitu Riase	Paddy Cassava	Cocoa Coffee Pepper	Beef cattle Goat Buffalo

Source: Data Processing Results, 2024

The potential of the region varies depending on the land and soil conditions. The potential of the region also plays a role in the development of the economy of a region which is of course also supported by adequate environmental facilities and infrastructure, as well as the road network which will later play a role in distributing basic materials and agricultural products

Road Network Analysis

The existence of adequate infrastructure will contribute to the smooth production oriented towards the distribution of goods and services, increasing the economic equality of the region. Sidenreng Rappang Regency is a land-dominated area, of course the road network infrastructure will play an important role in the sustainability of the community's socio-economic activities.

Table 8. Road Network Based on Authority Level

No.	Level of Authority	Road Network Length (Km)	Percentage (%)
1.	National	64.66	4.50
2.	Province	82.80	5.76
3.	Regency/City	1,290.04	89.74
	Total	1,437.50	100.00

Source: BICIPTAPERA Service, 2022

a. Accessibility

The accessibility value of the road network in Sidenreng Rappang Regency can be seen in the following table:

Table 9. Accessibility value of Sidenreng Rappang Regency

Subdistrict	Number Relatedness	Average	Index Accessibility	Information
1	2	3	4	5
Baranti	210.94	233.66	Good	(<) Average
Dua Pitue	248.95	233.66	Bad	(>) Average
Kulo	268.81	233.66	Bad	(>) Average
Maritengngae	173.47	233.66	Good	(<) Average
Panca Lautang	283.91	233.66	Bad	(>) Average
Panca Rijang	176.57	233.66	Good	(<) Average
Pitu Riase	375.19	233.66	Bad	(>) Average
Pitu Riawa	238.94	233.66	Bad	(>) Average
Tellu Limpoe	220.17	233.66	Good	(<) Average
Watang Sidenreng	176.43	233.66	Good	(<) Average
Watang Pulu	196.86	233.66	Good	(<) Average

Source: Data Processing Results, 2024

From the results of the identification of road network accessibility in Sidenreng Rappang Regency using the linkage number approach, the results obtained from the table show that Baranti District, Maritengngae District, Panca Rijang District, Watang Sidenreng District and Tellu Limpoe District have good accessibility, this indicates that access to the area is not only based on the main route, but also has alternative routes so that it triggers accessibility between regions, for Kulo District, Panca Lautang District, Dua Pitu District, Pitu Riawa District, Pitu Riase District and Watang Pulu District obtained linkage numbers above the average value, which means that accessibility is still poor in the area.

b. Connectivity

The table below is the result of measuring the road network connectivity index at the sub-district level in Sidenreng Rappang Regency.

Table 10. Connectivity value of Sidenreng Rappang Regency

Subdistrict	District Road Section	Village/ Ward	Connectivity Value	Index description
Panca Lautang	23	10	2.3	Good
Tellu Limpoe	15	9	1.6	Good
Watang Pulu	31	10	3.1	Good
Baranti	18	9	2	Good
Panca Rijang	10	8	1.25	Good
Kulo	12	6	2	Good
Maritengngae	20	12	1.66	Good
Watang Sidenreng	16	8	2	Good
Pitu Riawa	24	12	2	Good
Dua Pitue	18	10	1.8	Good
Pitu Riase	49	12	4.08	Good
	236	**106**	**2.22**	**Good**

Source: Data Processing Results, 2024

Connectivity index assessment using *graph theory* , the road network in Sidenreng Rappang Regency shows results where areas in each sub-district have been provided with interconnected road sections. The index assessment also shows sections that have been connected and are able to serve inter and intra-regional movement.

c. Mobility

The following table determines the mobility index value based on PUPR Regulation Number 14/PRT/M 2010 concerning Minimum Service Standards. The data used are road network data obtained from the technical service that handles the road network and also demographic data in the form of population data for Sidenreng Rappang Regency.

Table 11. Mobility Value of Sidenreng Rappang Regency

Subdistrict	Mobility Target (Km/ 10,000 People)	Mobility achievement (Km/ 10,000 people)	Mobility Figure Achievement (%)	Information
2	***3***	***4***	***5=4/3*100***	***6***
Panca Lautang	3.00	4.77	159.01	Achieved
Tellu Limpoe	3.00	2.73	91.11	Not Yet Achieved
Watang Pulu	3.00	4.60	229.89	Achieved
Baranti	2.00	2.23	111.31	Achieved
Panca Rijang	2.00	2.68	134.13	Achieved
Kulo	3.00	4.12	206.03	Achieved
Maritengngae	2.00	5.36	268.06	Achieved
Watang Sidenreng	3.00	2.89	96.18	Not Yet Achieved
Pitu Riawa	3.00	4.46	148.66	Achieved
Dua Pitue	3.00	3.65	121.53	Achieved
Pitu Riase	11.00	5.97	59.70	Not Yet Achieved

Source: Data Processing Results, 2024

Based on the analysis results, Panca Lautang District, Watang Pulu District, Baranti District, Panca Rijang District, Kulo District, Maritengngae District, Dua Pitue District and Pitu Riawa District have fulfilled the mobility aspect of the road network, and Tellu Limpoe District, Watang Sidenreng District and Pitu Riase District have not fulfilled the mobility aspect.

SWOT Analysis

The *SWOT* matrix can clearly describe the strengths and strategic opportunities for improving the road network oriented towards the distribution of agricultural products.

Table 12. *SWOT* Matrix

Internal Factors / **External Factors**	**Strength (S)**	**Weakness (W)**
	• geographical location, topographic conditions, strategic land structure as a container for developing the agricultural sector • The available road network encourages regional growth based on local potential . • The available road network serves movement between intra and inter regions. • APBD allocation for handling road networks and other infrastructure • Synergy between DPRD members and executives that is oriented on Infrastructure Development	• lack of road equipment and most of it is in a state of disrepair. • Large budget requirements for road network management • Conversion of agricultural land • The height percentage of district road network in damaged condition • Declining quality and standard of road network infrastructure
Opportunities (O)	**Strategy (SO)**	**Strategy (WO)**
• Increasing the capacity of the road network for safety and orderly movement of road users. • Increasing connectivity between regions to support the acceleration of regional economic growth through the agricultural sector.	• Improving the road network based on its role and function • Utilize the role of the APBD by establishing technical programs • Making investments in the form of strengthening infrastructure according to regional potential	• Return of function to road networks and other supporting infrastructure • Maximizing APBD funding sources DAU, DAK and Revenue Sharing Funds

• Improving the quality of the road network and other environmental infrastructure that can increase regional productivity. • Increasing accessibility of the road network to facilitate the supply of raw materials and marketing between regions. • Increasing mobility to encourage smooth social and economic activities in the community		• Strengthening policies through regional government support for the agricultural sector • Availability of road network database
Threat (T) • Unstable economic aspects in areas where adequate facilities and infrastructure have not been built • Lack of productivity and competitiveness of local products • Public awareness of the existence of infrastructure is still low • Unstable productivity and commodity prices and population growth • Slowing economic growth	**Strategy (ST)** • Analyze, plan and manage utilization according to regional potential • Increasing human resource capacity • Involving the community in the development planning process • Strengthening the contribution of GRDP in the construction sector, the manufacturing industry sector and the trade sector as a support for the mainstay agricultural sector.	**Strategy (WT)** • Provision of access to basic services, infrastructure and public services in underdeveloped areas • The role of government and local communities in illegal activities in natural resource management • Conducting socialization in the form of understanding, awareness and concern regarding the benefits of developing transportation infrastructure.

4. Conclusion

Location Quotient analysis reveals that each sub-district has unique advantages based on existing commodity potential, which can be used as a basis for developing the economic sector at the regional level. The results of the connectivity analysis of the road network index with a value of >1. Overall, the analysis is categorized as good in all sub-districts and accessibility. There are 5 sub-districts with low accessibility scores and 6 others with good scores for the analysis of road network mobility because 8 sub-districts mostly get good index scores and meet mobility targets, and 3 other sub-districts have not met the mobility aspect in Sidenreng Rappang regency. The results of the SWOT strategy analysis obtained were improving the road network based on its role and function, utilizing the Regional Revenue and Expenditure Budget (APBD) by establishing technical programs, and investing in strengthening infrastructure according to regional potential in Sidenreng Rappang regency.

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6. References

[1] Directorate General of Highways. (1997). procedures for geometric planning of intercity roads, No. 038/T/BM/1997. Public Works Publishing Agency, Jakarta.

[2] Ministry of PUPR . (2010) . Technical Standards for Minimum Service Standards for Public Works and Spatial Planning.

[3] Krusen, A. P, Rizal, A. H, and Simatupang, P. H. *(*2024*).* Development Of Land Transportation Networks In Nagekeo District. *In Jurnal Teknik Sipil (Vol. 13, Issue 2). 111-120*

[4] T Ricky Hafidsyah. (2023). Analysis of Land Transportation Network Development in Padang Lawas Regency. *ARMADA : Jurnal Penelitian Multidisiplin*, *1*(12), 1376–1384.

[5] Ardi Kurniawan, et al. (2023). Tambakrejo Area Development Strategy in Semarang City Using SWOT Analysis. In *PONDASI* (Vol. 28).

[6] Sujantoko, et al. (2023). Study of Coastal Development of Surabaya City Using SWOT Method. *Media Komunikasi Teknik Sipil*, *29*(1), 1–10.

[7] Mafflichah, B, Hariyani, S and Sutikno, F. R. (2023). Tingkat Konektivitas dan Aksesibilitas Jaringan Jalan Antar Wilayah Sidoarjo-Mojokerto. Cakrawala, 17(2), 239–251.

[8] Dwi Esti Entari, Rifky Ujianto and Muhammad Abdullah. (2022). Arrangement of Merak Integrated Terminal Area Based on Transit Oriented Development (TOD) as an Effort to Develop Mass Transportation System in Banten Province. In *Jurnal Teknik Sipil* (Vol. 11, Issue 2).

[9] T. Ari Fitriadi, Yusria Darma and Sugiarto. (2022). Strategy for Developing Single Lane Bicycle Lanes in Banda Aceh City in the Banda Aceh City Spatial Planning Plan. *Jurnal Arsip Rekayasa Sipil Dan Perencanaan*, *5*(2), 69–76.

[10] Fachrurrazi, Sofyan M. Saleh and Izziah. (2022). Development Strategy for Ecotourism Facilities and Infrastructure in Krueng Jali, Jantho City. *Jurnal Arsip Rekayasa Sipil Dan Perencanaan*, *5*(2), 119–128.

[11] Saeful Amin, et al. (2021). Land Transportation Network Development Strategy of Brebes Regency. In *Infratech Building Journal (IJB)*.Vol. 2, Issue 2.

[12] Abednego Sabta, Jonie Tanijaya and Erni Rante Bunging. (2021). SWOT Analysis of the Evaluation of Feasibility and User Satisfaction in the Improvement of Inner-City Roads in South Manokwari Regency, West Papua Province. In *Paulus Civil Engineering Research* (Vol. 1, Issue 2).

[13] Hendra Elfriadi, Sugiarto and Irin Caisarina. (2020). Study of Minimum Service Standards (SPM) in the Road Sector in Nagan Raya Regency. *Jurnal Arsip Rekayasa Sipil Dan Perencanaan*, *3*(3), 211–219.

[14] A. Fikri Nurhidyani, Prima Jiwa Osly and Irfan Ihsani. (2018). The Relationship between Accessibility and the Level of Village Area Development in Tambun Selatan District, Bekasi Regency. In *J.Infras* (Vol. 4, Issue 2).

[15] Sreelekha, M. G, Krishnamurthy, K and Anjaneyulu M.V.L.R. (2016). Interaction between Road Network Connectivity and Spatial Pattern. *Procedia Technology*, *24*, 131–139.

[16] Windra Priatna and Amrin. (2016). Improving Road Access to Support Distribution of Production Results of the Independent Integrated City (KTM) Air Terang, Buol Regency. *In Pena Teknik,1(2), 111-124*