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The Impact Of The Changed Functions Of Irrigation Road Networks Become A Primary Local Road In Gowa Regency South Sulawesi-Indonesia

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ABSTRACT: *The development of land use in Gowa Regency has influenced the change of irrigation- roads network function to become the primary local road and impacted the change of irrigated land to settlement function, and increase traffic volume. So it takes an analysis, how the policy of road development in anticipating the impacts. The approach used in this research is the traffic impact analysis with survey method, quantitative and qualitative analysis. The results showed that the function of road as supporting infrastructure of agriculture production and maintenance of irrigation channels, gradually changed function as a liaison between plot and parcel, level town I, II, III and lower level. Improved road accessibility increases the Sales Value of Taxable Object (SVoTO) land, road performance with indicators of degree of saturation, peak traffic hour and traffic volume and vehicle speed and stable service level. The policy of improving the function of Macanda axis road is the preparation of the development plan, the implementation and control of the road infrastructure that is environmentally sound and involves stakeholders, especially the irrigation and road management.*
KEYWORDS: *Land function, accessibility, settlement, traffic generation.*

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I. INTRODUCTION

The total area of Gowa Regency utilized for the agricultural sector is as much as seventy-five percent by 2016 [1]. Population development is quite rapid in sub-urban areas, so the need for residential land and activities to shift the function of vacant land, rice fields and plantations into land settlements that have implications for changes in land use. Roads as the main support of social and economic activities can increase accessibility and economic growth [2,3,8]. The construction of roads in the Mawang sub-district of Gowa Regency affects the conversion of paddy field land into settlement land so that it becomes a serious problem to the sustainability of paddy field as a source of farmers' income and as a water catchment area.

Population, development, economic growth and people's purchasing power, human space needs, goods and services are increasing. While the availability for the development of transportation infrastructure cannot always be carried out its development [2,4]. Provision of poorly performing infrastructure leads to declining economic and financial development [5,9]. The existence of a healthy and sustainable environment can only occur by reducing the problem due to the minimum infrastructure provision and construction. This can be done with preventive and analyze the problem correctly [3.6]. This research, therefore, intends to analyze how the change of road function, performance existing roads and policies to maximize road performance that sustainability and function change and how its impact on change becomes the primary local road.

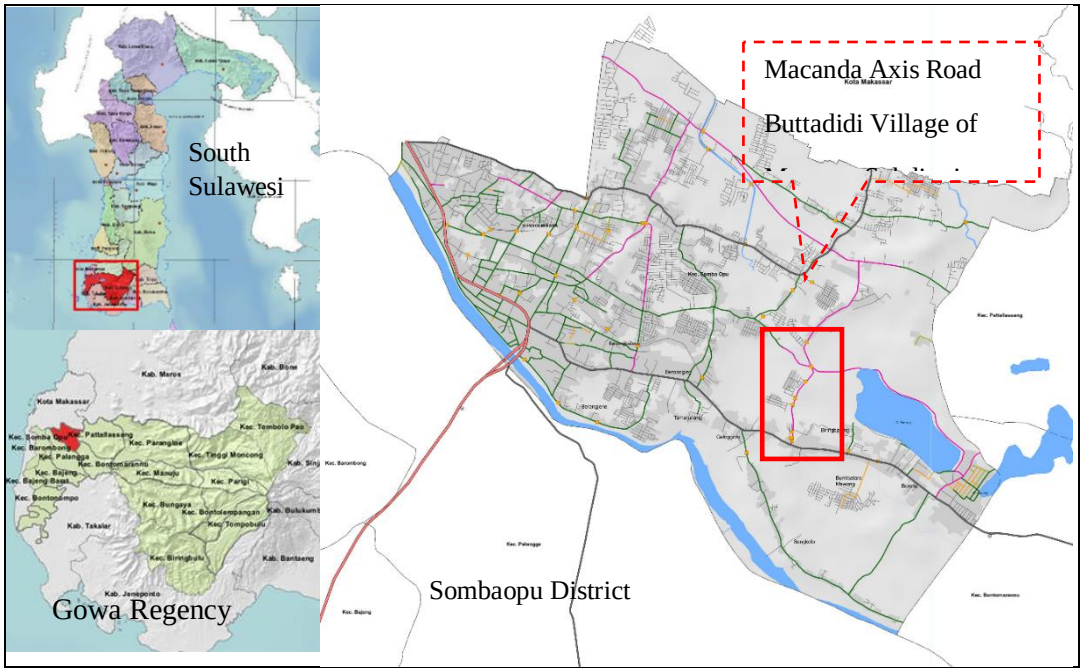


Figure 1. Research Sites

Source: Road Database Map, Public Works and Public Housing of Gowa Regency, 2017

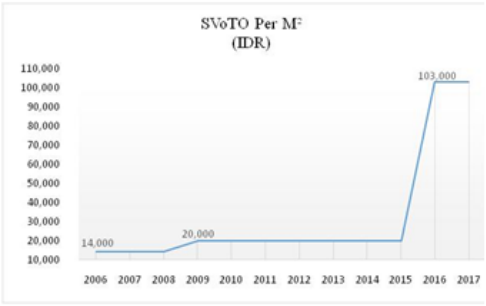
The object of this research is located on Macanda-Tamarunang Road Segment, Buttadidi Village, Mawang Sub-district, Sombaopu Sub-district, starting from the main shaft intersection of Malino Axis, as shown in Figure 1. Changes in the function of the road originally functioning as an irrigation inspection, road to surface land, an environmental road with *a telford* surface being the primary local road with a flexible pavement surface.

II. DISCUSSION

Changes in Road Functions

The authority for the management of irrigation channels is accommodated by the irrigation agency that manages the main network through the secondary network. While the tertiary network/farm level of farming is shaded by the agricultural service. Every use of water and the environment around the irrigation network coordinated with both agencies. Secondary irrigation channels Kassi located beside roads, intended to irrigate rice fields, and irrigation, roads functioned as an infrastructure for transporting agricultural products and for the maintenance of irrigation networks. In 1982 the road of inspection was built with Telford pavement as wide as 3 meters, to connect the village to the village or plot to the plot. In connection with the development of population migration to this region, which occurred in 1988 until now this area has been transformed into a new village in the village of Buttadidi.

The improvement of the physical structure of the road is by planting trees in the irrigation, border, space, increasing the pavement of the bending road with widening of 4 m, increasing the road function of the environmental road to the primary locale resulting in connectivity of access between the land and the city ladder above it. The growth of settlements increased rapidly after the increase in capacity with the widening of the road body to 6 m which was corroborated with concrete road construction in 2009, thus impacting the value of land and increasing the SVoTO) [8,12,16] as in figure 2.a



Source: Analysis results, 2018
Figure 2.a. SVoTO of Buttadidi Settlement

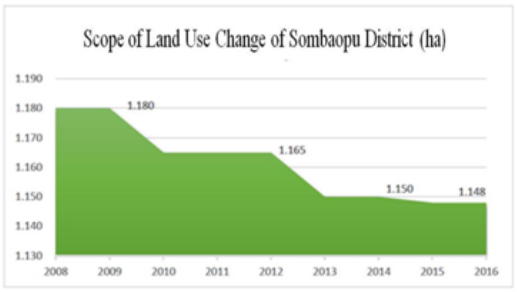
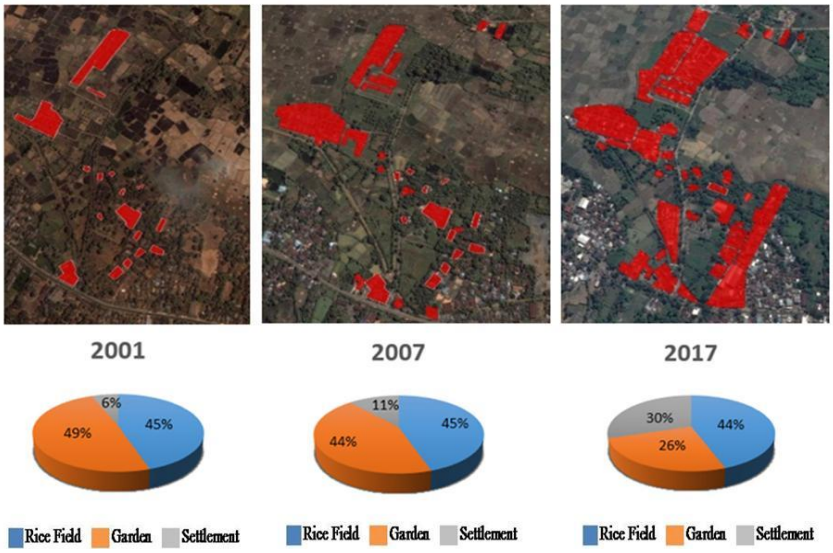
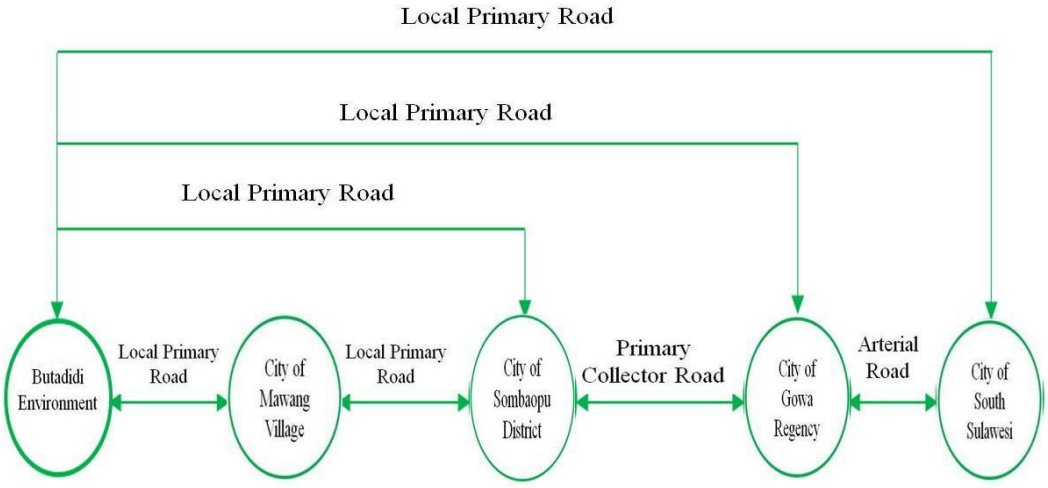


Figure 2.b. Change of land area
Source: Analysis Resutls of Gowa Regency in Figures 2009-2017

Changes in road functions resulted in the creation of new areas, reducing the area of agriculture and plantations. The area of agricultural land use change can be seen in Figure 2.b. Based on the data from the Central Bureau of Statistics of Somba Opu District, the average growth of households is 3.32% per year or about 1,035 households per year. The plantation land in Buttadidi village has changed its function into a settlement rather than rice field as shown in Figure 3.



Source: Processed from Google Earth 2018
Figure 3. Growth of Buttadidi settlement



Source: Guidance on classification of road function in urban areas and processed [10]
Figure 4. The hierarchy of primary road functions and Macanda axis local primary road

The activity of transporting minerals of class C mining with trucks in Parangloe Subdistrict on the side of the Jeneberang river, crossing the Malino axis road to Makassar resulted in high surface damage and congestion. So in 2009 the government made a policy of building a bypass road from Malino axis directly in the Makassar city through Macanda axis road [17,18]. Roads have increased in capacity by widening and improving concrete pavement construction. The hierarchy can be seen in figure 4.

(a) Disposal of residential waste (b) Foundation home on the channel

(c) Garbage disposal (d) Water color change

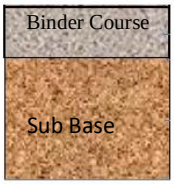
Figure 5. Impact of land function change

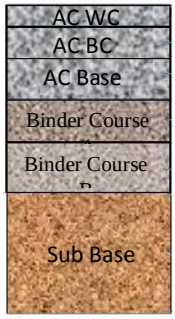
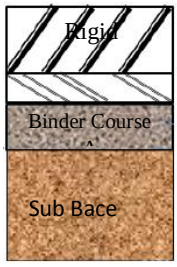
Impacts on the efficiency of the transfer of roads are increased connectivity and ease of mobilization of agricultural production facilities and yields, time efficiency, congestion reduction in primary arterial roads and road surface resistance and increased land and livelihood values [11,12]. Other impacts are waste disposal on the channel side, cracks in the channel wall due to vibration of the vehicle and the changing quality of irrigation water due to household effluent discharge [1,6]. Unavailability of drainage resulted in settlers using irrigation channels as sewerage estuaries, such illustration is shown in Figure 5. The effect of road function change affects several aspects as shown in **Table 1**.

Existing Condition of Road Performance

Land use conditions on the side of the Macanda axle irrigation canals consist of residential, agricultural and commercial buildings. Figure 6 shows the existing condition of the road, seen irrigation, border is in accordance with the rules. The irrigation channel has a depth of less than one meter, the distance of the irrigation line border at least one meter [9] is fulfilled.

Table 1. Effect of road function changes in several aspects

No.	Status of the Road	Technical Aspects	Law Aspects	Road Function	Land Use
1.	Road Inspection of Watering Channel [13]		Road inspection used for operation and maintenance of irrigation networks.	• Transport of agricultural products. • Operation and maintenance of irrigation networks	• Rice Field 45% • Garden 55% • SVoTO data not found
2.	Environment Road [13]		Government agencies, business entities, social bodies, or those that alter the function of inspection roads and / or irrigation canals	• Transport of agricultural products. • Operation and maintenance of irrigation networks • Connectivity between	• Rice Field 45% • Garden 54% • Settlement 1% • SVoTO data not found

			should widen the road and reinforce the dikes.	village/Environment	
3.	Local Primary Street [13,14]		To grant development permits, utilization, processing and/or dismantling of irrigation and/or irrigation structures in primary and secondary irrigation networks in irrigation areas across regencies/ municipalities.	• Transport of agricultural products. • Operation and maintenance of irrigation networks • Connectivity between villages/ Environment • Connectivity between parcels and municipalities.	• Rice Field 44% • Garden 45% • Settlement 11% • SVoTO=IDR.14.000/m period, 1993 until 2007
4.	Capacity Building (Local Primary) [13]		Changes in the function of road inspection and/or irrigation channels shall be carried out on road widening and retrofitting of embankments.	• Transport of agricultural products. • Operation and maintenance of irrigation networks • Connectivity between villages/ Environment • Connectivity between parcels and municipalities • Congestion reduction in Sungguminasa City.	• Rice Field 44% • Garden 45% • Settlement 11% • SVoTO=IDR.103.000/m period 2017

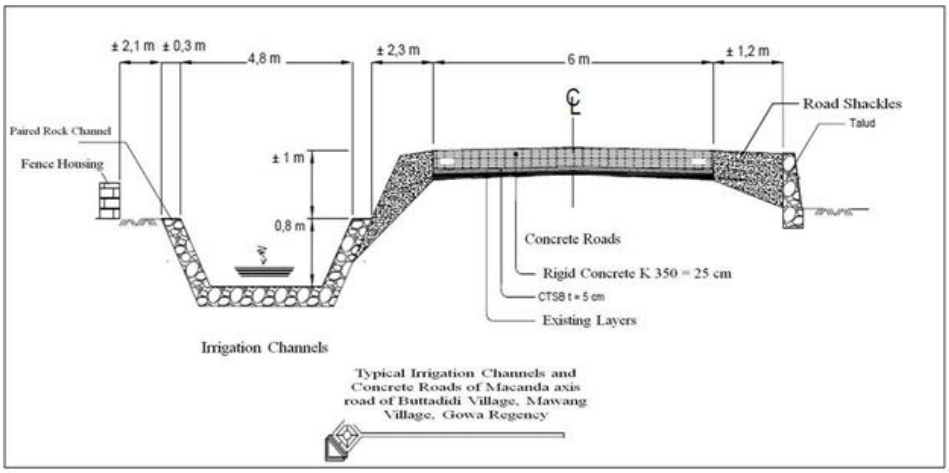
Source: Technical aspects according to Road Pavement Design Manual, Department of Public Works, Directorate General of Highways, 2013 and analysis results, 2018.

Note:

AC = Asphalt Concrete

BC = Binder Course

WC = Wearing Course



Source: Analysis Results, 2018

Figure 6. Typical existing conditions

Borderline rules of the local primary road fence are 2 meters away from the outer side of the road drainage and the building border line is measured from the lowest (left, right) edge of the body of the lower road (10 meters), generally in accordance with the rules, Figure 7. The road hierarchy based on Law 38 of 2004 which entered the primary collector is the primary local road.

Figure 7. Existing GSB and GSP Conditions

Based on the index of service, level of road segment such as geometric condition, traffic volume, speed, capacity and degree of saturation. Description of service, level of Macanda-Tamarunang or Macanda Axis Road is categorized B, (Table 2).

Table 2. Macanda Axis Road Service Level Index

No.	Traffic Flow (Q) (pcu/hour)	Capacity pcu/hour)	Degree of Saturation (DS)	Speed Free stream (km/hour)	Speed Max of Daily Traffic. (km/hour)	Speed Average (km/hour)	Speed Field Average (km/hour)	Service Level
1.	1.062	2.648	0,43	55,484	28,20	43,5	31,76	B

Source: Analysis Results, 2018

Road Network Development Policy

Monitoring and evaluating the performance of policies to formulate policies for the development of environmentally sound road segments with due attention to the function of sustainable irrigation networks can be seen in Table 3.

Table 3. Road Development Policy

No.	Policy Criteria	Policy	Strategy
1	The increasing of the Road Function [18, 19]	- Preparation of sustainable road development plan. - Development of environmentally sound infrastructure and utilities	- Road planning that maintains the function of the soil and surrounding environment - Improved structural conditions, intersections of plots and green lines
2	Utilization of the shoulder of the road [13, 14, 19]	- The increasing of the capacity and level of road service	- Greening and widening of roads - Construction of road drainage system - Reinforce channel and roadsides of abrasion
3	Irrigation channels [13, 20]	- Environmental control due to development impact - Increasing the role of irrigation network and road network providers - Empowerment of community participation in the continuity of irrigation channel function.	- Improved condition of the drainage systems of settlements to prevent contamination - Identify housing/buildings that damage the continuity of irrigation network functions.

III. CONCLUSION

Improving the function of roads has an impact on the ease of mobilization of people, goods and services such as agricultural production, time efficiency, reduction of traffic congestion on primary arterial roads, road surface resistance, and increased land and livelihoods of SVoTO. Changes in road function, increase the socio-economic interaction between parcels to parcels, becoming connectivity between plots and tiered cities. The degree of saturation occurs in the morning with a range of 0.43, the two-wheeled vehicle is the most vehicle (69%) through the Poros Macanda road. Average vehicle speed of 32 km/hour.

RECOMMENDATION

The policy of improving the function of Macanda axis road is oriented to improve the function of roads, the utilization of the shoulder of the road and maintain the sustainability of irrigation function with the involvement of the community, especially the prevention factor of household liquid waste which is channeled irrigation channel.

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