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The Effect of Transportation Infrastructure for the Regional Development and Public Welfare (Case Study of Deli Serdang Regency, North Sumatra, Indonesia)

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Abstract:

Transportation is important in a system, because without transportation the nexus between one place to another place is not materialized well. Interaction among regions is reflected in the transportation infrastructure facilities condition as well as the flow of people, goods, and services. Transport infrastructure is a measure of the spatial interaction among regions and has a very important role in supporting the process of a regional infrastructure development. Transportation infrastructure development can improve the accessibility of Deli Serdang region, thereby improving the economy of Deli Serdang, which consequently will increase the welfare of the community; therefore the accessibility planning is essential. For this purpose, there are three questions posed in this study.

This study took a sample of 360 respondents by means of probability sampling of the plateau, the low and shore of Deli Serdang

Region. Each plateau consists of three sub-districts with extensive sub-district criteria, medium, and small in order to obtain 9 districts. Instruments designed questionnaire with 56 items of questions to obtain data on 12 variables. The data analysis technique used is multiple linear regression analysis.

The results showed that both of quantity and quality variables, accuracy and ease had significant effect on the regional development and its aspects except qualitative variables to regional development as well as aspects of the economic, social and accuracy. Regional development variable also had a significant effect on the public welfare but the social aspect of revenue aspect.

Development of transport infrastructure should be improved through the quantity, accuracy and ease of roads in Deli Serdang districts in enhancing the development of the region in order to improve the welfare of rural communities.

Key words: transport infrastructure, regional development, public welfare

Classification JEL : I3, O1, R4

Introduction

The development area is an attempt to mate the harmony of natural resources, human and technology by paying attention to environmental capacity for community empowerment. Development of transport infrastructure is one of the vital points in the region development. The existence of infrastructure for the economy is very important. Logically it is understood that good roads and bridges will make the flow of goods from production centers to customer locations to run smoothly. The means of transport is an undeniable driving force of the economy.

Length of road conditions in Deli Serdang in 2010 reached 3570.230 km and in 2011 to 3670.230 km, which was divided into government road along 109.410 km, 187.880 km

along the provincial road and 3372.940 km of district roads while the length of the road based on good condition in 2010 along 2.43875 million Km increased to 2532.682 km (2011), medium condition (2010) all increased to 1050,826 1037,390 Km (2011), while the damaged condition 94.09 Km (2010) fell to 85 722 Km (2011), for more details can be seen in Table 5:30. This shows the development of road infrastructure development in Deli Serdang well enough so that this situation is expected to stimulate the economy in Deli Serdang in the future.

Beside the condition of district roads has grown every year, village road conditions have also been given special attention by Government Deli Serdang. They have also been given special attention in the Work Plan Department of Public Works of Deli Serdang in 2012. At the end of 2010 the length of village road of Deli Serdang reached 3,100 km. In 2012, the Department of Public Works implemented the construction of roads along the 100.00 Km. Rural roads development is intended that in future years the length of the district roads will extend as a result of the appointment status from village Road to district Road.

The problems faced by the Government of Deli Serdang in the field of transport, such as : 1) The level of damage to the road network and the District of rural roads are quite high; 2) Not optimal road network servicing both local function in the context of quality and service to ensure the efficiency of intermodal transport services; 3) There is still a lack of awareness of users of freight services across the road to exceed the allowable tonnage; 4) Increasing the volume of vehicular traffic is not matched with the addition of roads or improvement of road class; 5) Low professionalism actors construction services in the field of roads and bridges; 6) Problems of land acquisition for the construction of roads and bridges, such as; the high price of land speculation at the time of land acquisition, as well as the unclear status of land

ownership; 7) Not optimal business / community empowerment in an effort to maintain the results of physical activity in the form of roads and bridges independently.

Aderamo and Magaji (2010) concluded that road transport has a strong relationship with the distribution of public facilities in the rural environment in Nigeria. Adedeji, et al. (2014) concluded that the inequalities in the provision of road infrastructure and rehabilitation of roads in the area of Nigeria led to differences in levels of development. The poor condition of roads in the area has a negative impact on agricultural activities which constitute the main source of income of the population, thus increasing the number of poverty. Okoko (2011) conducted a study on the relationship between rural transport and rural development in the District Akwapim in Ghana. The results showed that all the road in the study area is in poor condition and in need of urgent repairs which has an impact on social and economic activities of farmers and well-being.

Terefe (2012) conducted a study on the effect of public investment program on the welfare of rural households in Ethiopia. The results showed that the ratio of the poverty rate decreased with increasing the accessibility of rural roads. Justman (1995) showed that a large investment in infrastructure provided an important role for economic growth. Bougheas et al., (2000) describes a logical mechanism for infrastructure contributes to economic growth. Other researchers Ali and Permia (2003) stated that investment in rural infrastructure shows the influence of the increase in agricultural and non-agricultural productivity, employment and income, as well as increased achievement better salary. Finally it reduces the poverty and improves the average income and consumption.

Literature Review

Development of transport infrastructure in a spatial context is an integral part of the economic development of an area or region. This is due to many spatial analyses that take into account the distance factor in the development of infrastructure and means of transport itself. According Wipper (1994) there are two important things that should be development orientation of this means, namely safety and quality of work life. Development is not only giving the ease and physical protection, but should give the chance to community to improve their living standards. Ease of access to outside parties provide public opportunities to improve their standard of living. Poister and Harris (2000) assert that the integrated quality program should be a commitment which must be maintained in order to increase the quality of way of life.

Demand transportation services are not only influenced by the physical aspect, but also social and economic aspects of a region. Planning of transport facilities should pay attention to three aspects of the above, so that the usefulness (utility) is efficient enough to meet the needs of the present and the future, that is the sufficient criterion in quantity and quality and economically viable. Thus transportation services can function in double, they are (a) Ability to support other development sectors, (b) Must be able to stimulate the growth of other development sectors. The description illustrates that good transport will produce a large multiplier effect benefits to both of the development of an area / region or a direct impact on improving the degree people's lives. Talvitie (1999) applied a more comprehensive approach in describing the transport system. In his view, this system is not only an input - process and output, but also including the impact and other consequences.

The Availability of roads that are social overhead capital has a very strong relationship with the level of development of the region characterized by the rate of economic growth and social welfare. This can be seen from the fact that the region has better infrastructure system, high levels of economic growth and better social welfare (Ernawi, 2007). This is in line with research conducted by Prasetyo and Paradise (2009) which states that the road infrastructure has a positive effect on the economy in Indonesia.

Methodology

The method used was a survey research in which data were collected from a sample on the population to represent the entire population. The population in this study was all districts and households located in Deli Serdang. 360 households were taken as samples. The sample was selected by using a multi-stage sampling method.

Based on the conceptual framework of research in this study, some variables used namely:

1. Variable of Transport Infrastructure (X) consists of four aspects: Quantity (X1), Quality (X 2), Accuracy (X3) and Ease (X4)
2. Variable of Area Development (Z) consists of three aspects: Economic Aspects (Z1), Social Aspects (Z2) and Institutional Aspects (Z3),
3. Public Welfare variable (Y) consists of five aspects, namely: Income (Y1), business and employment opportunities (Y2), Education (Y3), Health (Y4) and a sense of safety and comfortable (Y5),

Collecting data using a questionnaire firstly tested the validity and reliability testing. Data were analyzed using multiple regressions by first classical assumption.

Discussion

The level of Accessibility to the Area Research and Capital District

Accessibility is an ease measurement (time, cost, and effort) to make the shift from one place to another. Accessibility index indicate an appeal contained in a sub-region and the ease to reach the sub-region. The higher the accessibility index the more interesting the attractiveness of the region is. Accessibility index calculation applied the formula Hansen:

$$A_{ij} = E_j / d_{ij}^{a}$$

Aij = the area of accessibility index i to ij
Ej : Total employment in region j (units)
dij : distance between the i to j (km)
a : the rank of dij

The result of calculations based on the amount of accessibility analysis of field research effort between sub-region research and the capital of Deli Serdang district can be seen in Table 1 below:

Table 1. Index Accessibility in Deli Serdang District of the Year 2012

No	District Origin	District Destination	Distance to Destination (Km)	Distance to Destination(Km)	Industrial (Unit)	Sub district Accessibility Index
	I	j	dij	dij^2	Ej	Ej/dij^2
1.	STM Hulu	LubukPakam	51	2601	467.00	0.18
2.	BangunPurba	LubukPakam	25	625	1634.00	2.61
3.	GunungMeriah	LubukPakam	65	4225	105.00	0.02
4.	Galang	LubukPakam	18	324	2420.00	7.47
5.	Sunggal	LubukPakam	40	1600	10630.00	6.64
6.	Deli Tua	Lubuk Pakan	38	1444	3941.00	2.73
7.	Hamparan Perak	LubukPakam	52	2704	4833.00	1.79
8.	Labuhan Deli	LubukPakam	50	2500	2763.00	1.11
9.	PantaiLabu	LubukPakam	10	100	1889.00	18.89

Source: central bureau of statistics of Deli Serdang (2012), processed

Table 1 shows that the district with the highest accessibility index is PantaiLabu District, 18.89, this is due to the place are 10 km to the center of Deli Serdang and has 1889 units of business fields. District with the lowest accessibility index is GunungMeriah District; 0.02, caused by it is within 65 miles to the center of Deli Serdang and has 105 units of business field so that field of business open widely.

Transport Infrastructure for Regional Development

The purpose of this study was to analyze the effect of road transport infrastructure for the development of Deli Serdang regency. To reach that purpose, it has been formulated the main question that is "does the road transport infrastructure affect to the development of Deli Serdang regency?" The result summaries of the study are presented in Table 2 and Figure 1.

Tabel 2. Summary of Transport Infrastructural Effects for Regional Development

No	Dependent Variable	F-test	t- test			
			Quantity (X1)	Quality (X2)	Accuracy (X3)	Ease (X4)
1	**Development Area(Z)**	**S (+)**	**S (+)**	**NS (+)**	**S (+)**	**S (+)**
2	Economic Aspect (Z_1)	S (+)	S (+)	NS (+)	S (+)	S (+)
3	Social Aspect (Z_2)	S (+)	S (+)	NS (+)	NS (+)	S (+)
4	Institutional Aspect (Z_3)	S (+)	S (+)	S (+)	S (+)	S (+)

Source: Research Result , processed (2014)
Note: S = Significant ; NS = Non significant ; (+) = positive ; (-) = negative

Based on the results as shown in Table 2 indicates that the tested road transport infrastructure to answer the first question proved to be influential on the development of Deli Serdang regency. This means that it has an important factor in planning the development of rural areas in order to optimize the purpose of providing public services to the community. The findings of this study support the result study of Aderamo and

Magaji (2010) who concluded that road transport had a strong relationship with public facilities distribution in the rural environment in Nigeria.

The new finding in this study was not done by Aderamo and Magaji is a test to answer the first question about the road transport infrastructure of the four variables studied namely the quantity of road construction, road construction quality, accuracy and ease of road construction road construction. They were proved having a positive influence on the development of rural areas. Three of the four variables had a significant effect, and another variable that influence the quality of road construction had a positive but not significant. In addition, something new in testing the first to answer this question is the identification of a number of variables that positive influence on the development of rural areas. Four variables effect to the development of transport infrastructure of rural areas were supported by empirical data on the impact of economic, social and institutional development of rural areas.

The development of road network will push people's mobility (trip generation) road users. In the context of regional development, infrastructure is the driving wheels of economic growth. In the allocation of public and private finance, infrastructure is seen as the locomotive of national and regional development. It is important for improving the quality of life and well-being, among others, the increase in the value of consumption, increase labor productivity and access to employment, as well as an increase in real wealth and the realization of macro-economic stabilization namely fiscal sustainability, the development of credit markets, and its influence on the market labor. Infrastructure development has a major impact on economic growth (macro and micro) and the development of a country or region.

Law No. 38 of 2004 on the road, explains that the role of road infrastructure is a part of the transportation

infrastructure that has an important role in the economic field, social cultural, environmental, political, defense and security, as well as used for the greatest prosperity of the people. In addition, as a road infrastructure for the distribution of goods and services is the livelihood source for the life of the community and the nation. Road quantities seen from the number and length of paved roads will provide facilities for community for economic activities by opening a trading business, social activity to education and health facilities; perform institutional activities such as cooperatives and non-village cooperatives. The quality of roads in rural areas Deli gives positive but not significant effect, this is due to the type of road surface is still not all that asphalt and road conditions are still moderate conditions.

Through this research can be built and on the results of a model to determine a variable quantity of road transport infrastructure development / maintenance of roads (Kn) ,the quality of the construction / maintenance of roads (Kl), the accuracy of the construction/ maintenance of roads (Kt) and the ease of development/maintenance of roads (km) in an area can be utilized for the development of the region (PW). The model in question is that the development of the area can be increased or affected by road transport infrastructure, with a mathematical model as follows:

$$PW = a + Kn + Kl + Kt + Km + e$$

Based on the above models can be said that if the regional development is to increase the quantity, quality, maintenance, and ease of road construction, transport infrastructure must be optimized. Fourth position variable road transport infrastructure in relation to the development of the region can be described as shown in Figure 1. Figure 1 shows that there are four factors, namely the quantity, quality, ease and

accuracy of the roads construction/maintenance. The fourth factor is a unity that cannot be separated in an effort to use road transport infrastructure to boost the development of rural areas.

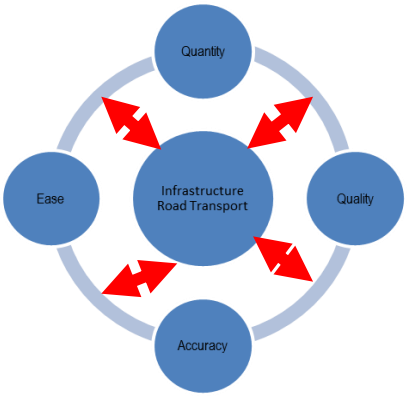

Figure1. Four factors play a role in the Road Transport Infrastructure Regional Development

The Effect of Regional Development of the Public Welfare

The purpose of this study was to analyze the effect of regional development for the welfare of rural communities Deli Serdang. For this purpose has formulated the main question is whether the development of the region affects the well-being of Deli Serdang rural community. Summary results of the study are presented in Table 3 and Figure 2.

Table 3. Summary of Results Effect of Regional Development of the Rural Community Welfare Deli Serdang

No	Dependent Variable	F Tes	T Test		
			Economics (Z1)	Social (Z2)	Institutional (Z3)
1	**Society Welfare(Y)**	**S (+)**	**S (+)**	**S (+)**	**S (+)**
2	Income (Y_1)	S (+)	S (+)	NS (-)	S (+)
3	Business Opportunities & Employment (Y_2)	S (+)	S (+)	S (+)	S (+)
4	Education (Y_3)	S (+)	S (+)	S (+)	S (+)

5	Health (Y_4)	S (+)	S (+)	S (+)	S (+)
6	Safe & Comfortable Senses(Y_3)	S (+)	S (+)	S (+)	S (+)

Source : Result Study, processed (2014)
Note: S = Significant : NS = Non significant : (+) = positive : (-) = negative

Based on the results as shown in Table 3 indicates that the development area tested to answer the second question proved to affect the welfare of Deli Serdang rural communities. This means that the development of the region is an important factor in planning for the welfare of rural communities. The new finding in testing to answer the second question is the third variable region under study such as: the development of economic, social and institutional aspects of regional development proved significant positive effect on the welfare of rural communities. In addition, something new in the test to answer the second question is the identification of a number of variables that influence positively on the welfare of rural communities. Three variables influence the development of the region for the welfare of rural communities supported by empirical data on the impact of income, business and employment opportunities, education, health, safety and comfort welfare of rural communities.

The development area is the use of the space taken by the government, private and public, whether it is done jointly or individually, then it is giving progress to the growing region. The government plays a role in opening the way for public access an area to interact with other regions. Roads are transportation access from one region to the other regions. Private has a role in opening their own business as well as industry, trading and services. Society has their own roles for business and sells their crops. Isolated region can cause difficult society in economic activity, access to education and health facilities so that the community takes time and a

longer distance in the activity, which consequently they must pay greater costs in the activity. Sirojuzilam (2005) suggests the development of the region basically has meaning an increase in the value of the benefits to the community area, a certain area can accommodate more residents, with the level of people welfare mostly viewed by a lot of facilities / infrastructure, goods or services available and the efforts of community activities increased, both in terms of the type, intensity, and quality service.

Through this research can be built and on the results of a model to determine whether the variable development of the region, namely the economic aspects (AE), social aspect (US) and institutional aspects (AK) in an area can be used to increase social welfare(KM). The model in question is that the public welfare can be enhanced or influenced by the development of the region, with a mathematical model as follows:

$$\mathbf{KM = a + AE + AS + AK + e}$$

Based on the above models can be said that if the well-being of rural communities is to increase so that the economic, social and institutional development of the area should be optimized. Position the third variable region development in relation to the welfare of the rural population can be described as shown in Figure 2.

Figure 2. Three factors play a role in the Regional Development of Public Welfare

Figure 2 shows that there are three factors: economic, social and institutional development of regions that play a role in the welfare of rural communities. The third factor is a unity that cannot be separated in the utilization of regional development efforts to improve people's welfare.

Conclusion

1. Infrastructure road transport simultaneously has a significant effect on regional development, economic, social and institutional aspects of regional development. The effect on the development of road transport infrastructure in partial regions showed that: a) the variable quantity, accuracy and ease of significant positive effect on regional development, economic, social and institutional, except for the variable precision no significant effect on the social aspects; b) Variable quality does not have significant effect on regional development, economic, and social, whereas variables significantly influence the quality of the institutional aspects.
2. Development of the area simultaneously has a significant effect on public welfare, income, business and employment opportunities, education, health, security

and comfort welfare. Effect of regional development for the welfare of society as a partial showed that: a) Variable economic aspects and institutional aspects significant positive effect on public welfare, income, business and employment opportunities, education, health, security and comfort; and b) Variable social aspects have positive effect on the welfare of the community, business and employment opportunities, education, health, safety and comfort, while the social aspect of variables have negative effect on income.

Suggestions

1. The construction / maintenance of transport infrastructure must be improve through the quantity in Deli Serdang in improving the welfare of rural communities.
2. There should be a policy to empower the entrepreneurs in the development of road transport infrastructure because the government has limited public spending on infrastructure costs of road transport, caused employers often send and receive goods in excess of the capacity of the road.
3. There needs to be a policy of public participation in the development / maintenance of road transport infrastructure, community participation can be done by involving the community in the planning, implementation and supervision of the construction / maintenance of road transport infrastructure.

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