

## **THE INFLUENCE OF THE CONSTRUCTION OF THE SITAKKURAK IRRIGATION DAM ON AREA DEVELOPMENT IN BARUS DISTRICT, CENTRAL TAPANULI DISTRICT**

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### **Abstract**

The Sitakkurak Irrigation Dam project which is being implemented in Barus District, Central Tapanuli Regency is a form of concern for the Central Government for the people. The irrigation project is carried out by the Ministry of Public Works, Directorate General of Water Resources. The objectives of this research are to: 1) Analyze differences in farmer production before and after the construction of the Akkurak irrigation weir, Barus District, Central Tapanuli Regency, and 2) Analyze what factors influence rice farmers' production in the Sitakkurak Irrigation area, Barus District, Central Tapanuli Regency. Research was carried out in Central Tapanuli Regency regarding the Influence of the Construction of the Sitakkurak Irrigation Dam on Regional Development in Barus District, Central Tapanuli Regency. The analytical method used in this research is the t-difference test and multiple regression analysis with a total of 69 respondents. The research results showed that there was a difference in farmers' rice production before and after the Sitakkurak irrigation dam and showed a significant influence because the results of the two paired sample tests were  $0.000 < 0.05$ . The average value of farmers' rice production before the Sitakkurak irrigation dam was 3.77 tons per planting season and the average value of rice production after the Sitakkurak irrigation dam was 4.17 per planting season. These results show that there is a difference of 0.40 per planting season. Simultaneously, the factors of land area, rice seeds, fertilizer, pesticides and number of workers have a significant effect on rice production. Partially, the factors of land area, rice seeds, fertilizer and number of workers have a positive and significant effect on rice production, while the pesticide factor has a positive and insignificant effect on rice production.

**Keywords:** *Lowland Rice Production, Sitakkurak Irrigation Dam*

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### **1. INTRODUCTION**

In accordance with the Decree of the Minister of Public Works number: 293/KPTS/M/2014, concerning the determination of the status of irrigation areas, the management of which is the authority and responsibility of the government, provincial government and district/city government, that in the Central Tapanuli Regency area there are 58 authorized Irrigation Areas district with an area of 12,853 Ha. However, if you look at the potential water resources in Central Tapanuli Regency, especially from the rivers in this area, there is actually still a lot that can be utilized to support the development of agricultural irrigation. The Sitakkurak Irrigation Dam project which is being implemented in Barus District, Central Tapanuli Regency is a form of concern for the Central Government for the people. The irrigation project is carried out by the Ministry of Public Works, Directorate General of Water Resources. The irrigation projects carried out by the Public Works Department of Central Tapanuli Regency are seen in Table 1.1 below:

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Table 1.1. Central Tapanuli Regency Irrigation Project Data for 2014

No	Name of Irrigation Area	Area(Ha)	No	Name of Irrigation Area	Area(Ha)
1	DI Binjohara	195	31	IN Tolang	155
2	DI Horsik	25	32	AT Tumba	236
3	IN Hutaimbaru	295	33	IN Uratan	230
4	IN Hutanabolon	110	34	IN Siaili Tukka	957
5	IN Mandailing	350	35	IN Napapoli	278
6	IN Manduamas	55	36	DI Sp. Maruku/Sitabeak	75
7	DI Parlabian	62	37	IN Sosor Gonting/Sogar	150
8	IN Parmaldoan	427	38	IN Pulo Raya	555
9	DI Raso	190	39	DI Parlabian/Marbun/Simargara/Sipea-pea/Maduma	291
10	DI Rogas	480	40	Gonting Mahe/DI Pangbatas/Pelita/Dragon Embossed	520
11	IN Saragi	225	41	DI Unte Mungkur III/ Pangasean	475
12	IN. Stone's Edge	310	42	IN Sipange/Aek Tutun	140
13	IN Sibuluan	50	43	IN Pulo Pakkat/Angoli	30
14	IN Sigodung	370	44	IN. Aek dakka	260
15	AT Sihapas	108	45	AT Aek Lumut	100
16	IN Sihiong	255	46	IN Central Farm	350
17	IN Sikoling-koling	543	47	IN Sigala Gala	75
18	IN Silaga-laga	300	48	IN Muara Balak	100
19	IN Silali	67	49	AT Sitakkurak	736
20	IN Simanosor	425	50	IN Pananggahan	80
21	IN Simulbas	270	51	DI. Sitolbak	200
22	IN. Hasang Hill	110	52	DI. Sorkam Kanan	200
23	IN Sipaubat	100	53	DI. Sorkam Left	175
24	IN Sipodang	110	54	DI. Tolang	155
25	IN Sitandiang	725	55	DI. Tumba	236
26	AT Sitakkurak	736	56	IN Sipalis	374
27	IN Sitandiang	725	57	DI Sidikkil	150
28	IN Sitolbak	200	58	AT Sistar	220
29	IN Sorkam Right	200			
30	DI Sorkam Left	179			

Source: Central Tapanuli Regency Public Works and Spatial Planning Service.

With the Sitakkurak Irrigation Dam Project, it is hoped that the community will feel the impact on farmers' income in order to create a better standard of living for the welfare of the farming community. Apart from irrigation systems, rural agricultural production results depend on the agricultural production factors used such as land area, labor, seeds, fertilizers and pesticides used. With irrigation being built, it is hoped that it can increase agricultural production. By increasing agricultural production, it is hoped that farmers' income and surplus will increase. Food self-sufficiency will be guaranteed. Therefore, the construction of the Sitakkurak Irrigation Dam project is expected to be able to encourage growth, especially in the agricultural sector as well as

other rural economies. The economic development of a region can be seen from GRDP from 2011 to 2015 (Gross Regional Domestic Product). In this case, Central Tapanuli Regency is one of the districts where people's livelihoods are generally in the rice farming sector. The biggest source of livelihood for the community is the agricultural sector, which can be seen in Table 1.2 as follows:

**Central Tapanuli Regency GRDP Based on 2014 Constant Prices According to Business Fields 2014-2018 (Million Rupiah)**

Sector	GRDP of Central Tapanuli Regency Based on Constant Prices 2010 According to Business Field Year (Million Rupiah)				
	2014	2015	2016	2017	2018
A. Agriculture, Forestry and Fisheries	130,083.50	136,513.71	145,439.40	156,280.70	167,169.60
B. Mining and Quarrying	75,460.66	80,261.85	86,552.79	93,231.80	100,749.20
C. Processing Industry	38,496.60	40,861.59	43,824.06	46,264.20	49,047.94
D. Procurement of Electricity and Gas	55,611.51	58,852.59	61,214.67	61,520.30	64,924.14
E. Water Supply, Waste Management, Waste and Recycling	109,804.18	115,778.41	122,343.04	129,830.40	138,134.13
F. Construction	15,825.77	16,709.84	17,715.77	18,640.70	19,586.49
G. Wholesale and Retail Trade; Car and Motorcycle Repair	434,853.63	463,406.63	487,829.30	503,672.50	531,030.23
H. Transportation and Warehousing	59,060.84	62,295.61	65,422.85	68,722.00	72,387.52
I. Provision of accommodation and food and drink	19,994.68	20,729.44	21,403.30	22,217.50	23,262.67
J. Information and Communication	4,935.12	5,240.61	5,560.29	5,855.10	6,185.54
K. Financial Services and Insurance	5,460,846.09	5,738,320.51	6,032,212.59	6,348,241.23	6,678,155.65
L. Real Estate	2,703,787.01	2,830,577.29	2,965,727.64	3,110,359.40	3,265,066.31
M N. Company Services	15,011.85	15,773.87	16,878.04	18,407.80	19,576.21
O. Government Administration, Defense and Mandatory Social Security	647,728.09	664,119.32	687,958.01	708,594.88	731,729.67
P. Educational Services	26,938.97	27,427.11	28,838.54	33,683.20	36,171.70
Q. Health Services and Social Activities	5,644.56	5,963.68	6,367.40	6,821.55	7,314.07
R, S, T, U. Other services	541,300.75	570,564.59	602,516.20	657,017.00	694,447.69
<b>GRDP</b>	<b>576,308.36</b>	<b>623,244.35</b>	<b>666,621.28</b>	<b>707,122.20</b>	<b>751,372.53</b>

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It can be said that Central Tapanuli Regency is very dependent on the agricultural sector which contributes more than half of Central Tapanuli's GRDP. Rural development has a strategic meaning and role in the framework of national development because villages and their communities are the basis of economic, political, socio-cultural and defense and security power and are also the central point of national development. Village development and its various problems are development that is directly related to some communities in rural areas.

**2. RESEARCH METHOD**

**Research sites**

The research was conducted in Barus District, Central Tapanuli Regency. The location selection was made based on the consideration that the Sitakkurak Irrigation Dam is in Barus District.

**Population and Sample**

**Population**

The population in this study was the entire number of rice farming households that used the Sitakkurak irrigation weir, totaling 222 RT.

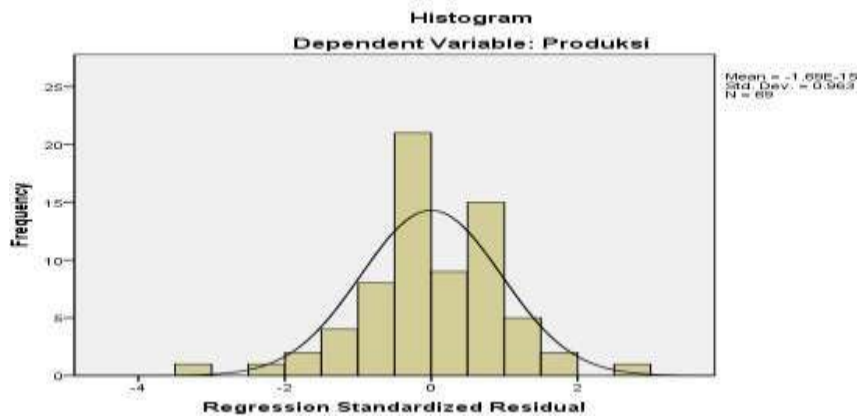
**Sample**

Results from Yamane's formula for Ujung Batu Village  $N1 = (69 : 222) \times 100 = 31$  Heads of family. Aek Dakka Village  $N2 = (69 : 222) \times 122 = 38$  Heads of families

**3. RESULTS AND DISCUSSION**

**Classical Assumption Testing**

**a. Normality test**



**b. Multicollinearity Test**

**Table 3.1 Multicollinearity Test Results**

Model	Collinearity Statistics	
	Tolerance	VIF
1 (Constant)		
Land area	.107	9,440
Rice Seedlings	,239	4,181
Fertilizer	,207	4,823
Pesticide	,639	1,565
Total manpower	.137	7,275

a. Dependent Variable: Production

c. Heteroscedasticity test

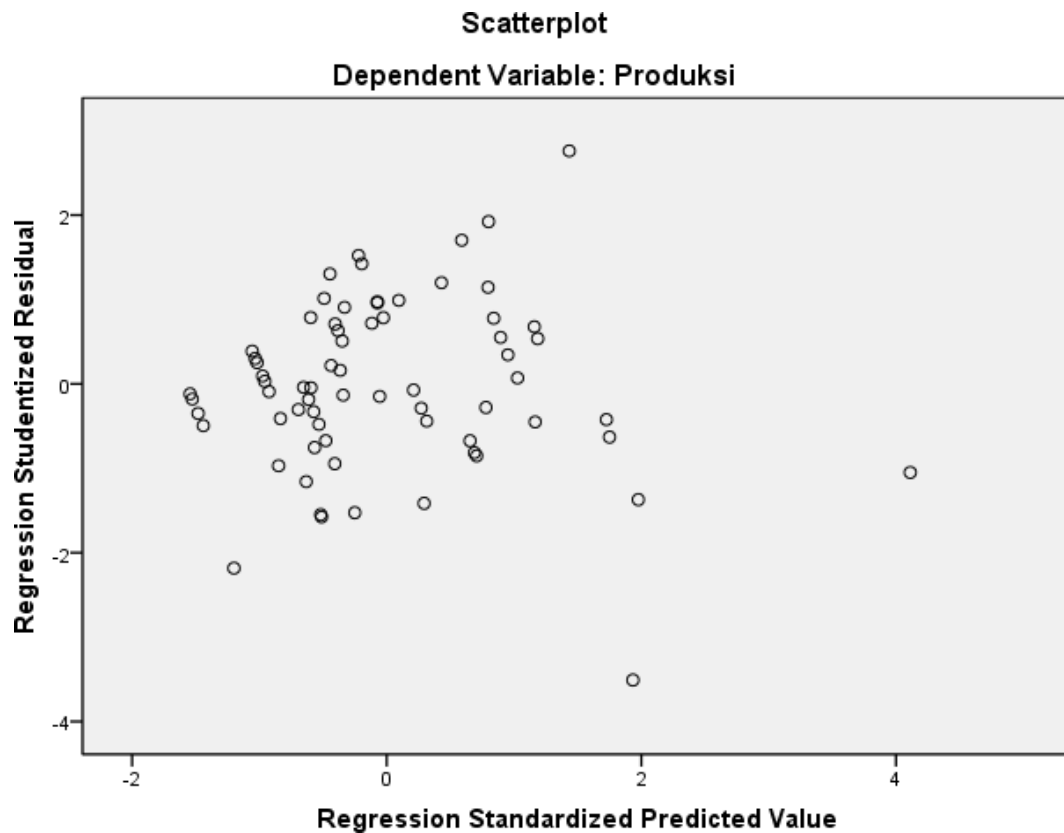


Figure 3.2 Scatterplot graph

d. Glesjer test

Table 3.2 Glesjer Test of Research Variables

Model	Unstandardized Coefficients		Standardized Coefficients	Q	Sig.
	B	Std. Error	Beta		
1 (Constant)	,209	,107		1,954	,055
Land area	,315	,335	,381	,942	,350
Rice Seedlings	-.003	,005	-.148	-.604	,548
Fertilizer	,000	,000	,124	,471	,639
Pesticide	,015	,025	,091	,611	,543
Total manpower	-.002	,004	-.133	-.411	,682

a. Dependent Variable: abs\_res1

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**Hypothesis test**

**Table 3.3 Results of Analysis of Factors Affecting Production**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	,503	,176		2,865	,006
Land area	1,597	,550	,326	2,906	,005
Rice Seedlings	,017	,008	,148	2,180	,033
Fertilizer	,002	,001	,298	4,097	,000
Pesticide	,069	,041	,070	1,681	,098
Total manpower	,014	,006	,201	2,249	,028

a. Dependent Variable: Production

The multiple linear regression equation above can be described as follows:

1. The constant (a) is 0.503, meaning that if there is no influence from land area, rice seeds, fertilizers, pesticides, and the number of cooperative workers with 0 (zero), then rice production will remain at 0.503 tonnes/Ha.
2. The regression coefficient The land area variable has a positive and significant effect on rice production.
3. Regression coefficient The rice seed variable has a positive and significant effect on rice production.
4. Regression coefficient The fertilizer variable has a positive and significant effect on rice production. The fertilizer used by the sample of farmer respondents in Barus District was between 65 - 1,100 kg with the average fertilizer used being 372.40 kg. The fertilizer used is Urea, KCl and TSP.
5. Regression coefficient The pesticide variable has a positive and insignificant effect on rice production.
6. Regression coefficient The variable number of workers has a positive and significant effect on rice production.

**DISCUSSION**

One important factor that can influence the growth of rice plants is water or irrigation. The existence of irrigation is one of the aids to the water supply for rice plants, where when the dry season is almost here the availability of water decreases and results in the distribution of water in paddy fields being unstable, for this reason the regional government builds secondary irrigation canals that can connect river flows to several canal points. tertiary which then irrigates the rice fields like the irrigation system that has been built in Barus District, Central Tapanuli Regency. The irrigation system is one of the factors that determines when to plant lowland rice. In one year, 1 to 3 plantings are carried out, depending on the condition of the farmer's agricultural land.

From an economic perspective, water (irrigation) is an important production factor in lowland rice farming, in addition to land, capital (seeds, fertilizers and pesticides), labor and management. Agronomically, superior varieties of rice seeds are very responsive to fertilization, provided that sufficient water is available. This means that the availability of sufficient water will be able to increase rice productivity. Increased productivity occurs if each unit of variable input produces higher output. Theoretically, this means that there will be an upward shift in the production function. It is hoped that increasing productivity will be able to increase the income of lowland rice farmers, which in turn will be able to improve the welfare of farmers and their families, as well as village communities in general.

The welfare of village communities is reflected in the increasing increase in their income and in the increasingly equal distribution of income among them. The research results showed that only the land area, rice seeds, fertilizer and number of workers had a positive and significant effect on crop production, while the pesticide factor had no significant effect on rice crop production. Land area has a positive and significant effect on rice production because land is a medium for plant growth. The larger the area of land, the more rice plants can be cultivated, which will affect rice production. These results are in line with research by Pasaribu (2009) which concluded that land area and labor have a significant effect on crop production. According to Hanafie (2010) in agricultural development, the availability of sufficient and timely capital is an important and strategic element. Capital in agriculture is cash used to purchase agricultural production facilities consisting of seeds, agricultural machinery, fertilizer, pesticides and so on. Capital in this form is physical capital. Apart from physical capital, human capital is also needed in agriculture to manage and increase agricultural production.

Workers in the agricultural sector are farmers. The implementation of the production process in agriculture depends on the role of human resources, in this case farmers, as implementers. The role of farmers as workers in agriculture is as workers, the farmers themselves run their farming business. In practice, the farmer does not work alone, but is assisted by other workers, namely his wife and children. Children over 10 years old are considered productive workers. Based on the area of land owned, there are rich farmers who own large land, middle farmers who own medium land and small farmers who own small land. At a micro level, the influence of land in agriculture can be seen from land control, area of cultivated land and land value. Regional development is the value of regional benefits for the people of a particular region by combining natural resources, human resources and technology. The development of rice farming in Barus District, Central Tapanuli Regency is expected to open wider access to the surrounding area, smooth transportation access to markets. Infrastructure development will make the movement of goods and services faster. The first stage of regional development is natural resources, which in this research is the development of rice farming. The development of rice farming can create business opportunities and potential employment opportunities in Barus District. Business and work opportunities require human resources. The research results show that the development of rice farming can absorb labor. The role of rice agricultural development in absorbing labor directly and indirectly reduces the unemployment rate. Directly, rice farmers try not to become unemployed and indirectly they can reduce the unemployment rate by absorbing labor.

This condition has a positive impact on the Barus District Government in particular and Central Tapanuli Regency in general, this is because it can reduce poverty levels and unemployment rates. Regional development planning has various aspects of change that are implemented in a planned and coordinated manner. The focus of regional planning is achieving the goals of social sub-systems that are organized territorially or spatially. According to Adisasmita (2005), in the regional system there are three main components, namely population resources, economic activities and transportation systems. The interdependence of economic activities and population in terms of production and consumption (employment, labor and income) plays a fundamental role in efforts to organize regional structures. The social (regarding spatial planning) and temporal (regarding time) aspects of the above state of interdependence can be expressed in terms of transportation and communication costs, the size of the economic scale. Each region has a different pattern of economic growth. Economic planning for a region must take into account the economic, social and physical characteristics of the region itself, including its interactions with other regions. According to Pasaribu (2009), an increase in people's income and an increase in labor due to rice farming will have a positive impact on economic activities. Rising income will increase demand for daily necessities. The increase in production will have an impact on the development of other sectors, such as trade and industry, which will reduce unemployment and increase economic activity.

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Local economic development can create new jobs and stimulate local economic activities aimed at increasing the number and variety of job opportunities available to local residents, this condition will have an impact on increasing economic growth, reducing unemployment, reducing poor households, improving community welfare, and long term can increase local government revenues from the tax sector (Pasaribu, 2009). Rice farming can develop a local economy that has competitiveness to improve the economy in Barus District. The three pillars of regional development, namely natural resources, human resources and technology, cannot be separated from the region's ability to streamline the movement of people, goods and services. It is hoped that rice farming in Barus District can open wider access to the surrounding area, smooth transportation access to markets. Infrastructure development will make the movement of goods and services faster. Improving road infrastructure will expand access to production pockets. Development of road infrastructure will increase the attractiveness and competitiveness of the region. According to Miraza (2010) each region or region has different local economic potential.

It is from this local potential that the region/region drives its economy, especially from the point of view of its advantages. If each district and city moves to grow, of course the area where the district and city are located will grow too. This will influence the growth of neighboring regions and continue to encourage national economic growth. Regional governments must be able to optimize the use of local resources, many of which are still hidden by inviting the private sector to cultivate this potential. The role of the private sector in cultivating regional potential is decisive, as long as the regional government provides certainty and services for the entry of investment. Apart from that, economic growth is greatly influenced by population growth. Economic growth can quickly change an area from an agricultural village to an agropolitan one. Population growth occurs as a result of natural growth processes and urbanization. Natural population growth is the main factor that influences the regional economy because it creates a need for various goods and services.

#### **4. CONCLUSION**

1. There was a difference in farmers' rice production before and after the Sitakkurak irrigation dam and showed a significant influence because the results of the two paired sample tests were  $0.000 < 0.05$ . The average value of farmers' rice production before the Sitakkurak irrigation dam was 3.77 tons per planting season and the average value of rice production after the Sitakkurak irrigation dam was 4.17 per planting season. These results show a difference of 0.40 per planting season.
2. Simultaneously, the factors of land area, rice seeds, fertilizer, pesticides, and number of workers have a significant effect on rice production. Partially, the factors of land area, rice seeds, fertilizer and number of workers have a positive and significant effect on rice production, while the pesticide factor has a positive and insignificant effect on rice production.

#### **REFERENCES**

- Adisasmita, R. (2005). *Pembangunan Ekonomi Perkotaan*. Yogyakarta: Graha Ilmu.
- Departemen Pekerjaan umum, Standar Perencanaan Irigasi (KP.01.02.04,06) Penerbit Yayasan
- Miraza, B. H. (2010). *Pembangunan Pedesaan: Teori dan Praktek*.
- Pasaribu, H. (2009). Pengaruh Komitmen, Persepsi dan Penerapan Pilar Dasar Total Quality Management terhadap Kinerja Manajerial (Survei pada BUMN Manufaktur di Indonesia). *Jurnal Akuntansi dan Keuangan* , 11 (2), 65-75.
- Hanafie, R. (2010). Peran pangan pokok lokal tradisional dalam diversifikasi konsumsi pangan. *JSEP (Jurnal Ekonomi Sosial dan Pertanian)* , 4 (2), 1-7.