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SUSTAINABLE WATER SUPPLY MANAGEMENT MODEL AT TIRTA KUALO REGIONAL WATER COMPANY IN TANJUNGBALAI CITY, SUMATERA UTARA PROVINCE

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ABSTRACT

Tirta Kualo is the only Regional Water Company that provides drinking water to the people of Tanjungbalai City which have not been able to serve the entire community. The purpose of this study was to determine the potential availability of Tirta Kualo Regional Water Company (hereinafter PDAM) to meet the water needs of the people, to know the condition of water supply services, to determine the effect of environmental, social, economic, human resources strategies on sustainable water governance and designed a model for sustainable water management in PDAM Tirta Kualo, Tanjungbalai City. The population was customers of PDAM Tirta Kualo who have been domiciled in Tanjungbalai City for more than 10 years. The sample is determined by purposive sampling. Descriptive analysis is used to determine the potential and services of PDAM Tirta Kualo, multiple linear regression is used to determine the factors that affected the sustainability of water availability and SWOT analysis to formulate a governance model for sustainable water availability. The analysis showed that based on the area of Tanjungbalai City of 60.62 km2 with a population of 169,367 inhabitants and coverage services of PDAM Tirta Kualo in 2019 was only 68.86%, the potential water that must be available is 5.787,39 liters/second. Based on the population, the production capacity that must be available is 97 liters/second. Water needs for each house connection that must be available to the next 5 years is 14.79 liters/second. The service conditions are still not good because the company has not Full Cost Recovery or cannot meet the operational needs and the quality of human recources is still low. The factors that most influence the governance of water supply are the Environmental and Social factors. The designed of sustainable water management model in PDAM Tirta Kualo based on Economic factors, Environmental Factors, Social Factors, Human Resources Factors and Integrated Institutions.

Keywords: Water Governance Model, Water Availability, Sustainable Water Management

1. INTRODUCTIONS

There are at least 780 million people in the world who do not have access to clean water, and around 2.5 billion of people who lack access to safe sanitation system (Cooley H, et al., 2013). Water promote economic development to improve social equity, freshwater is addressed specifically in SDGs 6 which ensure access to clean water and sanitation (White, et. al, 2019). The water crisis occurs not only because of climate change but also because of urban growth and exponential population development which has created strong demands for the communities to respect their rights, one of the most basic and necessary is to have access to safe drinking water, guarantee universal access and equal rights over water which is an element of great geopolitical value (Zaragoza, 2019). The issue of scarcity and inequality in access to clean water in Indonesia is due to an increasing the needs of water (Directorate General of Water Resources of the Ministry of Public Works and Public Housing of the Republic of Indonesia, 2014). Sustainable water governance goals directed framework to manage societal activities to ensure equitable and safe clean water to support the development of social and economic and supporting ecosystems (White, et al., 2013). The increasing water demand leads to excessive exploitation of water resources resulting in a decrease in environmental carrying capacity. Water supplies is major issues to maintain every years and continue in upcoming years (Kassa, 2017). Water policy need to reforms since current water governance system fail to provide services of water and balancing the social, economic (Kim, at. Al., 2017).

Researchers are trying to find strategies and new breakthroughs that focus on sustainable water management such as holistic management approaches to create synergies and harmonious integration between regions, sectors and generations (Wiek and Larson, 2012). The problem of water resources governance and clean water supply is not only a global and national issue, but also a problem in areas such as one of the smallest cities of North Sumatra province, Tanjungbalai City. According to Regional Regulation No.1 year 1998 concerning about the management of water supply services that implemented by PDAM Tirta Kualo by utilizing Silau River as the water sources. The construction of water treatment plant facilities is in line with the increasing of water needs due to population growth. In the downtown area the water needs have been met both in quantity and quality but in the suburbs area it has still not been met. This condition is due to the production capacity of existing Water Treatment Plants are still inadequate in meeting the customer's water needs. The increasing growing number of urban inhabitants and leakages in municipal infrastructure, the increasing industrial use of water and growing needs of agriculture are very detrimental to the water supplies (Gupta, et. al., 2018).

Principles for sustainable water governance systems such as contribution to societal goals of regional development, contribution to social justice, adaptive capacity (Schneider, et. al., 2014). The correlation between water governance and "smart city" must be observed from the perspective of sustainable environment and economic, there are at least three dimensions of sustainability such as: social, citizens are concerned to the dynamic of the environment; the ecological one, the use of natural resources must be compatible with its preservation; and economic, protection of the environment must be compatible with economic growth, and keep the balance between both perspectives must be achieved (Gimenez, et. al., 2018).

Based on Supporting Drinking Water Supply System Development Support (BPPSPAM) evaluation results in 2016 which stated that the health level of PDAM Tirta Kualo in 2016 was 2.28 and was classified as less healthy and the financial condition of PDAM Tirta Kualo in 2016 had lost as evidenced by the independent auditor's Report on PDAM Tirta Kualo's Internal Financial Statements for 2016, while the customers' need for clean water continues to increase due to high water loss rates of 36.86% (Company Profile of PDAM Tirta Kualo, 2017). This happened because the company's management is carried out in a closed way, the company's accountability is considered low so that it gives an opportunity for the emergence of bureaucratic intervention in the company decision making process. The use of resources is also considered inefficient with a large amount of human resources but a low level of productivity. This will further burden financial conditions.

METHODOLOGY

This research will be carried out by taking the population of all families who are customers of PDAM Tirta Kualo. Sample collection uses purposive sampling, where the respondent is a customer of the PDAM, a family who lives in the district for more than 10 years, and understands the use of water. Regression analysis model in sociology are used to quantitatively analyze the influence of the factors (Fan, 2014). Water intake rate is influenced by demographic, physiological and social economic factors (Zheng. et. al., 2020). To analyze water governance system, need to focusing on water availability, water used, decision making over water distribution (Scheider. F, et. al., 2014).

The following data analysis methods are based on research objectives:

Table 1. Data Analysis Method Based on Research Objectives

No	Research Purposes	Analysis Methode
1.	To analyze the condition of the potential availability of water supply in Tanjungbalai City	Descriptive analysis
2.	To analyze the increasing needs of water that caused water scarcity in Tanjungbalai City	Descriptive analysis
3.	To analyze the condition of water supply governance of PDAM Tirta Kualo	Descriptive analysis
4.	To analyze the influence of environmental factors, social factors, economic factors, Human Resources factors on sustainable water management in PDAM Tirta Kualo	Multiple Linear Regression Analysis
5.	To formulate a model for sustainable water management in PDAM Tirta Kualo	

Source: (Research Results, 2020)

In analyzing the potential water availability, water services and community needs of water, and based on the influence of environmental factors, social factors, economic factors, human resource factors on the management of water supply of PDAM Tirta Kualo including formulating a Sustainable Water Supply Governance Model then quantitative descriptive approach is used.

RESULTS AND DISCUSSION

I. Case Study Area

Tanjungbalai City locates in the midstream of the Asahan river and Silau river which empties into the Malacca Strait are shown in Figures 1. PDAM Tirta kualo is the only Regional Water Company which is responsible for the supply of clean water in Tanjungbalai City.

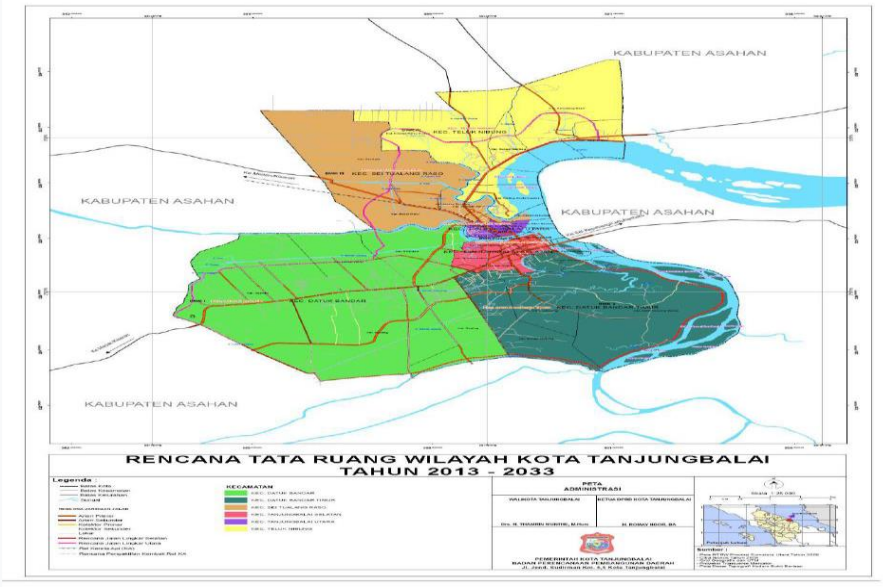

Figure 1. Tanjungbalai City

1.1 Water Supply Condition in PDAM Tirta Kualo

Here is the following condition of water supply in PDAM Tirta Kualo based on clean water requirements, such as:

a. Clean Water Conditions Based on Quantity Requirements

Production capacity available at PDAM Tirta Kualo is only 360 l/sec, but in 2017 Tanjungbalai City should be owned ± 95.47 m3/sec by using Silau river, such as:

Water capacity: Total area x Rainfall or River Water Discharge

Water Capacity = 60.620 km^2 x 95,47 m3/second
= 5787391,4 m3/second
= 5.787,3914 liter/second

Then it is known that the water capacity of PDAM Tirta Kualo that must be available for the entire population of Tanjungbalai City are 5.787,39 l/sec but the available capacities are only 360 l/sec until 2019.

b. Water Conditions Based on Quality Requirements

Analysis of production quality of PDAM Tirta Kualo for the last 3 (three) months, namely April, May and June 2019 conducted by PDAM Tirta Kualo on the four river water quality parameters treated by PDAM Tirta Kualo, namely physical, inorganic, microbiological, and organic parameters , shows that the quality of clean water does not meet the standards set by the Government, namely the general provisions of the Regulation of the Minister of Health No.492/ MENKES/Per/IV/2010 concerning drinking water quality standards. This condition is due to PDAM Tirta Kualo is not checking water quality regularly because the company does not have its own laboratory and should go to central laboratory in Medan City.

1.2. Coverage Services of PDAM Tirta Kualo

Drinking water services for the people of Tanjungbalai city based on Regional Regulation No. 1 year 1988 are conducted by PDAM Tirta Kualo by utilizing surface water sourced from the Silau River. PDAM Tirta Kualo has served around 70% of the entire population of the city. This is actually quite good if it is related to the amount of investment needed to supply drinking water through surface water treatment, but with consideration of alternative drinking water sources it is difficult to obtain in Tanjungbalai.

Based on data from PDAM Tirta Kualo, an overview of water supply by PDAM Tirta Kualo is shown in the table below.

Table 2. Water Supply Condition in PDAM Tirta Kualo

Year	Total Population (inhabitant)	Total Connection (inhabitant)	Total Connection (Connection)	Coverage area (%)	Production capacity (lt/sec)	Discarge Required (lt/sec)	Lack of discarge (lt/sec)
2017	169,367	116,600	23,320	68,84	360	389	29
2018	171,775	122,600	24,520	71,37	360	409	49

Source: (PDAM Tirta Kualo, 2018)

Based on the data above, there has been an increase in the number of residents in Tanjungbalai City from 2017 to 2018 by 2.408 inhabitant. This effected the increasing of the percentage of house connections, which previously was 23.320% become 24.520%.

However, based on the total of installed debit, PDAM Tirta Kualo did not experience an increasing from the previous year, resulting in an increase in deficit (lack of water debit) from the previous 29 l/sec increased to 49 l/sec.

Tabel 3. Coverage Area of PDAM Tirta Kualo

Area	Sub District	Total Area (km2)	Total Citizen (inhabitat)	Total Costumer (families)	Total Costumer (inhabitant)	Served Presentage (%)
I	Datuk Bandar	22.59	37.062	4.860	24.300	65.57
	Datuk Bandar Timur	14.57	29.546	5.056	25.278	85.55
II	Tanjung Balai Selatan	1.98	21.198	4.983	21.028	99.20
III	Tanjung Balai Utara	0.84	17.395	2.729	13.645	78.44
IV	Sungai Tualang Raso	8.09	24.906	2.496	13.812	55.46
V	Teluk Nibung	12.55	39.260	3.196	18.537	47.22
Total		60.62	169.367	23.320	116.600	68.86

Source: (PDAM Tirta Kualo, 2017)

The table above shows that the total population of Tanjungbalai City served by clean water is 23.320 customers or equal to 68,86% of the total population. If you see the comparison of data between water production and the percentage of water loss is presented as the table below.

Table 4. Comparison between Water Production with Water Losses

Year	Water Production m^3	Water Distribution M^3	Water Sold M^3	Water Losses M^3	Presentage of water losses (%)
2018	10.798.236	10.516.773	6.639.862	3.876.911	36,86

Source : (PDAM Tirta Kualo, 2018)

Based on the data above, the percentage of water loss is still relatively very high (36.86%) this is due to several factors including: 1) the number of illegal connections 2) many customers do not have a water meter as a measurement of water use (Results of Interview with Engineering, 2020). Based on human resource data, the total number of employees is 283 people with the highest level of education is 185 senior high school and the least educated elementary school is 7 people. Based on the organizational structure, PDAM Tirta Kualo consists of 5 (five) work units namely the Engineering Section, the Planning Section, the Subscription Relations Section, the Administration and Finance Section and the Internal Control Unit. As the matter of facted the existing Standard Operation Prosedure is not implemented properly.

2. Water Supply Needs of the people of Tanjungbalai City

Based on the above water demand standards, Kota Tanjungbalai with a population in 2017 was 169,367 inhabitants, while the number of customers in 2017 was 23,320. Service coverage in 2020 reached 25,760 customers (BPS, 2020). Based on these data Projection of Clean Water Needs Projection per house connection for the next 5 years PDAM Tirta Kualo Kota Tanjungbalai with the assumption that customer growth has increased by 2% annually obtained from PDAM Tirta Kualo 2018 performance data (BPKP, 2018). If you see the progress every year, the following graph is a projection of clean water needs for customers in the next 7 years:

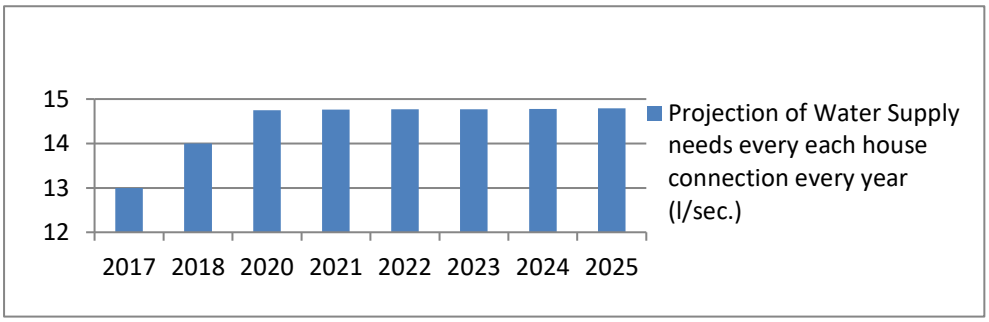

Figure 2. Projection of Water Needs for the next 5 Years

From the data above shows that the projection of water supply needs has increased around 2% each year so that PDAM Tirta Kualo must continue to maintain the quantity and quality of the production.

3. Sustainable Water Supply Governance in PDAM Tirta Kualo

Continuous changes in the political, legal, economic, social, and technological aspects of water must ensure that efforts to improve water management and services offer the best long-term prospects (Alejandro, et. al., 2020). Sustainable water supply governance in PDAM Tirta Kualo using the principles of governance based on the existing issues in every work unit is shown in the table below:

Tabel 5. The Interviews Result with Every Work Unit Based on Issues

No.	Working Units	Issues
1	Tansmission and Distribution Unit	1. Water production does not meet health requirements and does not meet quality, quantity and continuity requirements because laboratory tests are conducted once every 6 (six) months or even never because they do not have their own laboratories, while the closest laboratory is in the city of Medan, about 5 hours journey from the City of Tanjungbalai. 2. The level of water loss is very high, reaching 36.86% 3. Condition of the Water Treatment Plant and bore wells are not good there are some that are damaged and left alone without maintenance / maintenance 4. Transmission and distribution pipelines are old and leaky 5. 5. Employees do not implement SOP (Standard Operational Procedure) in carrying out work because of the low quality of human resources
2	Administration and Financial Unit	1. Customer accounts receivable high and not collectible by the company. 2. The company's operational costs are very large compared to the company's revenue each month so it is not enough to meet the company's operation cost. 3. Total number of employees are 283 employees and it spent a lot cost and difficult to manage the cash flow. The company is currently in arrears on employee salaries for up to 4 months. In the 2017 based on audit of BPKP(representative of financial audit in North Sumatera) founded that the employee ratio was 13.15 meaning that 13 employees served 1000 customers. This means that 1 employee serves 77 customers. based on BPKP's performance evaluation, 1 employee should serve 200 customers.

		4. Not yet known the actual number of active customers 5. The level of quality of human resources is still low - the average education level is senior high school 6. The water account payment system has not used Payment Point Online Banking so that the level of employee corruption in quoting water accounts is very high 7. The administrative system is not in accordance with quality management system procedures and ISO
3	Costumer Services unit	1. Many undetected illegal connection 2. Customers do not have an accurate water meter as a measurement of water usage 3. The staff often estimates water usage
4	Planning Unit	1. The quality of human resources is low, the Head of Planning only has the STM education or is equivalent to senior high school 2. Infrastructure facilities do not support, such as the unavailability of tools for drawing techniques and even a computer only 1 piece
5	Internal Oversight Unit	1. never inspect all work units because human resources are low

Source : (Research Result, 2020)

Based on the results of the above interviews, several problems have occurred in PDAM Tirta Kualo work units, so that the conditions of governance that occur as shown in the following table are obtained:

Tabel 6. Existing Water Supply Governance in PDAM Tirta Kualo

Governance Principles	Indicator	Existing Conditions
I. Accountability	a. Achievement of Objectives	lack of employee loyalty to the company so that the achievement of company goals is less than optimal
	b. Clarity of Function	Standard Operational Procedure does not exist
	c. Implementation of vision and mission	Vision and Mission not implemented
II. Transparency	a. Overt	Not transparent
	b. Complete	systems and rules are incomplete and not properly implemented

	c. accurate / timely	many customers do not have a water meter so that the determination of the average customer usage is estimated by certain employees
III. Liability	a. environmental Conservation	The management does not include environmental conservation in the business plan. Monitoring of the river as a source of raw water is also not carried out.
	b. customer satisfaction	Service criticism and suggestions for customer satisfaction is not maximally carried out.
IV. Fairness and Equality	a. fair	PDAM cannot serve 100 percent of the Tanjungbalai community
	b. equal	Even though regulations on tariff groups have been made, water payments are still based on negotiations between customers and employees, not based on established groups.
V. Independent	a. professional	The company's management is not professional because not all customers are installed with water meters as a measurement of payment so that there is a payment negotiation between employees and customers.
	b. good management	professionalism and loyalty of the employees are still low

Source : (Research Result, 2020)

Based on the table above it is known that the condition of water supply governance in PDAM Tirta Kualo is still relatively low. There are no local institutions that are able to embrace and mediate between the different interests of the water user community (Scneider and Homewood, 2013). Many problems that occur in all working units and the governance principles are not achieved. This happened because the quality and loyalty of human resources are lows and the company does not yet Full Cost Recovery.

4. Factors that Affecting Sustainable Water Supply Governance in PDAM Tirta Kualo

Increasing water demand, due to economic development and intense population growth combined with water management practices influence sustainability (Bonriposi, 2013).

4.1.Characteristics of Respondent

The relationship between governance, sustainability and decision making is a concept that is closely related to the situation of local communities and therefore needs to be defined in terms of the characteristics of people living in a particular place (Iribarnegaray and Seghezzo, 2012). Based on 100 samples of respondent of customers of PDAM Tirta Kualo shows that:

Tabel 7. Characteristic of Respondent

No.	Characteristic	Indicator	Result (%)
1.	Costumers	a. Utilizing water for bathing, washing, toileting	51%
		b. Use water for bathing, washing, toileting, cooking, and drinking	49%
	Gender	a. Men	77%
		b. Women	23%
2.	Age	a. 17 up to 25 years old	27%
		b. 36 up to 45 years old	35%
		c. 46 up to 55 years old	19%
		d. more than 56 years old	1%
3.	Education	a. Uneducated	1%
		b. Junior High School Graduate	1%
		c. Senior High School Graduate	15%
		d. College / Academy / post graduate	83%
4.	Profession	a. Government employees	51%
		b. Private employess	32%
		c. Entrepreneur	14%
		d. Others	3%
5.	Income	a. more Rp. 5.000.000	37%
		b. more than Rp. 2.000.000 - Rp. 3.000.000	21%
		c. more than Rp. 1.000.000 - Rp. 2.000.000	14%
		d. more than Rp. 3.000.000 - Rp. 4.000.000	13%
		e. more than Rp. 4.000.000 up to Rp. 5.000.000	9%
		f. more than Rp. 500.000 up to Rp. 1.000.000	6%
6.	Type of house	a. 55 – 100 m^2	35%
		b. 201 – 300 m^2	19%
		c. 36 m^2	19%
		d. 101 – 200 m^2	13%
		e. more than 300 m^2	8%
		f. 37 – 54 m^2	6%

Source: (Research Result, 2020)

4.2. Linear Regression Test

This analysis is used to determine the effect of independent and dependent variables with data processing using SPSS Version 20. Based on the calculations, the results of the analysis are as follows:

Table 8. Regression Test

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	8,917	2,598		3,432	,001		
	Total of Economic factors X1	,187	,151	,126	1,234	,220	,942	1,062
	Total of Environmental factors X2	,352	,217	,173	1,620	,109	,861	1,162
	Total of Social Factors X3	,317	,254	,125	1,245	,216	,968	1,033
	Total of Human resources Factor X4	,114	,321	,038	,356	,723	,873	1,146

a. Variable of dependent : Sustainable Governance total Y

From the above table the regression results are obtained as follows:

Y = 8,917 + 0,187X1 + 0,352X2 + 0,317X3 + 0,114X4

Such as,

Y : Sustanable Governance
X1 : Economic factors
X2 : Environmental Factors
X3 : Social Factors
X4 : Human Resources Factors

4.3. Hypothesis Test

In this study a significance level of 5% was used to test the hypothesis accepted or rejected. The following table shows the data for partial and simultaneous hypothesis testing.

a. Hypothesis Test (Partial)

From the table below it is known that economic factors have a Sig value of 0.220, environmental factors a Sig value of 0.109, a social factor a Sig value of 0.216, an HR factor a Sig value of 0.723. Where the Sig value of all the independent variables is greater than the significance level of 5% (0.05), so the hypothesis is accepted, namely:

H1: Economic factors influence Sustainable Water Management

H2: Environmental factors influence Sustainable Water Management
H3: Social factors influence sustainable water Governance
H4: Human Resources factors influence Sustainable Water Management

Table 9. Hypothesis Test (partial)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
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	Total of social factors X3	,317	,254	,125	1,245	,216	,968	1,033
	Total of human resources factors X4	,114	,321	,038	,356	,723	,873	1,146

a. Dependent Variable: Sustainable Governance Total Y

b. Hypothesis Test (Simultaneous)

From the table above it is known that the variables of economic, environmental, social, Human Resources have an F value - count 1.686 smaller than the F table of 3.35, so the hypothesis is accepted:

H5: Economic, environmental, social, human resources factors influence Sustainable Water Management

Tabel 10. Hypothesis Test (simultan)

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	35,565	4	8,891	1,686	,160[b]
	Residual	500,945	95	5,273		
	Total	536,510	99			

a. Dependent Variable: Sustainable Governance Total Y

b. Predictors: (Constant), Human Resources factors total X4, Social Factors Total X3, Economic Factors Total X1, Environmental factors Total X2

5. Sustainable Clean Water Governance Model in PDAM Tirta Kualo

The existing condition of Tanjungbalai City requires appropriate management strategies. The formulation of the strategy is carried out using SWOT Analysis that needed in conducting this analysis is to know the influential strategic factors. To achieve sustainable governance can be analyzed with SWOT analysis (Strengths, Weaknesses, Opportunities, Threats), namely analyzing economic factors, environmental ecology and social society (Chambers, et. al., 2020). These strategic factors include internal factors consisting of strengths and weaknesses, as well as external factors consisting of opportunities and threats. Based on interviews with several key informants (regulators, communities, and experts), several internal and external factors have been identified that are influential in formulating water resources conservation governance in the City of Tanjungbalai.

Formulation of alternative strategies with a SWOT analysis is a combination of internal factors (strengths and weaknesses) with external factors (opportunities and threats), which consists of (1) a combination of strengths/strengths/opportunities (SO) factors, (2) a combination of weaknesses/weakness-opportunity/opportunity (WO), (3) combined strength/threat/threats (ST) factor, and (4) combined weakness/threat/threats (WT) factors.

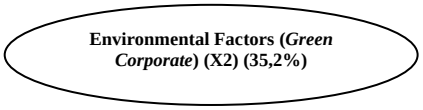
Table 11. SWOT Matrix Formulation of Alternative Governance Strategies for Water Supply in Tanjungbalai City

Internal Factor / **Exsternal factor**	Strength (S)	Weakness (W)
	S1 Regional Regulations and programs (policies) on the Governance of Water Supply in the City of Tanjungbalai	W1. The physical condition of Tanjungbalai City is not diverse
	S2 The existence of stakeholders in the managing water resources in Tanjungbalai City	W2 Inadequate placement and capacity of human resources in the Regional Government
	S3 Land covered in catchment area is relatively well	W3. Level of authority of each stakeholder
		W4. Lack of firmness in implementing regulations

	maintained	
Opportunities (O) O1. Stakeholders with an interest in water in the City of Tanjungbalai O2 Higher education centers (Number of educational institutions related to water resources)	S-O Use power to take advantage of opportunities 1. Establish Local Regulations and programs on Governance for Water Supply that touches all stakeholders (S2-O1) Encourage the participation of universities to conduct a comprehensive study related to the Management of Water Supply (S1-O2)	W-o Minimize weaknesses to take advantage of opportunities 1. Increase monitoring and evaluation activities in implementing regulations related to Water Supply Governance (W2, W3, W4-O1)
Threat (T) Q1. The existence of various political interests of the authorities Q2. Population growth rate (increased water and land demand) Q3. Inefficiency of PDAM Tirta Kualo	S-T Using power to overcome threats 1. Aligning political interests in accordance with regional development plans (S1, S2-T1) 2. Optimizing the participation of PDAM Tirta Kualo starting from the planning, implementation and monitoring of Water Supply Governance (S2-T3)	W-T Minimize weaknesses and avoid threats 1. Increase community and apparatus understanding about the governance conditions for Water Supply in Tanjungbalai City (W1-T, T2)

Source: (Research Result, 2020)

Based on the data above, the following Model of Sustainable Water Supply Governance in PDAM Tirta Kualo Tanjungbalai City is based on the results of regression and SWOT analysis, regression results and design drawings of "Sustainable Water Supply Governance Model in PDAM Tirta Kualo Tanjungbalai City":



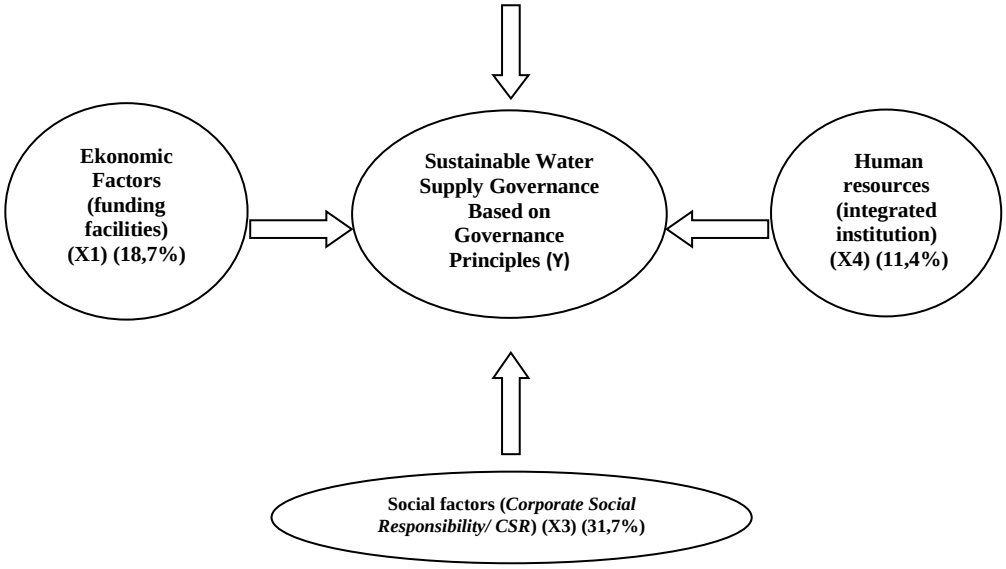


Figure 3. Sustainable Water Supply Governance Model

The data above states that the economic influence is 18.7%, environmental 35.2%, social 31.7%, human resources 11.4% on the creation of Sustainable Water Supply Governance in PDAM Tirta Kualo Tanjungbalai City. The most influences the Sustainable Water Supply Governance in PDAM Tirta Kualo Tanjungbalai City is "Environmental and Social Factors" which means that in designing the governance, PDAM Tirta Kualo must pay attention to factors relating to "ENVIRONMENT & SOCIAL" by making strategic breakthroughs from the results of the SWOT analysis that has been reviewed before. The latest breakthroughs based on these factors are from economic factors in the form of funding facilities, environmental factors in the form of green Corporate / Company-Based Environment, social factors such as Corporate Social Responsibility. This sustainable water supply management model can be used to maximize the potential utilization of water supply available to meet the increasing water demand every year.

CONCLUSION

Based on the results of the analysis that has been conducted on the study of Sustainable Water Supply Governance Models in PDAM Tirta Kualo Tanjungbalai City, it can be concluded that:

The area of Tanjungbalai City is 6,052 Ha or 60.62 km2 and the smallest area in North Sumatra with population 169,367 inhabitants, the coverage area 116,600 or around 68.86%. Viewed from the area, the potential of clean water that must be produce by Tanjungbalai City is 5,787.39 l/sec. while the water production capacity of PDAM Tirta Kualo is only 360 l/sec. until 2019. The quantity is still inadequate in meeting the needs of water

because the rate of losses is still high. The quality does not meet drinking water standards in accordance with Regulation of the Minister of Health No.492 / MENKES / Per / IV / 2010 concerning drinking water quality standards. This condition is due to PDAM Tirta Kualo not checking water quality regularly because it does not have its own laboratory.

Based on the population of Tanjungbalai, the production capacity that must be available is 97 l/sec. for the people of Tanjungbalai City. Each house connection needs an average of 13 or 14 l/sec. The water needs projected for each house connection in the next 5 years with an assumption of an increase of 2%, an increase in the need for water averages 14.79 l/sec.
The condition of water supply governance in PDAM Tirta Kualo classified low, a lot of issues in all working units and all of the governance principles is not achieved. This happened because the company is not full cost recovery and the quality of human resources is very low.
Hypothesis test results are accepted either partially or simultaneously where economic, environmental, social, and human resources factors influence the governance of sustainable water management either partially or simultaneously. With the estimated results of the regression equation that has been formulated, namely: Y = 8.917 + 0.187X1 + 0.352X2 + 0.317X3 + 0.114X4.

The design of the Sustainable Water Supply Governance Model refers to the principles of governance, namely accountability, transparency, responsibility, fairness and equity, independent and takes into account the factors that affect governance as well as the estimation results of the regression equation, in order to achieve the optimal utilization of potential clean water for customers and for all the community in Tanjungbalai city through improvements or increases in the Output Model (Economic Factors in Facility Funding (18.7%), Output Model (Environmental Factors) in the form of Green Corporate or Environmental Based Companies (35.2%), Output Model (Social Factors) in the form of CSR (Corporate Social Responsibility (31.7%)) or Social Based Companies, Output Models (HR Factors) in the form of Integrated Institutions (11.4%).

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