



IMPLEMENTATION OF GROUNDWATER USAGE REDUCTION POLICY IN SOUTH JAKARTA

IMPLEMENTASI KEBIJAKAN MINIMALISASI PENGGUNAAN AIR TANAH DI JAKARTA SELATAN

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Abstract

The accelerated urbanization of Jakarta is precipitating substantial transformations in the city's physical landscape, driven by urban planning initiatives, particularly in the realm of water resource management, with a pronounced reliance on groundwater. This surge in groundwater extraction, notably prevalent in South Jakarta, has led to increased land subsidence, necessitating the enforcement of Governor Regulation Number 162 of 2012. This regulatory framework delineates directives for water resource management, tailored to address the extensive use of groundwater in South Jakarta. This research aims to comprehensively analyze the implementation of policies designed to curtail groundwater usage in South Jakarta. Employing George Edwards III's Policy Implementation framework, four crucial indicators—communication, resources, disposition, and bureaucratic structure—are systematically investigated. Utilizing a descriptive, qualitative approach with data gathered through interviews, observations, and document analysis, the study reveals the pressing need for heightened communication efforts and identifies nuanced challenges in bureaucratic structure, particularly varying interests among agencies. The research advocates for intensified communication strategies and underscores the importance of inter-agency coordination, especially concerning established water tariffs.

Keywords: Implementation, Policy, Groundwater, Jakarta.

Abstrak

Percepatan urbanisasi di Jakarta memicu transformasi besar dalam lanskap fisik kota, yang didorong oleh inisiatif perencanaan kota, terutama dalam bidang pengelolaan sumber daya air, dengan ketergantungan yang besar pada air tanah. Lonjakan pengambilan air tanah, terutama di Jakarta Selatan, telah menyebabkan peningkatan penurunan permukaan tanah, yang mengharuskan pemberlakuan Peraturan Gubernur Nomor 162 Tahun 2012. Kerangka kerja peraturan ini menggambarkan arahan pengelolaan sumber daya air, yang disesuaikan untuk mengatasi penggunaan air tanah yang ekstensif di Jakarta Selatan. Penelitian ini bertujuan untuk menganalisis secara komprehensif implementasi kebijakan yang dirancang untuk mengurangi penggunaan air tanah di Jakarta Selatan. Dengan menggunakan kerangka kerja Implementasi Kebijakan George Edwards III, empat indikator penting - komunikasi, sumber daya, disposisi, dan struktur birokrasi - diselidiki secara sistematis. Dengan menggunakan pendekatan kualitatif deskriptif dengan data yang dikumpulkan melalui wawancara, observasi, dan analisis dokumen, penelitian ini mengungkapkan kebutuhan mendesak akan upaya komunikasi yang lebih baik dan mengidentifikasi berbagai tantangan dalam struktur birokrasi, terutama



perbedaan kepentingan di antara berbagai lembaga. Penelitian ini mengadvokasi strategi komunikasi yang lebih intensif dan menggarisbawahi pentingnya koordinasi antar lembaga, terutama terkait dengan tarif air yang telah ditetapkan.

Kata Kunci: Implementasi, Kebijakan, Air Tanah, Jakarta

INTRODUCTION

Water is a vital element essential for sustaining human life, and its utilisation varies according to diverse contextual needs. In agrarian environments, for instance, the role of water is crucial in facilitating agricultural, livestock, and fishery activities, reflecting the essential life-supporting functions in rural settings (Molden, 2013). In such areas, the volume of water required is expected to be relatively straightforward. Conversely, urban habitats show a significantly higher demand for water resources due to the large concentration of populations characteristic of metropolitan centres (Makbul et al., 2023; Ramdhan et al., 2021). Large populations living in urban conglomerates require substantial amounts of drinking water, not only for household consumption but also to meet the needs of industrial processes integral to urban economies (Dos Santos et al., 2017). Thus, the varied nature of water utilisation underscores the complex interaction between geographical contexts and societal demands, illustrating different paradigms of water needs in rural and urban environments.

According to Aprilia et al. (2022), thirteen rivers in the Jakarta area show raw water quality levels below the established standards, rendering the utilisation of these water sources infeasible. Consequently, raw water extraction from these thirteen rivers cannot be carried out due to poor water quality. However, it is noteworthy that among these, only two rivers, Krukut River and Cengkareng Drain, commendably comply with the established raw water quality standards (Silver, 2016). These two exceptional water streams maintain water quality levels exceeding the set benchmarks, distinguishing them as viable sources for raw water extraction (Prihatinningtyas et al., 2021). Essentially, this highlights a clear dichotomy in the quality of Jakarta's river waters, where most rivers do not meet the set standards, while certain rivers, represented by Krukut River and Cengkareng Drain, exemplify uncontaminated and regulation-compliant raw water quality.

In line with the provisions of Law No. 17 of 2019 on Water Resources, which states that the jurisdiction over water and its sources lies with the state, this responsibility is delegated to relevant ministries and local governments across various regions in Indonesia (Muryati & Triasih, 2021). Concurrently, the commendable initiative by the Provincial Government of DKI Jakarta to regain control over water resource management, transitioning from privatisation to local government supervision, is praiseworthy (Silver, 2007). This strategic policy statement is poised to synergistically align and strengthen the governance framework applied to groundwater resources in Jakarta. The articulated policy trajectory signifies a critical point in the regulatory landscape, embodying a careful shift towards local governance and state-backed stewardship of vital water assets, in accordance with the broader legal imperatives outlined in national legislation.

The establishment of the Governor of DKI Jakarta Regulation on Water Resource Management is underpinned by the primary objective of realising a wise, optimal, comprehensive, integrated, and sustainable water resource governance paradigm, highlighted by environmentally conscious practices aimed at enhancing public welfare. The conceptual framework outlined in Governor Regulation No. 162/2012, specifically detailed in Chapter 1, Article 1, Paragraph 9, states that water resource management is an integrated effort encompassing the planning, implementation, monitoring, and evaluation of initiatives directed at conservation, utilisation, and control of the destructive power of water resources. Further articulated in Governor Regulation No. 162/2012, Article 3, Paragraph (d), is



the provision that the orientation of water resource management is explicitly designed to reduce dependence on deep groundwater and shallow groundwater, emphasising the necessity of conservation practices in the extraction and utilisation processes. This regulatory framework thus signifies a sincere commitment to promoting sustainable water resource practices while ameliorating the potentially adverse environmental impacts associated with groundwater extraction.

The prescriptive guidelines outlined in the explanatory section regarding the principles and directives governing water resource management include the following:

1. The necessity to manage water resources holistically, with a higher emphasis on conservation and the wise use of water resources,.
2. Prioritisation of non-structural approaches in water resource conservation.
3. Utilisation of surface water, rainwater, recycled water, and desalinated seawater to enhance and increase water resilience in the DKI Jakarta region.
4. The necessity to minimise the use of deep and shallow groundwater, especially if used without concurrent conservation measures.
5. Priority should be placed on mitigation, adaptation, and damage control strategies to address the potentially harmful impacts of water's destructive power on life, with a particular focus on water bodies.
6. Empowerment of communities and commercial entities in matters related to the involvement and management of water resources. These directives collectively underscore a comprehensive and wise approach to water resource governance, encompassing conservation principles and pragmatic utilisation strategies to enhance the water resilience of DKI Jakarta.

The pragmatic implementation of water resource management policies in the administrative region of DKI Jakarta has experienced less than optimal realisation (Basuki et al., 2022). A relevant illustration of this phenomenon can be seen historically, particularly before the formulation of the current governor's regulations. In 1998, the provincial government of DKI Jakarta entered into a partnership with private entities, PALYJA and Aetra, for the management of clean water, a partnership scheduled to end in early 2023. Within the framework of this cooperation, an ambitious target was set to achieve 80 percent coverage by the end of that period. However, the current reality shows a striking difference, with clean water service coverage for Jakarta residents reaching only 65 percent, indicating a 15 percent shortfall from the established target of 80 percent (Alamsyah & Angela, 2023). This discrepancy underscores a gap that needs to be addressed in achieving the set benchmarks, necessitating a critical assessment of existing policies and their effective implementation in the complex realm of water resource management in DKI Jakarta.

Simultaneously, the extensive utilisation of groundwater has significant implications, particularly the phenomenon of land subsidence. Paradoxically, the northern sector of Jakarta has witnessed substantial manifestations of this phenomenon, with alarming rates of land subsidence recorded at 25 cm per year (Gambolati & Teatini, 2015). Additionally, the southern region of Jakarta also shows noticeable impacts, albeit on a smaller scale, with an annual land subsidence rate of 5 cm (Karana & Suprihardjo, 2013; Okta et al., 2022; Ramadhan & Taqwa, 2023). Although the current rate of land subsidence may not be considered significant, it is crucial to emphasise that continuous groundwater extraction in the southern Jakarta area has the potential to trigger more severe land subsidence in the future (Syaban & Appiah-Opoku, 2023).

METHODS

This study adopts a qualitative research paradigm, characterised by its depth in examining events based on existing empirical realities, as explained by Neuman (2014). Positioned within the scope of



qualitative research methodology, this study aims to offer not only explanations but also methodically and comprehensively structured descriptions and elucidations, in alignment with the descriptive typology described by Soejono (2005). Descriptive research, as proposed by Soejono, strives to provide an accurate depiction of individuals, conditions, and phenomena pertinent to the research questions, aiming to present a precise portrayal of phenomena in accordance with the research theme.

The research data sources include primary and secondary data. Primary data, obtained through in-depth interviews with various informants involved in the formulation of the governor's regulation (Pergub), provide direct insights. Complementing this, secondary data are gathered from a careful review of various documents and literature. The use of in-depth interviews aligns with Neuman's perspective, which underscores the importance of direct engagement with informants closely related to the Pergub formulation process, thus providing a more nuanced and immediate understanding.

Furthermore, the theoretical framework underlying this study is derived from George Edward III's policy implementation theory, encompassing aspects of communication, resources, disposition, and bureaucratic structure. This theoretical lens serves as an analytical scaffold, offering a structured examination of the policy enactment process in the context of water resource management in Jakarta.

RESULTS AND DISCUSSION

Results

South Jakarta, one of the administrative cities in the Province of DKI Jakarta, continues to enhance its public services and information systems oriented towards a smart city. The emblem of the administrative city of South Jakarta features five shields, adorned with depictions of the Rambutan tree, the Rapih Rambutan fruit, and the Gelatik bird, symbolising a green and tranquil natural environment embodying the ideals of unity, strength, and shared tranquility. Additionally, the expansive area of South Jakarta covers 145.73 km², with sub-districts showing variations in area size. Consisting of 10 sub-districts, Jagakarsa is the largest sub-district, covering an area of 24.87 km², while Mampang Prapatan is the smallest, with an area of 7.73 km².

Table 1
Population and Population Density of South Jakarta

Subdistrict	Area (sq km)	Population			Density	Sex Ratio
		Male	Female	Total		
Jagakarsa	24,87	190.808	188.069	378.877	15.236	101
Pasar Minggu	2169	153.546	151.713	305.259	14.071,20	101
Cilandak	18,16	98.442	101.913	200.358	11.030,90	97
Pesanggrahan	12,76	111.461	110.123	221.584	17.371,20	101
Keb. Lama	16,72	152.728	153.826	306.554	18.335,80	99
Keb. Baru	12,93	71.259	72.318	143.577	11.107,90	99
Mampang P.	7,73	74.906	71.224	146.130	18.902,80	105
Pancoran	8,63	77.477	76.342	153.819	18.037,10	101
Tebet	903	104.868	106.110	210.978	23.350,90	99
Setiabudi	8,85	70.340	69.256	139.596	15.776,20	102
Jumlah	141,37	1.105.835	1.100.897	2.206.732	15.621,00	100

Sources: Rencana Strategis Jakarta Selatan 2017-2022



The Administrative City of South Jakarta operates within a dynamic and strategic environment, presenting a convergence of challenges and opportunities. Among the challenges faced is the rapidly increasing urbanisation rate, where nearly 70% of the economic turnover is concentrated in Jakarta. Failure to effectively manage and control urbanisation in South Jakarta could potentially lead to a surge in slum settlements, worsening traffic congestion, and increased unemployment rates. Additionally, the region grapples with disaster threats, particularly floods, which historically affected all districts in 2014. Vulnerability to landslides is concentrated in the districts of Kebayoran Lama, Kebayoran Baru, Tebet, Pesanggrahan, Pasar Minggu, and Cilandak. Alongside this, recorded fire incidents in 2017 saw a 42% increase, totaling 348 cases. Therefore, there is a strategic need to optimise stakeholder engagement and enhance preparedness protocols to mitigate the occurrence and impacts of such disasters.

Furthermore, persistent traffic congestion looms large, given South Jakarta's strategic proximity to Central Jakarta, which serves as a hub for upper-middle-class economic activities. Despite these challenges, South Jakarta stands as a centre for economic activities, contributing 22% to Jakarta's Gross Regional Domestic Product, amounting to approximately 485.232 trillion Indonesian Rupiah. This economic hub has facilitated substantial employment absorption, with 1.33 million individuals engaged across various enterprises encompassing small, medium, and large-scale businesses.

Derived from policy, this discourse emphasises the importance of active participation, particularly in groundwater utilisation, with an emphasis on ethical and moral considerations. These strategic initiatives are crucial in the context of achieving clean water targets in Jakarta, reaching 824 million cubic metres in 2015. The Jakarta Provincial Government, in its commitment to provide clean water to Jakarta residents, has endeavoured through PAM Jaya, PALYJA, and Aetra since 1998. However, cumulative data until 2015 indicates that the annual distribution of clean piped water reached 560 million cubic meters. Field conditions in the same year showed a concerning network pipe leakage of 232 million cubic metres annually. Despite these efforts, a significant portion of Jakarta's population still relies on groundwater sources, with an annual consumption of 496 million cubic metres, indicating a utilisation rate of 60%, contrasting sharply with the 40% consumption from piped clean water. Thus, the collective clean water supply facilitated by PAM Jaya, PALYJA, and Aetra exclusively amounts to 328 million cubic metres annually. Detailed metrics are presented in Table 2 for a comprehensive review.

Table 2
Provision of Clean Water in Jakarta

Description	Quantity	Percentage
Clean water requirement	824, 7 million m ³	
Piped water provision	560,6 million m ³	
Pipeline network leakage	232, 2 million m ³	41,42%
Groundwater usage	496, 3 million m ³	60,18%
Piped water supply (nett)	328, 4 million m ³	

Sources: BPLHD DKI Jakarta

The permissible threshold for groundwater extraction is 30% of the total aquifer reserves, as exceeding this limit can lead to environmental degradation, as illustrated in the tabulated presentation above. Data sourced from the Jakarta Environmental Agency in 2018, relating to the Setiabudi and North Cipete areas, describes the groundwater quality in the Setiabudi region. In the groundwater quality description column, Setiabudi is classified as heavy, indicating a significant level of contamination. This contamination is attributed to a nitrate content of 2.93 and a sulphate content of 14.72. Therefore,



groundwater in this area is considered unfit for consumption, prompting residents to use piped clean water to ensure public health and safety.

Initiatives undertaken by the Jakarta Provincial Government to mitigate groundwater use, as reported by the Jakarta Provincial Development Planning Agency (Bappeda), are outlined as follows:

1. In 2019, the government initiated the construction of infiltration wells designed to address rainwater pooling by facilitating the absorption of rainwater into the ground during periods of sufficient rainfall. Strategically placed across Jakarta, these wells, totaling 7,500, aim to alleviate water pooling and provide sustainable groundwater recharge, thereby enhancing water availability during dry seasons.
2. In 2021, the government plans to implement real-time groundwater usage monitoring devices across all areas of Jakarta. Currently in the investigation stage, this programme primarily targets areas lacking clean water infrastructure. The deployment of these devices is expected to provide critical information on groundwater consumption dynamics, serving as a basis for targeted interventions in areas without access to piped water.

Scheduled for 2022, the government plans to initiate the establishment of groundwater-free zones specifically designed for areas already served by existing piped water networks. This strategic step aims to reduce dependence on groundwater in areas where piped water infrastructure is available, thereby promoting a transition towards sustainable and centralised water supply systems.

Discussion

Communication

According to insights gathered from an interview with Informant 1, who serves as the Head of the Groundwater Utilisation Section at the Department of Industry and Energy (DPE), the explanation regarding the understanding of Governor Regulation No. 162 of 2012, titled "Direction, Policy, and Strategy for Water Resources Management," reveals that the mandate for water resources management falls under the purview of DPE, encompassing collaborative efforts towards groundwater conservation. This mandate is supported by regulations outlined in Governor Regulation No. 267 of 2016, which delineates the organisational framework and operational protocols for the Department of Industry and Energy. Additionally, Governor Regulation No. 113 of 2005 elaborates guidelines related to the supervision and monitoring of groundwater, covering activities ranging from public mining, oil and gas, and electricity efforts.

Within the scope of DPE's responsibilities regarding groundwater use minimization programmes, explicit provisions are articulated in Governor Regulation No. 267/2016, particularly in Article 3, subparagraph (q), describing the implementation of groundwater conservation initiatives. This initiative mandates DPE to undertake comprehensive planning, development, management, supervision, control, and evaluation for industrial and energy affairs. The realisation of groundwater conservation efforts, as outlined by the Department of Industry and Energy, is marked by the effective closure regulations for shallow and bore wells in the Setiabudi area. Concurrently, public awareness campaigns have been conducted, advocating for the cessation of groundwater use and a swift transition to clean piped water alternatives.

Resources

Based on interview findings, operationalization of this indicator within two SKPDs, namely the Department of Industry and Energy (DPE) and PAM Jaya, has shown positive results. The Department of Industry and Energy explains that its staff actively contributes to policy directive implementation through a team of 25 members possessing adequate expertise in their field. Additionally, in the case of



PAM Jaya, strong staff support is noted, with a personnel count of 825 individuals, a configuration deemed highly sufficient for the smooth implementation of policies.

Findings from interviews focused on authority indicators indicate a regulatory framework describing oversight responsibilities entrusted to the Department of Industry and Energy for enforcement of related regulations. This oversight includes monitoring registered and unregistered groundwater utilisation, vigilance in groundwater drainage activities, and enforcement against violations in groundwater utilisation practices. Simultaneously, PAM Jaya acts as overseer for PALYJA and Aetra, monitoring the oversight processes conducted by local governments over these two private companies. This regulatory framework serves dual purposes of expanding the customer base and enhancing the provision of the provision of clean piped water services.

Disposition

Findings from interview analysis and observational data indicate satisfactory implementation of policy regulations regarding the effective provision of clean water. However, significant discrepancies emerge within the community, particularly among PALYJA clean water users. These users express a tendency to rely on clean water due to a perceived lack of initiatives by PALYJA officials to disseminate information. This indicates a clear mismatch, implying that PAM Jaya, entrusted with overseeing PALYJA, may not demonstrate full commitment or a proactive stance in improving customer relations and services.

Table 3
Clean Water Tariffs in Jakarta

No	Customer Group	Usage Block and Clean Water Tariff Per m ³		
		0 - 10 m ³	11 - 20 m ³	> 20 m ³
1	Group I	1.050	1.050	1.050
2	Group II	1.050	1.050	1.575
3	Group III A	3.550	4.700	5.500
4	Group III B	4.900	6.000	7.450
5	Group IV A	6.825	8.150	9.800
6	Group IV B	12.550	12.550	12.550
7	Group V/Special	14.650	14.650	14.650

Sources: PAM Jaya

In Table 3 above, there are customer group sections, with each group having different allocations. Here are the explanations for the customer groups:

1. Group I: places of worship, public hydrants and water mains, dormitories and social institutions, orphanages, and similar entities.
2. Group II: government hospitals, very basic households, water stations and tanker trucks, very basic apartment buildings, and similar entities.
3. Group III A: simple households, modest apartment buildings, and similar entities.
4. Group III B: middle-income households, medium apartment buildings, small stalls and shops, small workshops, small home-based businesses, non-commercial private institutions, and similar entities.
5. Group IV A; luxurious households, embassies/consulates, government agency offices, foreign representative offices, commercial private institutions, tailors, military institutions, medium



- workshops, medium home-based businesses/lodgings, barbershops, restaurants, private hospitals/clinics, law offices, laboratories, small industries, luxury apartment buildings, doctor practices, budget/non-star hotels, shop houses/shophouses, and similar entities.
6. Group IV B: 1, 2, 3-star hotels or motels, beauty salons, cafes, banks, service stations, large workshops, companies/trade/businesses, 4 and 5-star hotels, high-rise buildings/condominiums, ice factories, food or beverage factories, chemical or pharmaceutical or cosmetic factories, textile factories, warehouses, water barges, PT Jaya Ancol, and similar entities.
 7. Group V/Special; BPP Tanjung Priok; and similar entities.

Bureaucratic Structure

Standard Operating Procedures (SOP) are routine activities that provide employees with means to carry out tasks according to established standards. These SOPs are outlined in Regional Regulation No. 113 of 2005 for the Department of Industry and Energy (DPE), while PAM Jaya's SOPs are regulated under Regional Regulation No. 11 of 1993. Both the Department of Industry and Energy and PAM Jaya demonstrate comprehensive understanding of their respective roles and authorities, maintaining coordinated workflow in efforts towards water resource management. There are no significant conflicts or differences of interest between the Department of Industry and Energy and PAM Jaya due to smooth coordination. However, conflicts of interest arise between PAM Jaya and the private companies PALYJA and Aetra. These disputes stem from differing interests regarding water tariff increases and the cessation of investments by these private companies. Overall, operational dynamics are generally good, given the division of roles and authorities within an integrated coordination framework. Of particular concern is the conflict between PAM Jaya and the aforementioned private companies due to inadequate coordination regarding water tariff adjustments.

CONCLUSION

Conclusion

In presenting consecutive findings and discussions, this research concludes that the assessment of policy implementation metrics, as explained through George C. Edward III's theoretical framework, consists of four critical indicators that play a vital role in ensuring implementation success. These four indicators are communication, resources, disposition, and bureaucratic structure within the context of Edward III's policy implementation model.

1. In the dimension of communication, the evaluation of the success of the policy to minimise groundwater use in South Jakarta heavily depends on communication variables. While stakeholders have performed adequately, there remains a deficiency in public awareness regarding Governor Regulation No. 162 of 2012. As a result, optimal success in communication variables has not been fully achieved.
2. Further assessing the success of policy implementation from the perspective of resource variables, this study underscores the sufficiency of human resources in the Department of Industry and Energy and PAM Jaya. This sufficiency is evidenced by the number of personnel in both institutions, exemplified by 25 personnel in the Department of Industry and Energy managing groundwater and 825 personnel in PAM Jaya.
3. Regarding the disposition indicator, the research findings indicate a good understanding among policy implementers regarding their designated responsibilities, such as the closure of 7,500 wells in Jakarta and the success in persuading the public to use piped water from PAM Jaya, PALYJA, and/or Aetra. However, there remains public disagreement over the perceived high cost of clean water.



4. The bureaucratic structure variable shows good compliance with Standard Operating Procedures (SOPs) by the implementers. Nevertheless, challenges arise from conflicting interests between PAM Jaya, PALYJA, and Aetra, particularly concerning PAM Jaya's concerns about the cessation of funding and investments from these three companies due to the expiration of their cooperation in 2023. Additionally, the transition from the Jakarta Provincial Department of Industry and Energy to the Water Resources Department in 2020 adds an important administrative layer to this complex policy landscape.

Recomendation

The Jakarta government is urged to conduct campaigns aimed at raising public awareness regarding the urgency of using piped water. Firm actions should be taken against companies still using groundwater in an effort to enforce this policy. The government also plays a crucial role in pioneering the setting of water tariffs, aiming to create equitable treatment for all Jakarta residents. Through these steps, it is hoped that public awareness and compliance with using piped water will be achieved, along with the establishment of equitable treatment among all segments of Jakarta society.

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