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Implementing Drinking Water Supply System Policy in Kotamobagu City, Indonesia: Technical Operations, Monitoring, and Service Performance

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ABSTRACT

The study responds to the continuing gap between the public mandate to provide safe, adequate, and sustainable drinking water and the actual condition of local SPAM services, where overall service coverage remains low, distribution performance is uneven, several systems require maintenance, and institutional arrangements have not yet enabled fully focused management. Using a qualitative descriptive approach, the original article collected data through interviews, observation, and documentation involving the Head of Public Works and Spatial Planning Office, the Head of Human Settlements Division, technical sanitation staff, and community users of SPAM services. The findings show that SPAM policy has been implemented through technical operation, maintenance, monitoring, reporting, and service delivery activities; however, implementation has not yet reached optimal performance. Key problems include insufficient intake capacity, water leakage in aging distribution networks, limited maintenance funding, weak water quality surveillance due to budget constraints, unfilled UPTD institutional structure, limited certified human resources, manual complaint handling, and declining local revenue from the water service. The article argues that policy strengthening must move from fragmented operational activity toward integrated water governance that combines infrastructure renewal, institutional activation, digital monitoring, water quality assurance, responsive customer service, and sustainable financing. The study contributes to public administration literature by showing that local drinking water policy is not only a technical infrastructure problem, but also an implementation problem shaped by resources, bureaucratic structure, communication, service accountability, and community trust.

Keywords: drinking water policy, infrastructure governance, Kotamobagu, local government, policy implementation, public service, SPAM.

INTRODUCTION

Access to drinking water is one of the most fundamental indicators of public welfare because it directly affects health, household productivity, settlement quality, and human dignity. In local government administration, water provision is not merely a physical infrastructure function; it is a public policy obligation that requires planning, budgeting, technical operation, institutional accountability, and continuous service responsiveness. When drinking water systems are weak, the result is not only household inconvenience, but also a broader governance deficit: citizens lose confidence in public service, local revenue declines, and development programs fail to translate into everyday welfare. For that reason, the implementation of the Drinking Water Supply System policy, or SPAM, provides an important entry point for assessing the capacity of local government to transform formal policy into reliable service outcomes.

The importance of drinking water is reinforced by the Sustainable Development Goals, particularly Goal 6, which calls for universal and equitable access to safe and affordable drinking water. In Indonesia, the national government has also emphasized acceleration of drinking water and domestic wastewater services through policy instruments such as Presidential Instruction No. 1 of 2024 and regulations governing SPAM. Such policy frameworks show that drinking water is no longer understood as an isolated technical sector. It is connected to poverty reduction, public health, settlement development, environmental protection, and inclusive urban governance. However, national targets are only meaningful when local implementing organizations possess the capacity to operate, maintain, monitor, and expand systems according to real needs.

Kotamobagu City represents a relevant case because it is a growing urban area with expanding settlement needs and a public demand for more reliable water services. The article records that the city has four subdistricts, eighteen urban villages, and fifteen villages, with a population of 130,410 people. Despite the existence of nine SPAM locations, the overall coverage of city-managed drinking water service remains only 21.30 percent. This indicates a significant gap between formal system availability and actual household access. Some service areas have stronger performance, such as the Pontodon and Bilalang I service areas with a coverage figure of 54.60 percent, while other areas such as Pontodon Timur, Upai, and Bilalang II remain at 14.70 percent. These differences suggest that the problem is not simply the absence of infrastructure, but also the uneven operational capacity of existing systems.

The empirical problem becomes sharper when the service coverage data are connected to interview findings. Informants in the article explained that the condition of SPAM facilities is generally still functional, but several weaknesses continue to limit service performance. Intake capacity has become insufficient for growing demand, several networks experience leakage, maintenance is often conducted only by priority because of limited budget, and the city still depends on manual or semi-manual arrangements for complaint handling and revenue collection. In several locations, asset transfer problems have also limited the authority of the city government to manage facilities fully. These circumstances show that SPAM policy implementation is simultaneously technical, institutional, financial, and social.

The article further shows that Kotamobagu has already attempted to improve policy implementation. The local government issued Mayor Regulation No. 25 of 2023 on the establishment of the Regional Technical Implementation Unit (UPTD) for Drinking Water. The Public Works and Spatial Planning Office also developed SIME-SPAM as a monitoring and evaluation application. These steps indicate administrative awareness and a movement toward more

focused and digital governance. Nevertheless, the UPTD structure has not yet been fully filled, SIME-SPAM still requires further development, and the water service remains embedded in broader public works responsibilities. This produces a condition in which policy exists, technical activity occurs, but implementation performance remains not yet optimal.

This article retains the empirical substance of the original qualitative study but presents it in a tighter academic structure consisting of introduction, theoretical framework, method, findings, discussion, conclusion, and references. The purpose is threefold. First, it analyzes how the SPAM policy has been implemented in Kotamobagu City. Second, it identifies determinant factors that explain why implementation remains suboptimal. Third, it proposes a policy strengthening direction based on implementation theory, infrastructure governance, digital monitoring, and public service accountability. The central argument is that SPAM implementation in Kotamobagu is already running, but it remains constrained by weak integration between infrastructure capacity, human resources, institutional structure, financing, monitoring, and citizen-facing service systems.

THEORETICAL FRAMEWORK

Policy implementation theory provides the principal lens for interpreting the Kotamobagu SPAM case. Public policy is commonly understood as a set of decisions, actions, and non-actions chosen by government in response to public problems. Dye defines public policy as whatever governments choose to do or not to do (Dye, 2012). Anderson views policy as a purposive course of action pursued by actors in dealing with a problem or matter of concern (Anderson, 2011). In the context of drinking water, policy is not only a formal statement contained in laws and regulations; it becomes meaningful when it produces functioning infrastructure, accessible service, reliable water quality, and public satisfaction.

Implementation is the stage where policy commitments are translated into operational reality. Ripley and Franklin explain that implementation refers to what happens after a law or policy decision has been adopted, including actions undertaken by administrative actors to make programs work (Ripley & Franklin, 1986). Nugroho similarly emphasizes that implementation is the way a policy achieves its objectives through programs, projects, and activities (Nugroho, 2014). This perspective is highly relevant to SPAM because the existence of regulation does not automatically provide water to households. A policy must be transformed into intake development, water treatment, distribution repair, customer service, payment systems, monitoring, and maintenance routines.

The Van Meter and Van Horn model remain one of the most useful frameworks for analyzing implementation performance. Their model identifies six main variables: policy standards and objectives, resources, characteristics of implementing agencies, inter-organizational communication, social-economic-political environment, and implementer disposition (Van Meter & Van Horn, 1975). In Kotamobagu, standards and objectives are visible in national SPAM regulations and local mayoral regulation, but resources and implementing capacity remain uneven. Financial constraints limit maintenance, human resources require technical certification, and institutional characteristics remain transitional because the UPTD has not yet become fully operational. The model helps explain why policy can be formally present while operational results remain limited.

Edward III complements this approach by highlighting communication, resources, disposition, and bureaucratic structure as key variables affecting implementation (Edward III,

1980). Communication matters because policy objectives must be understood by implementers, customers, and related agencies. Resources matter because infrastructure, budget, personnel, and technology determine whether services can be delivered. Disposition matters because the willingness of officials to act, maintain, and innovate influences performance. Bureaucratic structure matters because unclear mandates or unfilled organizations can slow implementation. In Kotamobagu, all four variables appear in the empirical findings: communication with the public is still limited, resources are inadequate, implementers show commitment but lack support, and the UPTD structure is not yet filled.

Grindle's model views implementation as both an administrative and political process shaped by policy content and implementation context (Grindle, 1980). The content of a policy includes interests affected, benefits expected, desired degree of change, position of decision makers, implementers, and resources committed. The context includes power relations, institutional characteristics, and compliance or responsiveness. SPAM policy has a clear public benefit because it concerns household water access, health, and quality of life. However, the desired change is demanding: expanding coverage, improving water quality, repairing networks, increasing PAD, and changing customer behavior. These changes require resources and institutional authority, which are not yet fully available.

The literature on public service also clarifies why drinking water implementation must be assessed from the user perspective. Public service quality is related to reliability, responsiveness, assurance, empathy, and tangible service conditions (Zeithaml, Parasuraman, & Berry, 1990). Although water service has technical dimensions, citizens experience it through daily reliability, clarity of complaint handling, water flow, color, taste, and payment convenience. When users report small flow, dirty water during rainy seasons, or preference for alternative sources such as wells and PDAM Bolaang Mongondow, they are not only evaluating infrastructure; they are evaluating the credibility of local government service.

Good governance principles are also relevant to SPAM. Governance requires transparency, accountability, participation, effectiveness, and responsiveness (UNDP, 1997). In water governance, these principles require accurate data on coverage and water quality, clear institutional responsibility, open complaint channels, and financial sustainability. The article indicates that Kotamobagu has moved toward digital monitoring through SIME-SPAM, but the system still requires further development. Digital government theory suggests that technology improves service only when it is integrated with work processes, personnel capacity, and institutional incentives (Heeks, 2006). A monitoring application without updated data, complaint integration, and decision-making use will not automatically improve performance.

The concept of sustainable infrastructure governance adds another theoretical layer. Drinking water systems involve long life-cycle assets: intake structures, transmission pipes, treatment units, reservoirs, distribution networks, and household connections. These assets require preventive maintenance, not merely emergency repair. Infrastructure governance therefore demands planning, asset management, budgeting, maintenance scheduling, and performance monitoring (OECD, 2017). In Kotamobagu, the finding that repairs are conducted based on priority because funds are limited indicates that maintenance is still reactive rather than preventive. This is a classic implementation problem because short-term budget limitations produce long-term service decline.

Finally, the SPAM case must be understood through the relationship between service performance and local revenue. Water service generates PAD through tariffs or retribution, but

revenue depends on user trust, connection coverage, payment convenience, and service reliability. If water flow is weak or quality is inconsistent, households may shift to wells or other providers, which reduces public revenue and further weakens maintenance capacity. This produces a negative cycle. Public administration theory therefore requires an integrated solution: the government must improve service quality to strengthen willingness to pay, while simultaneously improving collection systems and reinvesting revenue into maintenance and expansion.

METHOD

This article is based on a qualitative descriptive study conducted in Kotamobagu City. The qualitative approach was appropriate because the research sought to understand policy implementation as experienced by officials and community users rather than to measure statistical causality. Qualitative inquiry allows the researcher to explore how actors interpret SPAM policy, what operational problems they encounter, how monitoring and evaluation are conducted, and how citizens perceive service quality. As explained by Moleong, qualitative research is useful for understanding phenomena holistically through descriptions in words and context-sensitive interpretation (Moleong, 2012).

The research site was the Public Works and Spatial Planning Office of Kotamobagu City, especially the Human Settlements Division and the drinking water service arrangements under that office. The unit of analysis was the implementation of SPAM policy in relation to technical operation and management, monitoring and evaluation, reporting, and public service. The study also examined determinant factors affecting implementation, such as water availability, infrastructure maintenance, human resource capacity, budget support, water quality testing, institutional structure, and public complaint handling.

Data were collected through interviews, observation, and documentation. Informants included the Head of PUPR Office, the Head of Human Settlements Division, a functional technical sanitation officer, and five community users of SPAM services. These informants were selected because they represent the key perspectives needed to understand implementation: leadership, technical management, operational expertise, and user experience. Documentation included service coverage data, SPAM unit data, PAD records, institutional regulations, DPA documents, and visual documentation of infrastructure and monitoring systems. Observation helped connect interview statements with physical and administrative evidence.

Data analysis followed the interactive model of Miles and Huberman, consisting of data reduction, data display, and conclusion drawing (Miles & Huberman, 1994). Data reduction was conducted by organizing interview and document evidence into the three main focus areas: technical operation and management, monitoring-evaluation-reporting, and service delivery. Data display was developed through matrices, charts, and adapted tables. Conclusions were drawn iteratively by comparing official statements, community experiences, and supporting documents. Trustworthiness was strengthened through source triangulation and method triangulation, so that findings did not rely on a single informant or one type of evidence. See table 1.

Table 1. Research informants involved in the this study

No.	Informant category	Number	Role in data generation

1	Head of PUPR Office, Kotamobagu City	1	Strategic leadership, policy direction, monitoring and institutional development
2	Head of Human Settlements Division	1	Technical management, maintenance priorities, service coverage and operational problems
3	Functional technical sanitation officer	1	Field-level technical information, water quality testing, intake and infrastructure condition
4	Community users of SPAM services	5	User satisfaction, water flow, water quality, complaint experience and alternative water sources
Total	All informants	8	Triangulated policy, technical and citizen perspectives

RESULTS AND DISCUSSION

The findings show that the implementation of SPAM policy in Kotamobagu City is already underway, but it has not yet achieved the level of performance required to meet public needs and national water service expectations. The city has nine SPAM locations and several facilities such as intake systems, treatment installations, reservoirs, distribution networks, and household connections. At the same time, only about 21.30 percent of the population is covered by the city-managed SPAM service. This gap between infrastructure existence and service coverage is the central empirical finding of the study. SPAM exists as a program, but it is not yet functioning as a fully integrated citywide service system.

At the technical-operational level, interviews show that the physical condition of SPAM is generally considered still good, but it requires significant maintenance funding. The technical sanitation officer explained that the current SPAM condition is good, but maintenance budget is urgently needed. The Head of Human Settlements Division added that management is still partly temporary because several SPAM assets, including Bilalang I and Pontodon, face land and intake constraints and have not been fully transferred from the provincial infrastructure agency to the city government. This finding indicates that implementation is constrained not only by physical damage but also by asset authority and institutional transition.

The problem of water availability is particularly important. Informants stated that existing intake capacity is no longer sufficient to meet the needs of the growing population. The city therefore needs additional intake infrastructure to increase raw water supply. This problem is directly connected to service dissatisfaction because insufficient intake capacity reduces flow at household connections. From the perspective of SPAM systems, intake is the first strategic node; when intake supply is limited, downstream interventions such as payment improvement or complaint handling will not fully solve the service problem.

Water quality is another important dimension. The article records that the Public Works Office had cooperated with the Industrial Standardization and Service Center in Manado for water quality testing, and past test results were considered feasible. However, testing had not been conducted again in the current year because of budget limitations. This means that water quality

assurance exists, but it is not yet sufficiently continuous. In a drinking water policy context, periodic testing is crucial because citizens judge service not only from the existence of water but also from safety, clarity, odor, and suitability for household use.

Distribution network performance is also a major finding. Officials acknowledged leakage in distribution pipes and household connections, especially where meters are not yet used or where old pipes have deteriorated. Because maintenance budget is limited, pipe repair is conducted based on priority. This produces a reactive maintenance pattern. The service may continue to operate, but losses accumulate and reduce water reaching households. The community interviews support this diagnosis because users reported low water flow, intermittent service, and preference for wells or PDAM Bolaang Mongondow when city SPAM service is inadequate.

Human resource capacity constitutes another determinant. The Head of Human Settlements Division stated that human resources for water management remain insufficient and require training, technical guidance, and education. The technical officer also indicated that there are no certified personnel for water management and that the last training related to water quality testing occurred around 2016. This finding is important because SPAM requires specialized competencies, including water treatment, pipe maintenance, leak detection, asset management, customer service, and digital reporting. Without trained personnel, infrastructure investments may fail to generate sustainable service improvement.

Monitoring, evaluation, and reporting have been implemented but remain in a development stage. The Head of PUPR stated that periodic evaluation meetings are conducted at least quarterly to review targets and follow-up actions. The office has also created SIME-SPAM as an application for monitoring and evaluation. This is a positive finding because it shows awareness of digital governance and data-based monitoring. However, the article also notes that SIME-SPAM still needs further development to provide detailed data according to technical needs. Thus, digitalization has begun, but it is not yet fully institutionalized as a decision-support system.

The institutional structure is another central issue. Mayor Regulation No. 25 of 2023 established the UPTD Air Minum, but the organizational structure had not yet been filled at the time of the study. As a result, drinking water affairs still remain under the broader PUPR structure rather than being managed by a specialized operating unit. Officials suggested that the UPTD should be activated and later developed into a regional company so that water service can become more focused and professional. This finding reflects the importance of bureaucratic structure in implementation: the existence of a regulation is insufficient when the implementing unit is not operational.

User service findings reveal low satisfaction. The Head of Human Settlements Division acknowledged that SPAM service in Kotamobagu is not yet very good and that citizen satisfaction remains low. Community users confirmed this by reporting that water flow is often small, water can become turbid, and some households prefer wells or the service of PDAM Bolaang Mongondow. These statements show that service outcomes are not yet aligned with the expectations of safe, reliable, and sufficient water. In public service terms, the main weaknesses are reliability, responsiveness, and tangible quality.

The revenue data also reinforce the service problem. PAD from water service declined from Rp 318,782,800 in 2023 to Rp 273,292,620 in 2024 and Rp 199,918,534 in 2025. This decline can be interpreted as an indicator of weak coverage, low payment compliance, user dissatisfaction, and limited billing systems. Officials noted that payment collection is still mostly conducted by direct household billing, while only a few users come directly to the payment counter. The absence of

convenient digital payment channels reduces collection efficiency and weakens the financial basis for maintenance and expansion. See table 2, 3, 4, figure 1, 2, 3, 4 and figure 5.

Table 2. Administrative service coverage of SPAM household connections in Kotamobagu.

No.	SPAM location	SR	People served	Coverage note
1	SPAM Mobalang	772	3,555	-
2	SPAM Kotamobagu Selatan (IPA Poyowa Besar)	845	4,225	23.30%
3	SPAM Kobo Kecil	1,394	6,970	25.10%
4	SPAM Sia	130	650	-
5	SPAM Pontodon	414	2,070	54.60%
6	SPAM Bilalang I	1,332	6,660	54.60%
7	SPAM Pontodon Timur	160	800	-
8	SPAM Upai	31	155	-
9	SPAM Bilalang II	89	445	14.70%
Total	All SPAM service locations	5,469	15,184	21.30%

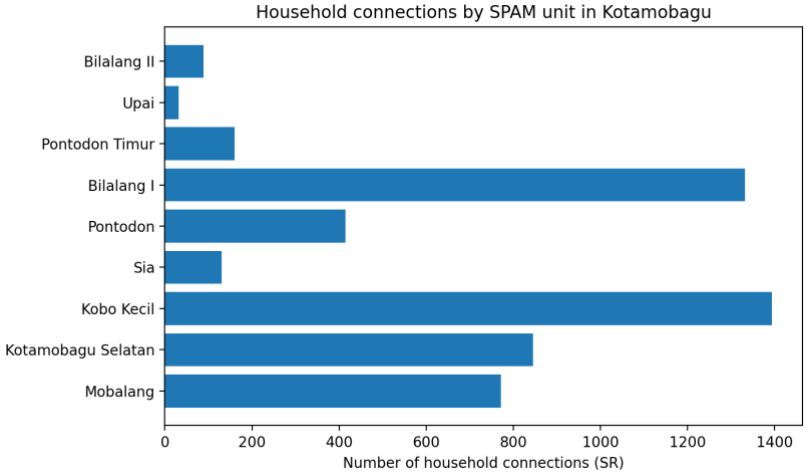

Figure 1. Household connections by SPAM unit, adapted from article service data

Table 3. Analytical matrix of SPAM policy implementation in Kotamobagu

Sub-focus	Empirical findings	Theoretical reading	Policy direction
Technical operation and management	SPAM facilities exist and several are functional, but intake capacity is insufficient, distribution networks leak, maintenance is reactive, and some assets face transfer constraints.	Van Meter and Van Horn emphasize that resources and agency characteristics shape implementation performance; here, technical resources and asset authority are uneven (Van Meter & Van Horn, 1975).	Add new intake, repair and map leakage, settle asset transfer, prioritize preventive maintenance, and connect technical planning with coverage targets.
Monitoring, evaluation and reporting	Quarterly meetings are conducted and SIME-SPAM has been developed, but the application still needs richer data and	Digital government strengthens implementation only when technology is aligned with work	Upgrade SIME-SPAM into a dashboard for coverage, water quality, leakage, complaints, maintenance and PAD.

	stronger integration with operational decisions.	processes and decision routines (Heeks, 2006).	
Service delivery	Community satisfaction remains low because water flow is small, quality can be turbid, complaints are not centralized, and many users prefer wells or PDAM Bolmong.	Public service quality depends on reliability and responsiveness, not merely formal service availability (Zeithaml et al., 1990).	Create hotline and digital complaint channel, improve flow reliability, publish response standards, and communicate water quality results.
Institutional capacity	UPTD Air Minum is legally established but not yet operational because the structure has not been filled.	Edward III identifies bureaucratic structure as a key variable in implementation; unclear or inactive structures weaken execution (Edward III, 1980).	Fill UPTD structure, define SOPs, assign technical staff, and prepare long-term transformation into a professional regional water operator.

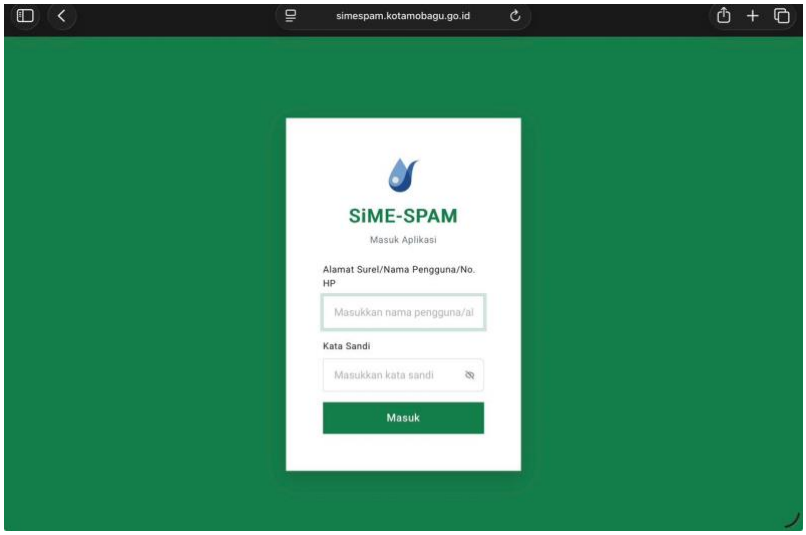

Figure 2. SIME-SPAM application interface documented in the article

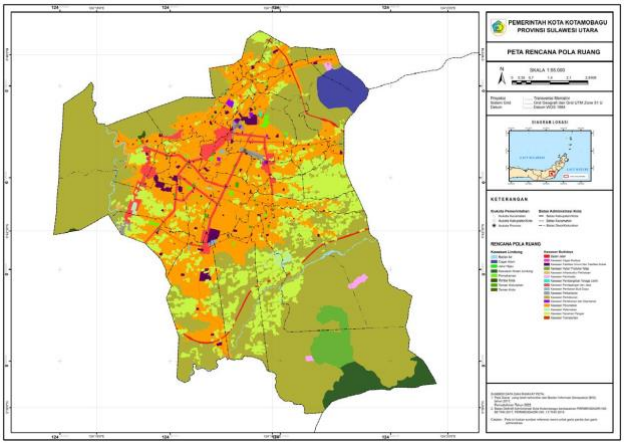

Figure 3. Administrative map/territorial context of Kotamobagu used in the article documentation

Figure 4. article-based field documentation of SPAM infrastructure conditions

Table 4. PAD from water service in Kotamobagu, 2023-2025

Year	PAD from water service	Change from previous year	Interpretive note
2023	Rp 318,782,800	-	Baseline revenue recorded in the article
2024	Rp 273,292,620	-14.27%	Revenue declined, indicating weaker service and collection performance
2025	Rp 199,918,534	-26.84%	Further decline, reinforcing the need for coverage expansion and payment reform

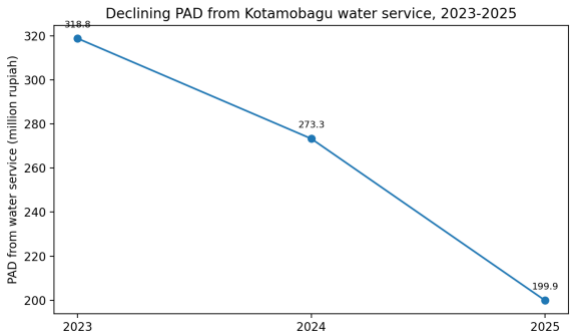

Figure 5. Declining PAD from water service, 2023-2025

The findings indicate that SPAM policy implementation in Kotamobagu should be understood as a partially functioning system. The policy is not absent. Regulations exist, technical activities are conducted, monitoring meetings are held, and an application has been initiated. However, these elements have not yet formed an integrated implementation system capable of ensuring reliable, safe, and expanding water service. This pattern is consistent with implementation theory, which emphasizes that policy outcomes depend on the alignment of objectives, resources, organizational capacity, communication, and environmental context (Van Meter & Van Horn, 1975). In Kotamobagu, the policy objective is clear, but the supporting variables are still incomplete.

The first analytical issue is the gap between formal policy and operational capacity. Mayor Regulation No. 25 of 2023 provides a legal basis for establishing a UPTD Air Minum, but the structure has not yet been filled. This creates a bureaucratic gap: the policy recognizes the need for a specialized technical unit, but the implementing organization remains inactive. From Edward III's perspective, this is a structural implementation problem (Edward III, 1980). When bureaucratic structure is not operational, policy functions are dispersed within a broader office and may not

receive dedicated attention. Water service requires daily operational decisions, customer management, maintenance planning, and revenue collection. These functions are difficult to optimize without a focused institution.

The second issue is resource adequacy. The article repeatedly points to limited funding as a central obstacle. Budget limitations affect maintenance, water quality testing, infrastructure repair, and training. In implementation theory, resources are not an auxiliary variable; they are the means through which policy intentions become action (Mazmanian & Sabatier, 1983). A regulation that mandates service improvement will not increase intake capacity unless capital investment is available. A monitoring application will not produce accurate data unless personnel can update and analyze it. A water quality standard will not protect citizens unless testing is funded regularly. The Kotamobagu case therefore shows how financial resources shape both technical and administrative performance.

The third issue is maintenance orientation. The study finds that repair of leaking networks is done by priority because budget is limited. This creates a reactive approach: the government responds to visible damage rather than preventing system losses through planned maintenance. In drinking water systems, this pattern is costly. Leakage reduces pressure, lowers the volume reaching customers, increases public complaints, and reduces willingness to pay. In the long run, deferred maintenance may require more expensive rehabilitation. Infrastructure governance literature stresses life-cycle asset management because infrastructure performance declines when operation and maintenance are not built into annual planning (OECD, 2017). Kotamobagu therefore needs a shift from emergency repair to preventive maintenance scheduling.

The fourth issue is water source and intake capacity. Informants stated that existing intake is no longer sufficient to meet the needs of the population. This is a strategic bottleneck because the distribution system cannot serve households if raw water supply is inadequate. Theoretically, this reflects the importance of causal logic in policy design. Weimer and Vining argue that implementation depends partly on the logic of the policy: whether the chosen instruments can plausibly produce intended outcomes (Weimer & Vining, 1999). If coverage expansion is desired, the policy instrument must include raw water development, additional intake, and possibly inter-system connection. Without these instruments, service expansion remains aspirational.

The fifth issue concerns water quality assurance. Although previous laboratory cooperation produced feasible test results, current testing was constrained by budget. This is problematic because water quality is one of the most visible and sensitive dimensions of public trust. Citizens who see turbid water or experience inconsistent quality will judge the service as unsafe regardless of formal statements. From a public service perspective, assurance and reliability are central to satisfaction (Zeithaml et al., 1990). The government therefore needs to institutionalize periodic testing and publish simplified results to strengthen public confidence. A small but consistent transparency mechanism can improve trust and encourage payment compliance.

The sixth issue is human resource competence. The absence of certified water management personnel and the long gap since the last water quality training indicate an implementation capacity problem. SPAM management requires technical, managerial, and digital competencies. Officials need to understand water treatment, leakage detection, customer data, meter management, financial administration, and digital reporting. Training should not be incidental or online only; it should be designed as a continuous capacity-building program linked to the future UPTD. Human resource development is especially important if Kotamobagu intends to transform the UPTD into a regional water company in the future.

The seventh issue is digitalization. SIME-SPAM is a positive innovation because it shows that the Public Works Office is not relying solely on manual monitoring. However, digital systems create value only when they are connected to decision making. The application should not merely store data; it should help officials identify which networks leak most often, which service areas have low coverage, which households are inactive, which complaints remain unresolved, and which maintenance activities have been completed. Heeks notes that e-government failure often occurs when technology is introduced without organizational change (Heeks, 2006). Therefore, SIME-SPAM should be developed together with SOPs, staff roles, dashboard indicators, and leadership review routines.

The eighth issue is public-facing service reform. Community interviews show low satisfaction due to low flow, turbid water, and preference for alternative sources. This suggests that the policy must treat citizens not only as beneficiaries but also as feedback sources. A responsive complaint system is essential. The article notes that complaints are often conveyed through personal messages rather than a formal hotline or integrated channel. This weakens accountability because complaints are difficult to record, classify, and follow up. Kotamobagu should develop a simple complaint mechanism that includes hotline, WhatsApp business account, complaint number, service standard, and integration with SIME-SPAM. Such a system would make service problems visible and measurable.

The ninth issue concerns payment and PAD. The decline in PAD from 2023 to 2025 indicates that service performance and financial sustainability are interconnected. When citizens are dissatisfied or when collection is inconvenient, revenue declines. When revenue declines, maintenance becomes harder. This creates a reinforcing cycle of weak service and weak finance. To break this cycle, payment reform should be introduced together with service improvement. Digital payment channels, customer database verification, meter installation, and transparent billing could improve collection. However, payment enforcement should be accompanied by visible service improvement so that citizens perceive value in paying.

The tenth issue is intergovernmental and asset coordination. Several systems still face asset transfer problems with provincial or central infrastructure agencies. This affects local authority to manage, maintain, and account for facilities. In policy implementation, inter-organizational communication is a major determinant (Van Meter & Van Horn, 1975). Kotamobagu needs a clear asset settlement agenda, including inventory, legal status clarification, handover documentation, and integration into city asset and maintenance planning. Without legal clarity, infrastructure may physically exist but remain administratively difficult to optimize.

When the findings are interpreted together, the central problem is not a single failure but a fragmented implementation chain. Intake supply, network reliability, water quality testing, trained personnel, institutional structure, monitoring data, complaint handling, and PAD collection are all connected. Weakness in one part affects the others. For example, limited intake reduces flow; low flow reduces user satisfaction; dissatisfaction reduces willingness to pay; low revenue reduces maintenance funds; weak maintenance increases leakage; leakage again reduces flow. This circular pattern requires an integrated strengthening strategy rather than isolated technical repair.

The proposed model therefore combines seven components. First, institutional activation through the full operationalization of UPTD Air Minum. Second, infrastructure renewal through additional intake, pipe rehabilitation, and water treatment improvement. Third, preventive maintenance through asset mapping and annual maintenance plans. Fourth, water quality assurance through routine laboratory testing and public communication. Fifth, human resource

strengthening through technical certification and continuous training. Sixth, digital governance through SIME-SPAM integration with complaints, coverage, maintenance, and revenue data. Seventh, financial sustainability through expanded household connections, digital payment, and reinvestment of revenue into service improvement.

This integrated approach is consistent with Grindle's view that policy implementation depends on both content and context (Grindle, 1980). The content of SPAM policy aims to provide safe and sustainable drinking water; the context includes limited budget, growing demand, user dissatisfaction, alternative providers, and institutional transition. A realistic strengthening strategy must therefore be both technical and administrative. It must increase water supply and reduce leakage, but also improve institutional clarity, digital monitoring, complaint responsiveness, and public trust. The most important lesson from the Kotamobagu case is that drinking water policy cannot be reduced to construction. It is a continuous service governance system.

The discussion also contributes to public administration scholarship. Many local water studies focus on engineering feasibility or infrastructure investment. This article shows that implementation analysis adds a different insight: infrastructure may exist but underperform because organizational and governance variables are weak. Policy implementation theory makes visible the relationship between formal regulation, resources, bureaucratic structure, communication, disposition, and service outcomes. In the Kotamobagu case, the same water network becomes a governance issue because its performance depends on budgeting, human resources, monitoring, user complaint channels, and legal asset status.

Practically, the study suggests that Kotamobagu should prioritize actions that produce immediate public trust while building long-term system capacity. Short-term actions include establishing a customer hotline, updating the customer database, conducting visible leakage repairs in high-complaint areas, and publishing water quality information. Medium-term actions include filling the UPTD structure, training operators, integrating SIME-SPAM data, and improving payment systems. Long-term actions include developing new intake, rehabilitating old networks, expanding household connections, and preparing a professional institutional model. The sequence matters because citizens need to see early improvements while the government builds deeper capacity.

Overall, the findings and discussion support the conclusion that SPAM implementation in Kotamobagu is running but not yet optimal. The main weakness lies in integration. Technical operations, monitoring, institutional structure, financing, and service accountability are not yet connected into one strong implementation system. The policy strengthening agenda must therefore be comprehensive, evidence-based, and service-oriented. If Kotamobagu can integrate its regulatory mandate, UPTD institutional development, SIME-SPAM monitoring, infrastructure improvement, and citizen service reforms, the city can gradually move from low coverage and declining revenue toward more reliable and sustainable water governance. See figure 6 and table 5.

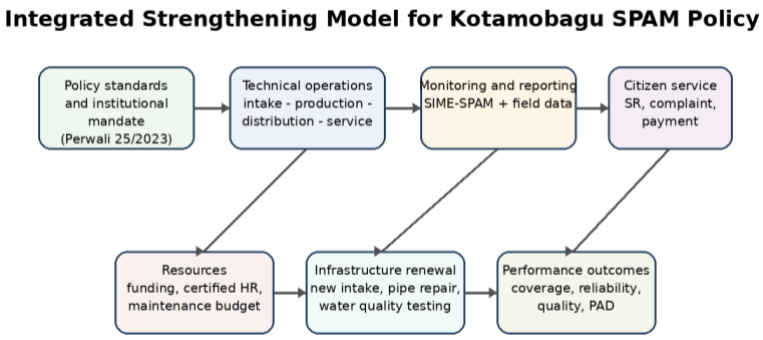

Figure 6. Integrated strengthening model for SPAM policy implementation in Kotamobagu

Table 5. Determinant factors affecting SPAM policy implementation

Determinant factor	Empirical indication	Implementation implication	Recommended response
Water source and intake capacity	Existing intake is insufficient for growing demand.	Coverage expansion cannot succeed without additional raw water supply.	Develop new intake and connect raw water planning with service target maps.
Distribution network condition	Leakage occurs in pipes and household connections; repair is priority-based.	Water loss reduces pressure, reliability, customer satisfaction and PAD.	Implement leak mapping, preventive maintenance, meter installation and pipe rehabilitation.
Water quality assurance	Past testing was feasible, but current testing is constrained by budget.	Public trust weakens when testing is not continuous and results are not communicated.	Fund routine water testing, publish results and link findings to treatment improvements.
Human resources	No certified personnel and limited training since 2016.	Technical operation and digital monitoring cannot be optimized.	Create annual training plan, certification and operator competency development.
Institutional structure	UPTD is established by regulation but not yet staffed.	Implementation remains dispersed and unfocused.	Fill organizational structure, define SOPs and prepare professional operator model.
Digital monitoring and service	SIME-SPAM exists but needs further development; complaints are still informal.	Data are not yet fully transformed into operational decisions.	Integrate SIME-SPAM with complaint handling, maintenance, coverage and revenue dashboards.
Financing and PAD	PAD declined from 2023 to 2025 and payment collection remains difficult.	Weak revenue reduces maintenance and expansion capacity.	Introduce digital payment, customer database improvement, service-based billing and revenue reinvestment.

Policy Implications

The practical implication of the study is that local government should not treat drinking water services as a residual function within a broad public works portfolio. The evidence indicates that SPAM requires a dedicated management chain that begins with raw water security and ends with household satisfaction. This chain includes planning, operation, maintenance, monitoring,

billing, complaint handling, and public communication. Each element must have a responsible actor, an annual work plan, and measurable indicators. Without such a chain, policy implementation will continue to depend on ad hoc responses to leakage, individual officer initiative, or limited project-based budgeting.

A second implication concerns budget prioritization. The decline of PAD should not be interpreted merely as a financial problem, but as a warning that the service relationship between government and citizens is weakening. Investment in repair, water quality testing, and customer service may initially require additional expenditure, but it can strengthen public trust and expand the base of paying users. The government should therefore design a reinvestment logic in which revenue from water service is transparently connected to visible improvements. Citizens are more likely to support payment when they see that tariffs and retribution are returned to better flow, cleaner water, and faster response to complaints.

A third implication is the importance of data governance. Kotamobagu already has an initial digital instrument through SIME-SPAM, yet the next step should be to convert it into an integrated management system. Data should be collected not only for reporting upward, but also for solving operational problems. The system should record connection status, service area, water flow complaints, pipe damage, maintenance history, water quality test results, unpaid bills, and revenue realization. This kind of data integration would allow the UPTD or future regional water operator to make evidence-based decisions and to prioritize interventions where the public impact is highest.

A fourth implication relates to community communication. The article shows that some users have moved to wells or PDAM Bolaang Mongondow because they perceive the city SPAM service as less reliable. Restoring trust requires more than technical repair. The government must communicate planned improvements, explain constraints honestly, publish service contact channels, and provide feedback after complaints are handled. Participation in water governance can be strengthened through neighborhood-level socialization, customer forums, and public reporting of coverage and quality indicators. In this sense, users are not passive beneficiaries; they are partners in monitoring service quality and protecting infrastructure.

Limitations and Future Research

This article is limited by its reliance on qualitative evidence from the article and available documentary data. The analysis is strong for interpreting implementation processes, institutional constraints, and service perceptions, but it does not calculate technical hydraulic performance or conduct laboratory testing. Future research can complement this study with quantitative measurement of non-revenue water, pressure levels, daily continuity of flow, water quality parameters, and customer satisfaction scores. Such mixed-method research would provide a more complete basis for investment planning.

Future studies may also compare Kotamobagu with other municipalities that manage drinking water through UPTD, local enterprises, or regional companies. Comparative research would help identify which institutional models are most effective under different fiscal and geographic conditions. In addition, future research can evaluate the development of SIME-SPAM after it is integrated with complaint handling and payment systems. This would be useful for understanding how digital governance can improve local water service when it is supported by trained personnel, strong leadership, and reliable data routines.

CONCLUSION

The implementation of the Drinking Water Supply System policy in Kotamobagu City has been carried out through technical operation, maintenance, monitoring, reporting, and service activities under the Public Works and Spatial Planning Office. However, the implementation remains not yet optimal. The most visible indicator is the low overall coverage of city-managed SPAM service, which reaches only 21.30 percent of the population despite the existence of nine SPAM locations. The study shows that several systems are functional, but their contribution to household access is limited by insufficient intake capacity, leakage in distribution networks, incomplete asset transfer, and reactive maintenance caused by budget constraints. The determinant factors affecting implementation are multidimensional. First, raw water and intake capacity are insufficient to meet growing demand. Second, infrastructure maintenance is constrained by limited budget, causing leakage and reduced flow. Third, water quality surveillance is not yet continuous because laboratory testing depends on available funding. Fourth, human resource capacity is weak, with limited certified personnel and insufficient technical training. Fifth, the UPTD Air Minum has been established legally but has not yet become operational because the structure is unfilled. Sixth, monitoring has begun through SIME-SPAM but still requires deeper integration with operational and service data. Seventh, complaint handling and payment collection remain insufficiently modernized, while PAD from water service has declined from 2023 to 2025. The article concludes that Kotamobagu requires an integrated strengthening strategy. The local government should activate the UPTD, increase maintenance and infrastructure funding, develop additional intake, rehabilitate old distribution networks, institutionalize routine water quality testing, strengthen human resources through certification, and expand SIME-SPAM into a full monitoring and service dashboard. The government should also create a formal complaint hotline and digital payment system to improve responsiveness and revenue collection. These steps are necessary to move SPAM implementation from partial operation toward sustainable service governance that supports access, quality, reliability, public trust, and local revenue. For public administration scholarship, the case demonstrates that drinking water policy is not merely a technical engineering issue. It is a policy implementation issue involving resources, bureaucratic structure, communication, digital governance, public service quality, and institutional accountability. The Kotamobagu experience confirms that local infrastructure policy succeeds when physical systems, administrative systems, and citizen-facing services are managed as one integrated governance chain.

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