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Research article

A Sustainability Perspective Analysis of the Donggi-Senoro Gas Refinery Development

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Abstract.
Mining and the production of oil and gas are two industries that contribute significantly to development. The impact of the Donggi-Senoro gas refinery development in Banggai Regency, Central Sulawesi on sustainability was assessed using a qualitative research framework. Data were gathered through direct interviews and field observations, which were supplemented by secondary data in the form of regional planning and evaluation documents. According to the findings, the oil and gas industry contributed significantly to regional income growth and economic development in Banggai Regency. The oil and gas industry's growing contribution to regional spending is expected to support macro development in Banggai Regency, particularly community-oriented economic development, despite its low proportion in comparison to the agricultural and plantation sectors, as well as the marine sector. Since 2015, this multilevel partnership has been at the forefront of building public facilities, infrastructure, and social projects as a form of corporate social responsibility (CSR). However, the study concluded that pursuing long-term gains is hampered in general. The construction of Donggi-Senoro has benefited only a few members of the community. The 'trickle-down effect' was stifled due to a lack of long-term CSR monitoring and the Local Government's political commitment to forming an integral and long-term public-private partnership. Capacity building, a regional economic development roadmap based on an impact analysis, and a CSR-based empowerment program were among the recommendations made in this study.

Keywords: development, sustainability, public-private-partnership

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1. INTRODUCTION

The trend of sustainability has accelerated innovation for the development of the renewable and environmentally friendly energy industry. Many countries have committed to reduce the use of fossil fuels-based energy and started exploring renewable energy sources [1]. In addition, the era of modern lives has led the mind-map of government and private sectors to the development of alternative energy in responding to the issue of the impact of energy on global environment. In fact, about 60% of total greenhouse gas emissions are generated from energy systems, thus a low-carbon energy system indeed becomes crucial matter [2].

One of the exploitations of energy sources that are considered clean (environmentally friendly) compared to oil and coal is natural gas which produces 50% lower carbon per unit of energy compared to other hydrocarbons [3]. Access to exploitation of the world's natural gas reserves has also increased due to the development of modern technology that facilitates the process of gas industrialization from upstream to downstream to meet the demand for natural gas. With the latest downstream technology, natural gas industry could possibly simplify the marketing and distribution process including obtaining a safer process of converting natural gas into liquefied natural gas (LNG). LNG has played a central position for its role in international gas industry and energy trade at a larger scope [4].

In practice, the Indonesian government has made natural gas an alternative choice to increase energy diversification and sustainable economic growth, while also reducing carbon emissions [5]. Within a framework of public private partnership, multiple stakeholders jointly managed an energy system that creates energy diversification from fossil fuels to alternative energy such as natural gas. As a means to increase the national demand for natural gas, the government has built infrastructure for gas pipelines and provided incentive funds to shift energy from gas fuel to LNG.

In Indonesia, one of the locations with high reserves of natural resources is the island of Sulawesi, which also has become the most attractive area for foreign investors to invest in oil and gas sector since 2011. Planning and development of LNG was early well-prepared as the Master Plan for the Acceleration and Expansion of Indonesian Economic Development (MP3EI) back in 2011. This energy blueprint has determined the development of the Sulawesi, particularly Central Sulawesi as the economic corridor for oil and gas exploration [6].

Blocks of Senoro-Toili and Matindok in Banggai Regency were scientifically identified as the most potential natural gas exploitation area in Central Sulawesi where the amount of natural gas reserves in its early development has reached 3.83 TSCF [7]. The claim was obvious that the development scheme of a gas field in these areas was a separate upstream and downstream development model, a very first natural gas development project in Indonesia. The upstream gas development in the Senoro-Toili block managed by the Joint Operating Body (JOB)-Tomori, while the Matindok block operated by Pertamina EP (Donggi Senoro-LNG, 2020). In the downstream where gas is processed into LNG, PT. Donggi Senoro-LNG (DSLNG) was the primary developer [8].

After 6 years of its development, DSNLG exploration is expected to gain a widespread benefit for national and regional development in particularly Banggai Regency. Like other industrial mega projects, the issue of advantage gap on economic, social

and environment of DSLNG at the local level especially for local people was surely crucial. Referring to Keraf's "Environmental Ethics", mining industry defined as one of industrial sectors which caused a massive environmental damage [9]. In social sphere, public responses of DSLNG development project are vary. At the local level, conflicts of pros and cons were common phenomenon for it has become the most affected area of project development. In many similar cases, resistance to mining projects often remains problem, thus support for relevant projects are difficult to get from various circles.

To get a better conclusion, this qualitative article analyzed the overview of domino effect of DSLNG on multi-sectors and perspectives including economic, social, environment and legal frameworks. The analysis also focuses on how good corporate governance in implementing partnership and corporate social responsibility (CSR) was performed. As an overview from sustainable development perspective, relevant literature confirmed that the increase of the regional income was quite significant, yet economic disparities from 2015 to 2020 still remains complicated. Social aspect is certainly one of the main focuses questioning how CSR is implemented, as well as the assumption of social conflict which is currently dilemmatic. Other dominant environmental impacts are land conversion, solid waste, industrial waste due to gas refinery activities, and other disturbances including dust and noise.

2. LITERATURE REVIEW

2.1. Policy Impact Evaluation

The impact evaluation defined as an integral part of public policy cycle (Dunn, 2003). In this study, the impact evaluation refers to a series of policy processes/stages known as ex-post evaluation. The logical mind-map of evaluation started when a policy in its implementation process produces a consequence, both positive and negative consequences. The impact of a policy includes all aspects, both internal and external, related to conditions or groups outside the goals or objectives of the policy, or often called externalities or abundant impacts [10].

Policy impact evaluation aims to ensure that the objectives of certain program have been implemented and achieved according to the determined plans and policy objectives, despite all dynamic changes and adjustments. Rather than implementation process, impact evaluation has a more focus on the outputs and impacts of policies. In relation to impact, it should be understood that both expected and unexpected impacts need to be anticipated. The expected impact implies that when the policy is made, the

government has determined or mapped out what impacts will possibly occur. Among these expected impacts, there are often unexpected impacts. More specifically, the impact evaluation in this scientific article directly refers to the sustainability aspect in the 3 main pillars of sustainable development, namely economic impact, social impact, and environmental impact.

2.2. Sustainable Development

Development involves elements of capacity, equity, empowerment, dan sustainability [11]. Sustainable development mainly focuses on fair development process and impacts in various sectors. The word “sustainable” in sustainable development also places environmental aspects as a fundamental focus in addition to economic and social impacts by ensuring the integrity (supporting capacity and carrying capacity) of the environment. To gain a broader understanding, the aspects of sustainable development is illustrated in the figure below.

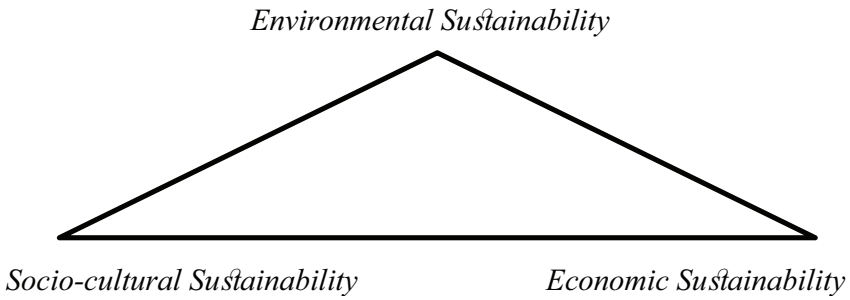

Figure 1: Three Dimensions of Sustainable Development. (Source: Analyzed by writer, adopted from Dahl, 2005; Northcote and Macbeth, 2006; Burstörm and Korhonen, 2001 in Alipour, Vaziri, & Ligay (2011)).

2.3. Community Participation

Community participation in this article can be interpreted as the involvement of an individual or group in one or a series of activities to achieve goals. In the concept of community participation, there is a division of authority that is agreed upon and carried out according to shared responsibilities. In practice, the success of policies including development programs and activities depends on the degree/level of stakeholder participation. Arnstein [12] formulated the concept of eight ladders of community participation (Eight Runs on Ladder of Citizen Participation) as indicators of analysis of the quality of community participation. In this article, the concept of community participation becomes the basis for analyzing the role of stakeholders in CSR activities

and partnerships by Donggi-Senoro LNG, regional-local government and community. To get a more detailed overview, community participation analysis refers to the degree of participation ladder as described in the following table:

Table 1: Participation Ladder.

8	*Citizen Control*	**Degree of Citizen Control**
7	*Delegate Power*	
6	*Partnership*	
5	*Placation*	**Degree of Tokenism**
4	*Consultation*	
3	*Informing*	
2	*Therapy*	**Non-Participation**
1	*Manipulation*	

Source: Arnstein (1971)

3. METHOD

This study used a qualitative descriptive approach to see how the impact of energy based-industrial development "Donggi-Senoro-LNG" on sustainable development sectors in Banggai Regency. The data sources of this research are primary data and secondary data. To obtain both primary and secondary data, data collection techniques in this study were carried out using in-depth interview, observation and documentation [13]. Particularly for primary data obtain, the writer conducted in-depth interviews with key informants and participant observation. Interviews were aimed to get a certain and practical overview of the Donggi-Senoro-LNG profile, the implementation of CSR, the role of regional government in planning, implementation, evaluation and reporting of the projects, also how all process of LNG development bring advantages for local community. The interviews referred to a purposive sampling method which includes informants consisting of non-governmental organization, Regional Planning and Development Agency, One-Stop Integrated Service and Investment Office and Donggi-Senoro LNG representatives.

In addition to interviews, primary data was also obtained through observational studies on community conditions and the environment around the LNG site. Secondary data was obtained through literature study and literature study of related primary data, results of previous research, and regulatory documents related to sustainable

development, legal framework for mining development at the regional and national levels.

Observation in this study aimed to reveal how the impact of Donggi-Senoro-LNG development, especially in economic, social and environmental sectors, as well as the problems. Documentation used to obtain direct information related to the management of Donggi-Senoro-LNG, regional regulations, and other relevant frameworks of regulation. The locus in this research is Donggi-Senoro-LNG, Luwuk, Banggai Regency, Central Sulawesi. The location selection was based on the fact that Donggi-Senoro-LNG is the first upstream-downstream LNG exploration scheme in Indonesia. The study was conducted in May-June 2021.

4. RESULTS AND DISCUSSION

4.1. Impact of DSLNG Project Development on Economic Sector

Regional Economic Improvement

DSLNG started its full operation in 2015, since the commencement of LNG shipment activities by DSLNG to Korea and Japan. By the end of September 2017, about 78 shipments had been made overseas. Since 2015, a number of revenues have been obtained at the local level of Banggai Regency as well as regional incomes of Central Sulawesi Province. The increase in income showed a positive trend from 2015 to 2020. This condition was triggered by the very large growth of foreign investment, especially in the mining sector in Central Sulawesi.

As shown in the table above, Central Sulawesi occupies the 5^{th} position as the highest investment destination in Indonesia, even the realization of foreign direct investment (FDI) continues to increase. Referring to these data, the liquefied natural gas (LNG) refinery in Banggai Regency, Central Sulawesi, namely PT Donggi Senoro has a very high investment share, around 96.12% of FDI investment in Central Sulawesi has flowed to the region and the company since 2013.

The high investment in the oil and gas industry establishment has directly increased the economic growth rate of Banggai Regency. In 2015-2019, the mining and quarrying sector (oil and gas, coal and lignite, metal ore, and others) became the highest economic driver in Banggai Regency. The high economic growth in Banggai Regency is driven by the start of LNG production (BPS Kabupaten Banggai, 2016). These data indicate that the mining and quarrying sector has a very large influence on the economic development of Banggai Regency. This can be seen from the GRDP of Banggai Regency which

Table 2: 10 Provinces with the Highest Realization of Foreign Investment.

Province	Foreign Inv					
	Project					
	2018	2019	2020	2018	2019	2020
West Java	4 713,0	5 526,0	11 031,0	5 573,5	5 881,0	4 793,7
DKI Jakarta	6 499,0	8 092,0	16 787,0	4 857,7	4 123,0	3 613,3
North Investment	47,0	128,0	182,0	362,8	1 008,5	2 409,0
Banten	1 895,0	2 559,0	4 288,0	2 827,3	1 868,2	2 143,6
Central Sulawesi	**154,0**	**209,0**	**388,0**	**672,4**	**1 805,0**	**1 779,0**
Riau Islands	804,0	1 279,0	2 143,0	831,3	1 363,4	1 649,4
East Java	1 441,0	2 142,0	4 059,0	1 333,4	866,3	1 575,5
South Sumatera	239,0	416,0	662,0	1 078,6	736,5	1 543,9
Central Java	801,0	1 249,0	2 795,0	2 372,7	2 723,2	1 363,6
Southeast Sulawesi	77,0	103,0	145,0	672,9	987,7	1 268,6
Indonesia	**21 972,0**	**30 354,0**	**56 726,0**	**29 307,9**	**28 208,8**	**28 666,3**
Note: Excluding Oil & Petroleum Sector, Banking, Non-Bank Financial Institutions, Insurance, Leases, Investments w						

Source: [14]

has the second highest nominal (in rupiah) in Central Sulawesi compared to other Regencies/Cities (see graph 2). This figure shows that the LNG development on a macro basis has made a positive contribution. For comparison, the average value of ADHB GRDP from 13 regencies/cities throughout Central Sulawesi is 12.89 trillion rupiah. Morowali Regency has the highest GRDP, followed by Banggai Regency and Palu.

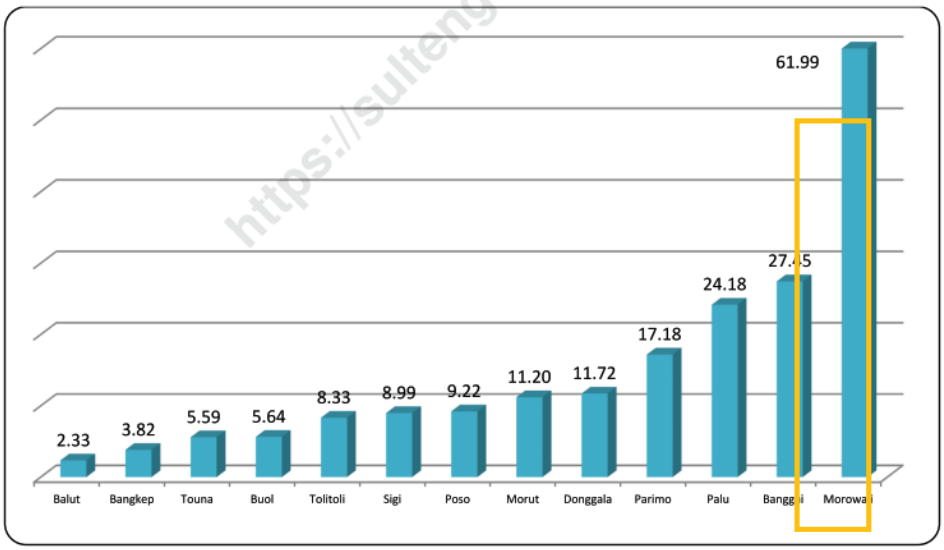

Figure 2: ADHB GRDP Value by Regency/City in Central Sulawesi (Trillion rupiah) in 2020. (Source: [15]).

4.2. Impact of DSLNG Project Development on Social Sector through CSR

a. *Expanding insight and motivation to further improve living standards*

In social sector, the establishment of the oil and gas industry to a certain extent is considered to led the insight and increased motivation of citizens to improve the quality of their human resources. It's similar with the motivation to improve living standards.

b. *Contribution to the implementation of socio-cultural activities*

In the socio-cultural activities of the community, the oil and gas companies are considered to contributed quite adequately. As indicated in the community development programs of oil and gas industry companies, there are various social assistances are provided to and utilized by the community.

c. *Access of some communities to the area where people's livelihoods are sourced*

In addition to the various positive impacts felt by the community, the operation of the oil and gas industry is considered to have caused a disturbance to the rights of the community related to the use of natural resources. "Restrictions" and "bans" on fishermen from placing FADs (Fish aggregating device) in the sea area that is now become the route for LNG tankers, are considered to have "robbed" the traditional rights of fishermen to use the area. Compensation given for FADs that must be dismantled/removed and/or providing assistance for fishing facilities, is considered not to be able to replace the "loss" that will be experienced in the long term.

d. *Longer access to transportation due to diversion of land/sea transportation routes around LNG installations*

The construction of oil and gas industry infrastructure has an impact on increasing various supporting infrastructure needed by the community. Among other things is the improvement of the quality of road infrastructure that connects various sub-districts with the district capital. In relative numbers, oil and gas industry companies have contributed to improving existing road infrastructure. However, the diversion of traffic lanes and the construction of new roads by DSLNG, although they have improved the quality of the roads to the maximum, are considered by the community to have increased the travel costs they have to pay, because the distances are getting longer.

e. *Prolonged land compensation process and disputes between residents*

Compensation for land is one aspect that often creates disputes between project parties and the community. During the operation period, the process of land compensation for the new road built by DSLNG was protracted in its completion and has also led to a dispute between two residents from different villages. Each of them claimed to be the owner of the land used for the road. In the upstream area, the FGDs conducted revealed cases of "borrowing" land certificates by Pertamina EP, which will be used to separate ownership of part of the land affected by the project, which is a protracted process that raises concerns among the community over the status of their land ownership.

f. *The domino effect of protests against oil and gas industry activities*

The disappointment of some community members towards oil and gas industry companies is often manifested in the form of rally by closing the traffic lanes connecting the oil and gas industry locations and the district capital. Rally are often carried out by residents in the Kintom and Nambo sub-districts demanding that oil and gas industry companies do something for the benefit of the people in the two sub-districts. The rally resulted in the disruption of land transportation connecting areas where the oil and gas industry is located and other areas around the district capital. One of the losers from the demonstration activity was the farmers in the Toili/West Toili area who were disturbed by the marketing of their agricultural products to the district capital, resulting in material losses.

4.3. Impact of DSLNG Project Development on the Environmental Sector

The operation of the gas chimney facility (flare) at the gas field location has become a source of concern for nearest residents regarding the impact on their safety and health. In addition, trucks transporting concentrates that pass into residential areas in the Toili/West Toili sub-districts are considered to cause disturbances in the form of air pollution and fears of health problems. In general, the analysis of the impact of DSLNG project development on the environmental sector can be viewed from the following 2 perspectives.

Environmental Quality Index in Banggai Regency

One of the environmental impact indicators caused by development projects is the change in the Environmental Quality Index (EQI). It can be used as a benchmark in the

macro scope at local and regional levels. This increase or decrease in EQI is not the main determinant, but is a determining factor for environmental conditions in a particular area. The table below provides an overview of Banggai Regency's EQI continues to decline from 2017 to 2020. In general, the EQI includes an Environmental Quality Index as measured by the Water Quality Index, Air Quality Index, and Land/Forest/Vegetation Cover Index.

Kabupaten *Regency*	2016	2017	2018	2019	2020
(1)	(2)	(3)	(4)	(5)	(6)
Kabupaten Banggai / Banggai Regency	-	-	83.08	82.07	79.62

Sumber/*Source*: Dinas Lingkungan Hidup Kabupaten Banggai/ Environmental Services of Banggai Regency

Figure 3: Environmental Quality Index Banggai Regency in 2020.

Kabupaten *Regency*	2016	2017	2018	2019	2020
(1)	(2)	(3)	(4)	(5)	(6)
Indeks Kualitas Air	-	-	-	-	70.00
Indeks Kualitas Udara	-	-	-	-	81.49
Indeks Kualitas Tutupan Lahan	-	-	-	-	85.43

Sumber/*Source*: Dinas Lingkungan Hidup Kabupaten Banggai/ Environmental Services of Banggai Regency

Figure 4: Water Quality Index, Air Quality Index, and Land Cover Quality Index of Banggai Regency in 2020.

Indirectly, the DSLNG industry also has an influence on the EQI of Banggai Regency. DSLNG is the largest mining sector/industry in Banggai Regency. The impact of natural gas processing certainly has an influence on the quality of air, water and land cover. In principle, corporate social responsibility programs should be able to minimize environmental impacts and contribute to EQI stability or improvement.

4.4. Community Participation in DSLNG's CSR Program

To facilitate the analysis, the authors measure the level of participation based on three main aspects of participation, namely understanding, benefits, and voluntarily as described in the table below:

Table 3: Main Aspects of Community Participation.

Level	Understanding	Benefits	Voluntarily
Citizen control	Yes	Yes	Initiatively
Delegated power	Yes	Yes	Initiatively
Partnership	Yes	Yes	Initiatively
Placation	Yes	Yes	Voluntarily
Consultation	Yes	Yes	Voluntarily
Informing	No	Yes	Voluntarily
Therapy	No	Yes	Obliged
Manipulation	No	No	Obliged

Source: [16]

In more detail, the results of the analysis of the level of participation in CSR programs are summarized in the following table:

Table 4: Community Participation in DSLNG's CSR Program.

Level	Understanding	Benefits	Voluntarily
Consultation	The public understand the information about CSR programs and participates in activities continuously	The community understand the benefits of CSR programs and makes good use of CSR facilities	The community voluntarily participates in CSR activities

5. CONCLUSION

The contribution of the oil and gas industry to regional revenue and economic development cannot be denied. Since the start, the contribution of the oil and gas industry to GRDP/Regional Spending in Banggai Regency in the form of profit-sharing funds has begun to show quite significant data. Although the proportion is still low compared to other primary sectors, especially the agriculture and plantation and marine sectors. In the future, although it is unlikely to shift the primary sector which has been the largest contributor to the Regency's GRDP, the contribution of the oil and gas industry will increase in line with the increase in LNG exports and or natural gas utilization for other domestic purposes. With the increase in the contribution of the oil and gas industry

to regional spending, it can be expected that this increase will be able to encourage development programs in Banggai Regency.

In addition to the district level, the existence of the oil and gas industry in Banggai Regency has also triggered the development of various physical facilities and infrastructure as well as economic growth/activity among the community, although only some members of the community have benefited from the existence of the oil and gas industry.

Apart from the benefits that can be felt at the district scale and by some community groups, the existence of the oil and gas industry directly or indirectly has caused various socio-economic and environmental problems. Various programs which were originally intended as an effort to mitigate the negative impacts of the existence of the oil and gas industry, in practice have not been able to achieve these goals/objectives. For this reason, several efforts need to be made, including, (1) strengthening regional development planning including a roadmap of planning documents that are integrated, holistic and based on regional advantages, (2) local government capacity in monitoring and evaluation, (3) strengthening public private partnerships through strategic partnership program, (4) a community-based CSR planning, implementation, and evaluation.

References

[1] D. Hartono, W. W. Purwanto, Nurkholis & I. A. Rum. Impact analysis of natural gas policy in Indonesia. Energy Sources, Part B: Economics, Planning, and Policy. 2017;12(8): 699-706.

[2] AGECC. Energy for sustainable future: Summary report and recommendation. New York: The Secretary-General‟s Advisory Group on Energy and Climate Change (AGECC); 2010.

[3] International Energy Agency. World energy outlook 2010. Paris: OECD/IEA; 2010.

[4] Henderson J, Moe A. Gazprom's LNG offensive: A demonstration of monopoly strength or impetus for Russian gas sector reform? Post-Communist Economies. 2016;28(3):281-299.

[5] D. Hartono, W. W. Purwanto, Nurkholis & I. A. Rum. Impact analysis of natural gas policy in Indonesia. Energy Sources, Part B: Economics, Planning, and Policy. 2017;12(8): 699-706.

[6] Decentralization Support Facility. Rencana strategis pulau sulawesi: Pembangunan kapasitas untuk perumusan kebijakan pembangunan daerah (Tahap II). Jakarta: DSF; 2011.

[7] Ministry of Energy and Mineral Resources. Policy roadmap for national natural gas 2014-2030. Ministry of Energy and Mineral Resources. 2014.

[8] Donggi Senoro-LNG. Company profile: DSLNG. Jakarta: Donggi Senoro-LNG; 2020.

[9] Gorys Keraf. Argumentasi dan Narasi. Jakarta. Gramedia. 2010.

[10] Winarno B. Kebijakan publik teori, proses, dan studi kasus. Yogyakarta: Center for Asia and Pacific Studies. 2014.

[11] Todaro MP. Pembangunan ekonomi di dunia ketiga. Jakarta: Erlangga; 2000.

[12] Arnstein SR. Passet, citizen participation: Affecting community change..New York: Praeger Publishers; 1971.

[13] Sugiyono. Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Bandung: Alfabeta. 2017.

[14] Badan Koordinasi Penanaman Modal. Data Realisasi Investasi NSWI. Jakarta: Badan Koordinasi Penanaman Modal. 2021.

[15] BPS Provinsi Sulawesi Tengah. Statistik Daerah Provinsi Sulawesi Tengah 2020. Palu: Badan Pusat Statistik. 2020.

[16] Citra Permatasari, Juli Soemirat, Siti Ainun. Identifikasi Tingkat Partisipasi Masyarakat dalam Pengelolaan Air Bersih di Kelurahan Cihaurgeulis. Jurnal Reka Lingkungan. 2018; 6(1): 1-10.