

Sustainable Development: Driving and Inhibiting Factor Affecting the Clean Water Management System in Indonesia

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Abstract

This research aimed to understand the driving and inhibiting factors affecting the clean water management system in Indonesia at the ontological and sociological levels based on the public policy perspective. This research adopted a qualitative method. Data were collected through observation and documentation. Data analysis used interactive steps, which were data reduction, data display, and data verification, supported by triangulation. The results indicated that the driving and inhibiting factors affecting the clean water management system in Indonesia and its implementation provided inputs for developing better regulation and policies for state agencies as public officials and practitioners in managing the clean water management system in Indonesia.

Keywords: Public Policy Theory, Institutional Theory, Water Management System.

INTRODUCTION

Clean water and proper sanitation are basic human needs. Providing clean water and sanitation to all people is one of the main goals of the Sustainable Development Goals (SDGs) that pertain to the environment. Policy, education, innovation, technology, and behavior all have an impact on the importance of clean water and sanitation, which are essential for life. The importance of quality clean water services is also recognized internationally. In various international agreements and declarations, including in the UN 2030 Agenda for Sustainable Development, it is stated that every individual has the right to have access to safe, affordable, and sustainable drinking water. Quality clean water services are also recognized as one of the main goals for overcoming poverty, improving public health, and achieving sustainable development (Cetrulo, Marques, Malheiros, & Cetrulo, 2020). Thus, ensuring quality clean water services is the responsibility of the government and related parties. The availability of safe and quality water must be prioritized in the planning and management of water resources and the construction of adequate infrastructure. This also involves effective institutional aspects, including strong regulations, good inter-agency coordination, and active community participation in decision-making related to clean water services. According to the World Health Organization (WHO), access to affordable and safe clean water is a key factor in fulfilling the human right to health. Water that does not meet safety standards can be a source of transmission of various diseases, including diarrhea, cholera, and other infectious diseases. Research also shows that poor quality drinking water can negatively impact children's physical and cognitive development. John Briscoe, a professor at Harvard University, stated that affordable and safe clean water services have a significant impact on increasing life expectancy and the quality of life of the people. In his research, he emphasized the importance of access to adequate clean water and affordable prices as an important step in achieving sustainable development goals (Briscoe, 2009).

Ecological water management is typically seen as an achievement in politics and cultures rather than a professional technical area. The process of incorporating ecological expertise into the hydraulic engineering bureaucracy has not been adequately explained. Examining the debate concerning dams in the Netherlands reveals that public environmental politics are altering the politics of interprofessional competition. Ecologists expand their professional jurisdiction by exploiting the political bankruptcy of the Dutch coastal engineering agency and aim to adjust their practice to conform to the dominant professional civil engineering culture

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(Disco, 2002). The Netherlands has experienced considerable changes in both water management and spatial design. In the past, the focus has been on fighting water using dams and dikes. On the other hand, a new approach emphasizes the use of water as a structural element in spatial planning. This modification considers how water affects how land is used and developed. There has been controversy in Dutch spatial planning about the new practice of area-specific development planning as it is believed to better reflect contemporary spatial planning concepts than traditional Dutch planning philosophy. The institutional change takes into consideration new regulations, creative policy approaches, and policy contexts (Wiering & Immink, 2006).

According to a case study done in Ontario, the goal of developing and growing municipal water and sewer systems was to counteract the risk of disease. City managers and sanitation experts are seeking solutions that integrate the responsibility of public services in supporting sanitation measures (MacNaughton, 1999). Water management is a complex sector that intersects with many others, encompassing a highly distinct set of interests and stakeholders with varying attitudes, leading to notable governance difficulties. The recommended technique for dealing with this scenario is through integrated water resource management. Integration as a foundation for balanced governance and policymaking has a long history and a wealth of positive and negative experiences. Some experience has led to the conclusion that there are numerous vertical and horizontal obstacles. There is an offer about a water governance phase for systematic integration, and the integration is implemented into the framework (Varis, Enckell, & Keskinen, 2014). Based on a public policy standpoint, there is a comparison study on the manner of delivering clean water in Hong Kong and Jakarta. Hong Kong has several water supply methods. Presently, toilets are being flushed using seawater and water imported from China. According to the Indonesian Constitution, the state has the responsibility to provide sufficient water resources to meet the demands of its population. Coastal areas have not had full access to piped water until today, thus water supply is based on community acceptance (Huwaina & Koestoer, 2022).

Water treatment technology is a highly developed field capable of providing water purity at practically any desired level. The main obstacle in choosing a certain process is determining which technology is best suited and adaptable to a specific social, political, and economic setting. Greece is making headway in the wastewater treatment sector. There are many challenges in adopting policies for wastewater management, including lessons relevant to developing nations, historical and economic factors, and pollution avoidance techniques (Tsagarakis, Mara, & Angelakis, 2001). The decision-making processes for critical functions such as water supply management and regulation, new water supply management and regulation, integrated water management, groundwater resource protection, alternative water source development, water recycling and conservation programs, water release rainfall control, and water extraction and use regulation for water protection should be more transparent and accountable. The legal aspects of water funding are addressed in *Paying for Water in California*. *Paying for Water* highlights the significance of municipal money in supporting California's water system. The financial gap in small rural community drinking water supply and water restoration activities is critical. This gap indicates legal impediments to obtaining more funds on a local level, since urban water and wastewater systems face looming issues connected to rising expenses and legal barriers to boosting costs to support contemporary integrated water management. Following a thorough analysis of the effects of restrictions on government programs, traditional funding sources for water development, management, and regulation are considered. Significant impediments to economically sustainable rational funding of water services exist, and interpretations of prohibitions compound these barriers, necessitating legal reform. Recommendations that water bodies, legislators, and judges investigate ways to enhance legal issues that are incompatible with sound and creative water resource management (Gray et al., 2014).

The theory of sustainability also emphasizes the importance of affordable and safe clean water services. According to this theory, quality clean water services must consider economic, social, and environmental aspects. Economically affordable clean water will ensure that all levels of society can access it without compromising other basic needs. In addition, clean water security is also related to efforts to manage water resources in a sustainable manner, including maintaining water quality, protecting water resources, and efficient use (Smiley & Stoler, 2020). World Conference on Sustainable Development agenda aims to renew the world's commitment to sustainable development. The conference agreed on a plan to implement sustainable values in sustainable development. This signifies an approach within the three pillars of sustainable development.

Without a doubt, the goals of sustainable development include equality in social welfare, economic development, and environmental protection. It's an interconnected system. The definition of sustainable development itself depends on how space and time are related, and the concept itself is based on a particular way of thinking. Therefore, sustainable development relies on a basic systems approach that tries to understand the existing interactions of the three pillars (environmental, social and economic) in an effort to realize better consequences of our actions. Based on the United States Environmental Protection Agency, sustainable development can be realized through the six aspects contained in each development pillar (Sajid, da Silva, & Danial, 2021).

It is necessary to put in place a system of performance accountability for government entities. It will provide practitioners and public authorities the input they need to create regulations that are more effective (Priyambodo, Wijaya, Wike, Sujarwoto, & Riyadi, 2023a, 2023b; Toruan, Gusti, & Riyadi, 2023). In order to provide stakeholders the knowledge and input they need to create better rules and policies, community empowerment must be put into practice (Nalikan, Rozikin, Sumartono, Suryadi, & Riyadi, 2023). Public-Private Partnership practices and policies furnish information to stakeholders (Syahrudin, Wijaya, Suryono, & Riyadi, 2023). To create better regulations, the collaboration needs to include the pertinent institutions (Tjahjono, Suryono, Riyanto, Amin, & Riyadi, 2023). To keep stakeholders informed, a conflict management strategy and an implementation plan are necessary (Toruan, Riyadi, & Gusti, 2023). In order to give public authorities clear input and information so they may develop better rules, it is imperative to put more effective policies into place (Rozikin, Wijaya, & Riyadi, 2023). Information regarding the application of collaborative governance in the development of digital infrastructure must be made available to stakeholders (Rozikin, Sulisty, Saleh, Hermawan, & Riyadi, 2023). To make regulations better, a policy has to be developed and put into action (Sipayung, Sumartono, Saleh, Rozikin, & Riyadi, 2023a).

To improve policy and practice and give stakeholders the knowledge they require, leadership and service are essential (Purbiantari, Zauhar, Suryadi, Hermawan, & Riyadi, 2023a). Undoubtedly, enhancing Job Competency is greatly aided by Transformational Leadership, Technology Adoption, and Public Service (Purbiantari, Zauhar, Suryadi, Hermawan, & Riyadi, 2023b). User satisfaction indisputably enhances organizational performance. (Sinulingga et al., 2023). The impact of information technology on innovative work practices is mediated by workplace spirituality, and the impact of transformational leadership on innovative work practices is also mediated (Susilo, Astuti, Arifin, Mawardi, & Riyadi, 2023). Empowerment of the community has a measurable positive impact on social capital and production capacity (Nuraini, Saleh, Wike, & Riyadi, 2023). Community empowerment is positively impacted by social capital and social leadership. Furthermore, the connection between social leadership and community empowerment is totally mediated by social capital (Rozikin, Nalikan, Sumartono, Suryadi, & Riyadi, 2023). Positive effects are seen in the program's content and implementation setting. Moreover, the collaborative governance has a good impact on the program. (Sipayung, Sumartono, Saleh, Rozikin, & Riyadi, 2023b). Further research is necessary to investigate the causes, practices, and outcomes of cooperation, competence, and performance. It should be noted that the effects of misbehavior can result in social and monetary losses. Therefore, it is imperative that involvement be required on both sides. Cooperation, proficiency, and performance are all interconnected. Between performance and partnership relationships, capabilities must function as a thorough mediator. The employment of dispute resolution is the sole way to attain cooperation, knowledge exchange, and effective and influential capabilities. Likewise, there is a positive and significant influence of job satisfaction on productivity (Assery, Tjahjono, Palupi, & Dzakiyullah, 2020; Assery, Tjahjono, Sobirin, & Hartono, 2017; Feriyanto, Assery, Saleh, & Suryaningsum, 2017; Hendriarti, Othman, Arif, Assery, & Jamal, 2022; Purnama, Tjahjono, Assery, & Dzakiyullah, 2020; Saleh, Assery, & Dzakiyullah, 2018; Saleh, Assery, Sabihaini, & Suryaningsum, 2017).

The impact of Public Service on Job Competency, specifically in relation to the Performance Accountability System, is notably favorable. The concepts of leadership and service can be classified into various thematic categories that offer valuable insights for enhancing policy and practice. The impact of user satisfaction on organizational performance is both positive and statistically significant. The impact of transformational leadership on innovative work behavior is mediated by an innovative climate, while the influence of information technology on innovative work behavior is mediated by workplace spirituality (Chandra & Riyadi, 2024; Nur,

Riyadi, Saleh, & Hermanto, 2024; Priyambodo et al., 2023a, 2023b; Purbiyantari et al., 2023a, 2023b; Purboyo, Riyadi, Irawan, & Inkiriwang, 2024; B. S. Riyadi, 2024; Sinulingga et al., 2023; Susilo et al., 2023; Syahrudin et al., 2023; Tjahjono et al., 2023; Toruan, Gusti, et al., 2023). It is essential to address the extent of the conflict of interest resulting from political negotiations, misuse of authority and personal interests. The state must retain its authority in managing Indonesia's vast natural resources (Hermanto & Riyadi, 2020; B. S. Riyadi, 2017, 2020b, 2020a; B. S. Riyadi, Atmoredjo, & Sukisno, 2020; B. S. Riyadi, Wibowo, & Susanti, 2020). There is also a study examines white-collar crime in Indonesia during the reform period, focusing on state officials, parliament, and political parties, found that white-collar crime has reached alarming levels, potentially forming state organized (Chandra & Riyadi, 2024; Purboyo et al., 2024; B. S. Riyadi, 2024; B. Sl. Riyadi, 2024)

The World Resource Institute (2019) predicted that by 2020, 49 countries would be experiencing severe water scarcity. It is anticipated that this number will rise in 2040 to 59 countries. The level of water scarcity is obtained from the calculation on the amount of water used from the domestic, agricultural, and industrial sectors compared to the available supply of surface water and groundwater. According to data from the World Resource Institute (WRI), water withdrawal keeps increasing. For instance, in 1960, a total volume of water extracted for human needs was only close to 2,000 cubic kilometers per year. In 2014, the total volume of water extracted was nearly 5,000 cubic kilometers per year. The total volume of water extracted was used for four sectors, including agriculture, industry, domestic, and animal husbandry. According to the Food and Agriculture Organization (FAO), there are four factors driving water scarcity in the next few decades, first is the inevitable growth in population, second is the increasing number of areas utilized for urban areas, concentrating the water needs in urban areas even though water resources in urban areas are increasingly limited, third is water consumption per person, increasing in line with world conditions that are increasingly developing, and the last is water resources increasingly threatened by increasing climate change (Boretta & Rosa, 2019).

According to a shocking 2020 study by the Republic of Indonesia's Ministry of Health, drinking water tainted with *Escherichia coli* (*E. coli*) bacteria is consumed by seven out of ten Indonesian households. It is imperative to acknowledge that water is an essential constituent of the human body. As a result, making sure everyone has access to clean, drinkable water needs to come first. Still, according to the Ministry of National Development Planning, only 7% of Indonesians would have access to safe sanitation in 2020, indicating the country's continued low accomplishment in this area. This is a significant shortfall compared to Thailand, where 26% of the population has access to safe sanitation, and India, where the figure stands at 46%. One of the problems faced is the availability of adequate clean water. Some areas still face difficulties in obtaining an adequate supply of clean water, especially during the dry season or when technical problems occur in the water distribution system. This has an impact on people's quality of life and can increase the risk of disease due to consumption of polluted water. In addition, the quality of clean water is also an important concern. Some water sources are exposed to industrial pollution, agricultural waste, or other factors that can contaminate drinking water, leading to public health issues and increased in the risk of waterborne diseases. Another issue is insufficient infrastructure. Water distribution infrastructure still needs improvement in certain areas, which might include more widespread pipeline networks and more effective water supply systems. This can prevent clean water from being distributed properly to the entire community. Several regions still face challenges in establishing a wide and efficient network of clean water pipes. Consequently, some individuals continue to depend on water sources, for instance, shallow wells or surface water sources, that are not confirmed to be clean and are susceptible to contamination. This limitation in infrastructure restricts people's access to safe and clean water, which can raise the likelihood of waterborne diseases.

The emphasis placed by different paradigms on the public and private aspects of drinking water varies. Different institutional arrangements are formed as a result of these paradigms, and these arrangements are influenced by time and place. It is clear that a paradigm shift, such as going from a deconcentrating paradigm to a democratic devolution paradigm, will result in considerable changes to the institutional design for service delivery. Effective institutional development can include careful planning, close supervision, and good coordination between various stakeholders. The institutional model must be able to predict future demand for clean water by considering population growth, environmental changes, and development of the industrial

sector. In addition, strict supervision is necessary to ensure that clean water services meet the set quality standards, as well as to prevent practices that are detrimental to society or the environment. According to the aforementioned research results, it remains unclear whether previous attempts by researchers to assess Indonesia's clean water management system have been successful. Meanwhile, researchers tried to explore it and identified the problems that occur in the clean water management system in Indonesia. The research problem was how are the driving and inhibiting factors in the clean water management system in Indonesia?

LITERATURE REVIEW

Institutional Theory

An institutional theory is a valuable framework for understanding and analyzing organizational and individual behavior in the context of society. This theory recognizes the impact of wider societal cultural traditions and particular institutions on human behavior. It highlights the significance of rules, regulations, norms, as well as formal and informal comprehension in shaping behavior. The normative dimension of institutional theory asserts that behavior is not only influenced by cultural traditions but also by certain institutions with which individuals and organizations interact on a regular basis. According to institutional theory, organizations adhere to social standards and expectations to obtain legitimacy and acceptance from their stakeholders. These norms and expectations are considered as institutional pressures, which influence organizational behavior and practices. For example, organizations may adopt certain practices or strategies that are widely accepted and respected in their industry or community in order to align with institutional norms and gain legitimacy. Compliance with these institutional norms is important for organizations as it helps them build credibility and trust with their stakeholders, such as customers, investors, employees and regulators. The institutional theory also emphasizes the influence of socio-cultural norms and values, as well as the influence of law and the justice system, on organizational structure and behavior. It suggests that organizations are influenced by their external environment and the pressure exerted by various institutions. These external pressures can shape organizational behavior and practices, leading to the adoption of certain strategies or actions that are in line with societal expectations. In addition to conforming to societal norms and expectations, organizations may also face pressure from certain institutions, such as regulatory agencies or industry associations, which in turn shape their behavior and practices. In addition, the institutional theory recognizes the importance of cognitive variables in shaping organizational behavior. For example, organizations may have certain beliefs or values that are influenced by the cultural norms and values of their wider society. According to the normative dimension of institutional theory, cultural traditions and institutions guide behavior. Individuals and organizations interact with these institutions on a regular basis, and they impose formal and informal constraints that govern economic activity and human behavior. This dimension emphasizes that behavior is not only influenced by the wider societal cultural traditions, but also by the specific institutions that individuals and organizations interact with. These institutions, through regular interactions, shape the behavior of individuals and organizations by providing them with prescribed norms, values and expectations to follow. In short, the institutional theory suggests that organizations are influenced by their external environment and the pressures exerted by various institutions. According to the institutional theory, organizations form as a result of pressure from the institutional environment, which leads to the institutionalization process. It makes the argument that organizations exist on a large scale and that, via institutionalization or adoption, all organizations have an impact on other types of organizations. The institutionalization process on the organizational basis is where the organizations are formed by the institutional environment that surrounds them (DiMaggio & Powell, 1983).

Considering that the institution is at the highest macro-level, it must be the primary target for capacity building efforts. In terms of institutional capacity, level perspective, institutions in the context of development planning are mainly concerned with tasks, functions, roles and mechanisms involved inter-institutional relations within the planning process itself. In this regard, it is important to understand the typology and character of each government organization in a planning system relationship map (Tamm Hallström & Segnestam Larsson, 2019). An explanation of the type of bureaucracy with its important parts describes the role of institutions in the context of development planning. In addition, it will be collaborated with the institutional exploration such as government organization dimension.

The research's conclusions are grounded in a sociological and epistemological analysis of several institutional theory definitions. This gives us the assurance to say that the development of several policies on the motivating and impeding elements of Indonesia's clean water management system is a component of institutional theory.

Public Policy

Public policy is a multifaceted tapestry of interdependent collective choices, including decisive actions taken by government agencies and offices. A set of government-determined and -implemented measures aimed at the common good constitute public policy. This insight clarifies why merely declaring the need for government action is insufficient. Specific, well-defined goals and objectives must guide the implementation of action for the good of the entire community. The five interconnected steps of the public policy process work as a cycle. These actions take place in a sequential order and are a part of a convoluted, non-linear, and fundamentally political process. The primary objective of public policy analysis is to generate, evaluate, and disseminate knowledge regarding the policy-making process (Dunn, 2012).

A significant first step in lessening government dominance and making room for the private sector in public services is the establishment of a New Public Management paradigm. In order to increase competition and the effectiveness of results-driven public services, new models of public policy are required, ones that encourage innovation in the delivery of services and alter the current rules of the game (Hood, 1991). With an emphasis on organizational structures based on decentralization, democratization, responsiveness, involvement, and community-driven services, the New Public Management places a high priority on the ideals of humanity and social justice. The establishment of organizational structure and managerial functions is given top priority in classical bureaucracy, with a focus on corporate and government bureaucracies. Additionally, it makes it easier for fundamental principles like economy, effectiveness, efficiency, and reason to advance. Decision-making methods based on research, systems, behavior, and management are all given equal weight in neo-bureaucracy. It covers bureaucratic choices made by the government and has an equally broad scope. One of the main effects of neo-bureaucracy is the growth of economy, rationality, effectiveness, and efficiency (Frederickson, 1976). One of the most important aspects of the public administration sector's reform was the dramatic paradigm change in favor of the New Public Management (NPM). NPM approaches the public sector from a business perspective. Experts in the assessment of public policy, including policy analysts, are schooled in the principles of the market economy, benefit and cost analysis, and the use of rational choice models (Denhardt, R. B., & Denhardt, 2000).

The concept of public policy theory can be used to analyze the creation of multiple policies focusing on the driving and inhibiting factors in the clean water management within Indonesia, based on epistemological and sociological descriptions of the theory.

Water Management System

Water is a valuable resource that is essential for the survival and well-being of all living organisms on our planet. It is clear that there is a significant difference in the way in which water resources are managed in developing and developed countries. The lack of infrastructure, financial resources and good governance in developing countries makes the management of these resources an enormous challenge. This often results in water scarcity, inadequate sanitation, and a lack of access to clean water for a large proportion of the population. In contrast, developed countries generally have an established water management system that prioritizes efficiency, sustainability, and equitable access to water resources. Despite these differences, both developing and developed countries recognize the importance of water management and the need to address water scarcity and wastewater treatment. Water management and wastewater treatment initiatives have received increasing attention in recent years, even in developing countries with limited technological resources. Many international organizations and governments have recognized the importance of addressing water management challenges in developing countries. Water management challenges are more common in developing countries due to increasing pressure on water resources (Hering & Ingold, 2012).

We rely on water resource systems for our survival and well-being. The most effective approach to face the increasing development pressure is preserving the land in watersheds and the water in rivers, streams, and lakes. The ongoing responsibility of water resource planners and managers is to identify the various impacts and trade-offs resulting from their objective in view of the limited predictability of the future. In the far future, they will choose whether to do a particular action or not. Professionals from many different fields, with a far wider scope than just water management, must be involved in this endeavor. The political process, which includes options in the decision-making process, determines the identified impacts and trade-offs (Loucks, 2000). The possibility that Integrated Water Resources Management (IWRM) can resolve the current water problem has been a major topic of discussion for the past thirty years. It also identifies seven critical challenges for IWRM implementation. Water resources like rivers and aquifers are crucial to the survival of all life forms on Earth. Sustainable development requires us to integrate our management of our most vital natural resource, water, through Integrated Water Resources Management. The natural environment and living both depend on water. Analyzing the evolution of IWRM over the last thirty years and projecting future application roadblocks are critical (Rahaman & Varis, 2005).

One of the main negative effects of climate change is global warming. Other anomalies accompany it, such as a lack of water resources, a decline in agricultural output, a lack of food security, increasing sea levels, melting glaciers, and a decline in biodiversity. Over time, the effects of climate change have resulted in a decline in air quality and agricultural productivity. Crop productivity is highly dependent on the climate. It is impacted by long-term patterns in temperature and precipitation, yearly changes in the climate, shocks experienced at various phases of growth, and extreme weather occurrences. Worldwide, farms that grow main crops are being affected by drought. We can no longer afford to overlook the fact that drought is having an impact on global food production since the area beneath these crops is getting smaller. Wheat, peas, sorghum, barley, maize, rice, and soybeans are all vulnerable. As temperatures rise, wheat yield will decrease. Watershed management, equitable policy for water delivery, river health maintenance, and increased storage of water are the obvious solutions. The detrimental effects that climate change has on water supplies can only be controlled in this way. Technical interventions, which include software, nutrient management, air management techniques, sensors for detecting temperature and analyzing soil health, and so forth, give farmers a scientific understanding of the climate parameters they require for sustainable management. Achieving meaningful progress in mitigating the dangers of climate change on our air resources requires collaboration among stakeholders, including farmers, local communities, academics, scientists, policymakers, and non-governmental organizations (Srivastav, Dhyani, Ranjan, Madhav, & Sillanpää, 2021).

It is essential to comprehend the condition of the water system, as well as its elements and their interactions. Assessing the quantity and quality of water available, locating sources of contamination, and assessing the governance and infrastructure in place are all critical to the efficient management of water resources. The water management system theory can be used to analyze the motivating and impeding elements in Indonesia's clean water management system, as demonstrated by the epistemological and sociological description of multiple definitions, for improving governance structures and research infrastructure.

METHODOLOGY

The study's objectives, which include characterizing and comprehending the nuances of events, occurrences, social interactions, attitudes, beliefs, and perceptions, aligned with the use of qualitative technique. Qualitative research is essential for investigating complicated research problems because previous ideas and concepts have often proven inadequate to capture their complexity. Through written and spoken language, as well as observation of the subjects and their surroundings, this research method generates descriptive data. (Creswell, 2013).

Data for this study were gathered by documentation and observation. Relevant material was gathered from a variety of sources, including online publications and library records. Three steps comprised the data analysis process: data reduction, data display, and data verification using the interactive model. The purpose of data reduction is to identify the key information, data display is to show the information, and data verification is to draw conclusions about the key findings (Miles & Huberman, 1994).

To gather accurate and trustworthy data, we used triangulation based on observation and documentation analysis. By using these strategies, we were able to guarantee conformability, auditability, believability, and transferability. Triangulation is used to compare the outcomes and is related to credibility in relation to truth. Transferability helps readers better understand the outcomes of qualitative research by showing how findings can be applied to other studies. The report is thorough, lucid, and methodical. It is completely auditable, which enables testing of every step of the research process, from case study design to data analysis. The findings are objective and accepted by all parties (Creswell, 2009).

FINDINGS

Result analysis was conducted based on observation and related documentation. Then the interactive model consisted of data reduction, data display, and data verification was conducted to obtain several themes as follows.

First Theme. Limited access to clean water in rural and remote areas is a major challenge in Indonesia. These challenges have had a devastating impact on health and social security. Without access to clean water, individuals are at risk of contracting waterborne diseases and experiencing poor hygiene practices. Lack of clean water also affects the welfare and development of society as a whole, as it hinders productivity, education, and economic growth. Moreover, reliance on alternative water sources in the region is not a sustainable long-term solution. Integrated watershed management measures are needed to address water resource management issues and ensure sustainable access to clean water in Indonesia. Therefore, it is important for the government to prioritize the provision of clean water and sanitation in rural and remote areas.

Second Theme. The primary challenge relating to clean water and sanitation in Indonesia is the rural-urban gap in accessing these resources, which is a significant issue. More developed areas, such as Jakarta have better sanitation and access to clean water than eastern provinces such as Papua. This gap highlights the need for targeted efforts to improve infrastructure and service delivery in rural areas. The issue of owning a house, fear of displacement, and uncertainty about land ownership leads to hesitation in investing in adequate sanitation facilities. Fear of displacement discourages individuals from making the necessary investments in adequate sanitation facilities, exacerbating existing challenges in providing access to clean water and sanitation services. To address these challenges, the Indonesian government needs to prioritize policies and initiatives that focus on reducing rural-urban disparities in access to clean water and sanitation.

Third Theme. There are several factors that contribute to the clean water and sanitation management system in Indonesia. One of the main factors is the limited access to clean water in rural and remote areas. Due to Indonesia's vast geographical conditions, not all regions have equal access to clean water. This is a challenge in ensuring the availability of clean water for all residents, especially in rural areas. In addition, the management of clean water supply in Indonesia is more focused on urban areas. This centralized approach leaves rural areas with limited access to clean water and puts a strain on the existing water supply infrastructure in urban areas. Another factor contributing to the issue is the low number of Public Drinking Water Companies (PDAMs) in Indonesia. Municipal and regional Water Companies manage just only 16.08% of the water supply, which is relatively low, given that the country's population and geographical challenges. In addition, the provision of clean water is also hampered by the lack of resources and infrastructure in marginalized communities. These communities, like indigenous and resettled people, often lack the resources and expertise necessary to maintain and ensure the water system is functioning properly.

Fourth Theme. In Indonesia, clean water and sanitation face significant challenges, especially in rural and remote areas. Limited access to clean water is the main factor that is a challenge in the clean water and sanitation management system in Indonesia. This is particularly true in rural and remote regions where the geographical conditions make it difficult to ensure that all citizens have equal access to clean water. Maintenance of clean water systems in indigenous settlements and rural areas is often under the responsibility of local management, who may not have sufficient resources to ensure proper maintenance and provision of clean water. One of the main challenges in managing clean water and sanitation in Indonesia is the limited

access to clean water in rural and remote areas. This challenge is caused by a centralized approach to clean water management, which focuses more on urban areas. In addition, the number of PDAMs in Indonesia is insufficient, only 16.08% are managed by urban and regional PDAMs. This centralized approach leaves rural areas with limited access to clean water and puts a strain on the existing water supply infrastructure in urban areas. In addition, the lack of resources and infrastructure in marginalized communities exacerbates challenges in clean water management. Therefore, individuals in areas not covered by PDAM frequently utilize alternative water sources like groundwater, river water, rainwater, and springs. This limited access to clean water does not only affect the availability of clean water but also creates long-term problems related to the management of water resources in Indonesia. As a decision maker and the party responsible for meeting community needs, the government must realize the importance of addressing this problem and allocating adequate resources to improve the supply of clean water and sanitation in rural and remote areas in Indonesia.

Fifth Theme. Management of clean water and sanitation in Indonesia is an urgent problem that requires immediate attention and serious handling. Currently, the provision of clean water in Indonesia, especially on a large scale, is mainly concentrated in urban areas which are managed by municipal and regional drinking water companies (PDAMs). Nevertheless, the coverage of clean water services provided by PDAM is still relatively limited, as only 16.08% of the population has access to them. The provision of clean water is essential not only for basic human needs but also for preventing health problems and social vulnerabilities. Therefore, the provision of clean water in Indonesia needs to be expanded and improved, especially in areas that currently lack access to clean water services. One possible solution is to increase the attention and involvement of the government in making decisions and supplying community water needs. In addition, given the limited resources and infrastructure, it is important to involve the community in urban water management to ensure a sustainable water supply for the community. To address water shortages in different areas and ensure that everyone has access to safe drinking water, the government must be involved in clean water management. Indonesia needs to address the serious issues of access to clean water and water scarcity. The issue of water shortage requires urgent attention and should be taken seriously. Water scarcity and inadequate sanitation management are major issues that require significant attention and effective handling in Indonesia. Water scarcity and insufficient access to clean water are two major issues that Indonesia is now dealing with. To answer these challenges, the government needs to prioritize water infrastructure development and invest in technology that can increase access to clean water for all citizens. Water scarcity and inadequate access to clean water are significant challenges faced by Indonesia. Addressing this challenge requires a comprehensive and integrated approach that includes improving water management systems, investing in infrastructure development, promoting water conservation and efficiency measures, and increasing public awareness of the importance of water conservation. To address the challenges of water scarcity and lack of access to clean water in Indonesia, an integrated and comprehensive approach is needed. This approach should involve a wide range of stakeholders, including government, water companies, and local communities. Involving stakeholders at various levels ensures that clean water and sanitation management efforts can be carried out effectively and sustainably in the long term.

DISCUSSION AND CONCLUSION

Usually, we can measure the indicator of clean water users by comparing the percentage of individuals supplied with water from PDAM's piped systems and those who rely on non-PDAM providers.. This indicator experienced an increase over the year.. This increase is due to program support from the synergy between the central and provincial governments. This synergy can speed up and enhance the implementation of clean water service programs for the community in the pursuit of community welfare. Although this percentage has increased, further improvement is necessary to better serve the targeted beneficiaries. Sanitizing households is a public health measure that aims to monitor the physical structures within a dwelling that may impact human health. The development of performance on household sanitation indicators increases every year. However, the government must prioritize providing stimulus to achieve the maximum possible increase in this indicator. It is important to note that the presence of sanitation facilities within households is a key factor that supports environmental hygiene, leading to healthy homes.

The report is thorough, lucid, and methodical. It is completely auditable, which enables testing of every step of the research process, from case study design to data analysis. The findings are objective and accepted by all parties.

The reduction of poverty and acceleration of development by public institutions can only be achieved through decentralization and citizen participation. Numerous challenges make it evident that the function of water supply in reducing poverty is limited when public assets, like drinking water, are excessively decentralized and outside the purview of local government agencies. According to the statement, closer ties between local government and community organizations will provide an institutional framework that will facilitate community participation in delivering essential services, enhancing the targeting of subsidies for the poor, and maintaining means of subsistence. Having a sufficient and secure supply of drinking water is a fundamental service that improves health and helps the underprivileged continue to support their families. While there has been a rather smooth shift from a centralization-based paradigm to a decentralization paradigm, a deeper comprehension of the many decentralization paradigms is still necessary. Since decentralization and centralization are characteristics rather than absolute ideals, there will unavoidably be many routes to decentralization. Different ideological constructions of decentralization may exist even within a designated national path, depending on where and when we go along the decentralization axis. This can be referred to as the decentralization paradigm, and it is dynamic, evolving in tandem with the advancement or regression of the decentralization axis.

Water management is a complex and multifaceted issue that requires coordinated efforts from governments, stakeholders, and local communities. Governments play an important role in developing and implementing water management policies and regulations. They have the power to enact laws and allocate resources to tackle water-related challenges. Stakeholders, including industry, non-governmental organizations, and community groups, also play an important role in water management. Their involvement is critical to the successful implementation of a water management strategy, as they bring diverse perspectives, knowledge, and resources to the table. Local communities, are very important in watershed management. They are directly affected by the quality and availability of water in their area and often have a deep understanding of local conditions and challenges. Local governments have a unique role in watershed management. They are responsible for managing and protecting the water resources within their jurisdiction and have the authority to make regulations and enforce compliance. In addition, local governments often enter into agreements between jurisdictions to achieve watershed objectives. This agreement facilitates collaboration and coordination among different local governments, encouraging an integrated approach to watershed management.

The involvement of local government, stakeholders and local communities is essential for effective water management. Their collaboration ensures that the water management strategy is comprehensive and inclusive, as well as reflects the needs and priorities of all concerned. This collaborative approach not only enhances the effectiveness of water management practices but also enhances stakeholder satisfaction and support. Moreover, integrating stakeholder perspectives on water quality into policy development is crucial. This helps align interventions with their needs and concerns, increasing their support for water management initiatives. In short, local government, stakeholders, and local communities have an important role in watershed management. Their involvement ensures that water management strategies are well informed, fair, and responsive to community and environmental needs. The involvement of local government, stakeholders, and local communities is very important in achieving effective water management. Their collaboration facilitates a comprehensive and inclusive approach to water management and ensures that the strategy reflects the needs and priorities of all concerned. In addition, the involvement of multiple stakeholders, including local government, local water authorities, stormwater practitioners, elected officials, landscape architects, and representatives from the community, is critical to the successful implementation of Low Impact Development practices. These stakeholders bring diverse perspectives, expertise and resources to the table, enabling a more holistic and integrated approach to managing water resources. With the involvement of local government, stakeholders, and local communities, water management strategies can be developed and implemented taking into account the unique characteristics and challenges of a watershed. This collaborative approach promotes effective decision making, promotes stakeholder satisfaction, and increases support for water management

initiatives.

By analyzing these factors, policy makers and stakeholders can develop strategies and implement measures to improve water management practices in developing countries. These strategies may include: 1. Investment in Infrastructure: Developing countries often lack the necessary infrastructure for effective water management. This can involve building or upgrading water treatment plants, pipelines, and storage facilities. Investing in infrastructure is critical for developing countries to ensure access to clean and safe water for their residents. 2. Implementation of Water Conservation Measures: Water scarcity is a common challenge in developing countries, and implementing water conservation measures can help overcome this problem. These measures may include promoting water-saving practices, such as efficient irrigation systems in agriculture, reducing water losses in distribution networks, and promoting awareness about the value of water and the need for sustainable use. 3. Strengthening Governance and Policy Framework: Developing countries often face challenges in governance and implementation of policies related to water management. Therefore, it is important for the government and stakeholders to prioritize and invest in water quality management to ensure the availability of clean and safe water for the community and the environment. This can be achieved by developing and implementing relevant standards, regulations, and guidelines dealing with water quality and ensuring proper monitoring and enforcement. 4. Improving Access to Sanitation Facilities: Inadequate sanitation facilities, especially in rural areas, are a major challenge for water management in developing countries. Therefore, it is very important to prioritize and invest in the development and implementation of sanitation facilities to protect water resources and improve public health. 5. Promoting Community Participation: Involving local communities in the planning and implementation of water management initiatives is critical to their success and long-term sustainability. It is important to involve local people in the decision-making process, ensuring that their needs and perspectives are taken into account.

The government must play an important role in providing policy support, allocating resources, and implementing regulations to improve water management systems and sanitation practices in Indonesia. This can be achieved through establishing clear water quality standards and guidelines, as well as enforcing regulations to prevent pollution and ensuring protection of water sources. The government should also invest in infrastructure development, such as water treatment plants, distribution networks, and sanitation facilities, to increase access to clean water and sanitation services, especially in rural and remote areas. In addition, it is very important to promote community participation and education in water and sanitation management practices. This can be done through implementing education campaigns that raise awareness about the importance of proper clean water and sanitation practices, as well as providing training and capacity building programs for local communities to actively participate in water and sanitation management efforts. By adopting these strategies, Indonesia can work towards its goal of ensuring clean and safe water for all citizens. To support these efforts, it is also important for the government and stakeholders to prioritize the allocation of funds for the implementation and maintenance of clean water and sanitation management systems. In addition, collaboration with international organizations and development partners can provide technical expertise and financial support to improve water and sanitation management practices in Indonesia. To answer the challenges of clean water and sanitation management in Indonesia, an integrated and comprehensive approach is necessary. This approach should include measures to improve water quality, ensure proper sanitation practices, enhance infrastructure development, encourage community participation and education, and allocate adequate funds and resources for implementation and maintenance.

Overall, the involvement of local government, stakeholders, and local communities is essential to achieve effective water management. Their involvement ensures that water management practices are well informed, fair, and responsive to the needs and concerns of all parties involved. Involving stakeholders in the policy-making process not only improves the quality and effectiveness of interventions but also promotes transparency, accountability, and public trust in water resources management systems. In addition, involving local stakeholders in water management increases the sense of ownership and responsibility among community members, promoting the long-term sustainability and resilience of water resources. In conclusion, the involvement of local government, stakeholders, and local communities is very important in achieving effective water management. Good coordination between various stakeholders is also an important element

in the development of an effective institutional model. Local governments, water service operators, communities, and the private sector need to work together in making strategic decisions, allocating resources wisely, and building mutually beneficial partnerships. The synergy between all these parties will strengthen the management capacity and development of clean water services, as well as increase efficiency in the supply and distribution of clean water. Quality clean water service is a fundamental right of every individual. Safe, clean, and affordable drinking water is an important element in maintaining human health and well-being. Quality drinking water plays a vital role in meeting hydration needs, maintaining cleanliness, preventing the spread of disease, and supporting human growth and development. Quality water services also have a direct impact on the quality of life of the community as a whole. With easy access and adequate availability of clean water, people can carry out their daily activities more effectively, including in the fields of education, employment, and social activities. Moreover, quality water also plays a role in increasing the productivity and competitiveness of an area because people who are healthy and have adequate clean water tend to be more productive and have a better quality of life.

Water management in developing countries is a complex and multifaceted challenge that requires coordinated efforts from governments, stakeholders, and local communities. It is critical for governments and stakeholders to prioritize and invest in water quality management, improve access to sanitation facilities, encourage community participation, and promote research and innovation. Therefore, developing countries can overcome problems such as water scarcity, river pollution, and inadequate sanitation facilities, and ensure the availability of clean and safe water for the population and the environment. In developing countries, where water and sanitation infrastructure is often inadequate, it is important for governments and stakeholders to continue to prioritize and invest in water quality management to ensure sustainable water and sanitation services. Effective water and sanitation management in developing countries depends on the participation of multiple stakeholders, including local communities. Stakeholders must work together to address problems such as water scarcity, pollution, and inadequate sanitation facilities. By prioritizing water quality management, increasing access to sanitation facilities, encouraging community participation, and investing in research and innovation, developing countries can address these challenges and achieve sustainable water management that meets the needs of their populations and protects the environment. Addressing water management problems in developing countries requires a comprehensive strategy that involves government priorities, stakeholder investment, community participation, and research and innovation.

Based on the result analysis and discussion of the research result above, it can be concluded that the driving and inhibiting factors in the clean water management system in Indonesia and its implication require policy and regulation needed to reach the best solution. It is suggested that the public officials who formulate policies and regulations - the legislative and executive branches - must take part in managing Indonesia's clean water system.

The challenge for future research is to improve the clean water management system. A sustainable institutional model must also consider environmental and sustainability aspects in the management of water resources. Protection of water resources, use of environmentally friendly technologies, and development of policies that support sustainability are integral parts of an effective institutional model. Thus, clean water services can be carried out by taking into account the needs of present and future generations. The development of an effective and sustainable institutional model is an important step in overcoming problems in clean water services. A better clean water service system can be built and significant benefits can be brought to the community by involving all stakeholders and paying attention to planning, monitoring, coordination, environment and sustainability aspects. In today's rapidly changing world, the involvement of local stakeholders in managing water resources is recognized as a key strategy for achieving water security. This approach is aligned with the principles of the Sustainable Development Goals which advocate for local community participation in water governance. By integrating water into participatory water governance mechanisms, there is potential to redefine the principle of water as a public service and ensure it is accessible and affordable to all members of society.

Data Availability Statement

All relevant data are available in the article and the annexes.

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