

Analysis of the Effectiveness of the Special Allocation Fund (DAK) Drinking Water Program on Drinking Water Access Achievement in Purwakarta Regency

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ABSTRACT

KEYWORDS

Special Allocation Fund, Minister of Public Works and Public Housing Regulation No. 27 of 2016, Effectiveness of SPAM Management, Relative Importance Index (RII), Confidence Interval (CI), Purwakarta Regency, Water Quality

The Government of Purwakarta Regency seeks to improve access to safe drinking water; however, by 2024, coverage has only reached 64%, still below the 81% target. This study aims to analyze the effectiveness of community-based Drinking Water Supply System (SPAM) management funded through the Special Allocation Fund (DAK) in three villages: Cipicung, Pasirangin, and Pusakamulya. The evaluation refers to five aspects based on Minister of Public Works and Housing Regulation No. 27 of 2016, namely technical, institutional, financial, social, and environmental aspects. The research method combined analysis of existing conditions and stakeholder perceptions. Primary data were collected through surveys and structured interviews with 129 respondents, while secondary data were obtained from relevant regulations. Data analysis employed the Relative Importance Index (RII) and Confidence Interval (CI). The results indicate that water quality is the most influential factor in determining the effectiveness of SPAM management. Cipicung and Pasirangin villages have successfully implemented all aspects, as reflected in good water quality, strong institutional arrangements, and high community participation. Meanwhile, Pusakamulya village faces challenges in the environmental aspect, particularly in water source protection, which affects water availability. The management model applied in Cipicung and Pasirangin can serve as a reference for other areas, with recommendations focusing on infrastructure improvement and strengthening water source protection.

INTRODUCTION

Water is a basic human need that is very important in supporting daily survival (Howell et al., 2022; Rosinger, 2023; Rzechorzek et al., 2022; Yamada et al., 2022). The availability of safe drinking water is closely related to public health and overall quality of life (Yuni Kartika, 2021; Sihadi Darmo Wihardjo, 2021). Limited access to clean water can increase the risk of disease and reduce community welfare. In daily life, water is used for various needs such as drinking, cooking, bathing, and sanitation (Fera Lestari, 2021). Therefore, fulfilling proper access to drinking water is an important responsibility of the government (Anugrah et al., 2022; Paikah & Yuliani, 2025; Perveen, 2023; Zarreh et al., 2024).

The government is not only obliged to prevent the occurrence of diseases, but also to ensure the fulfillment of people's right to a healthy life, including access to clean water, sanitation, decent housing, and a safe environment (Ludovikus Wadu Bomans, 2020). Access to proper drinking water is an integral part of basic public services (Ratna Dian Kurniawati,

2020). This commitment is also reflected in the global development agenda through the Sustainable Development Goals (SDGs), especially Goal 6 which emphasizes the importance of the availability and management of clean water and sustainable sanitation for all.

However, achieving this target at the regional level still faces various challenges. In Purwakarta Regency, the achievement of access to decent drinking water in 2024 will only reach 64%, an increase from 63% in 2023, but still far below the Regional Development Plan (RPD) target of 81% (Suryani, 2020). This condition shows that there are problems in the provision of drinking water services, especially in rural areas which are characterized by limited infrastructure, a decrease in the quality and quantity of raw water, and the management of the Drinking Water Supply System (SPAM) that is not optimal (RISPAM Purwakarta Regency, 2022).

In an effort to overcome these problems, the government allocates the Physical Special Allocation Fund (DAK) for the Drinking Water Sector as a funding instrument for basic infrastructure development. DAK aims to reduce disparities between regions and improve access to drinking water services (Ibrahim & Abdul, 2019). Several studies have shown that the DAK program is able to increase access to drinking water for low-income communities and rural areas (Qomaruddin, 2017). However, the effectiveness of its implementation is still questionable because it tends to be oriented towards budget inputs rather than outcomes or impacts (Yaqin & Herwanti, 2019). Therefore, evaluation is needed to improve the quality of program planning and implementation (Pambudi et al., 2021b; Sulaeman & Andriyanto, 2021).

Empirically, several villages in Purwakarta Regency show the development of access to drinking water after receiving the DAK program. Cipicung Village, for example, has experienced an increase in access from 44.74% in 2019 to 75.51% in 2024. Pasirangin Village and Pusakamulya Village also showed an increasing trend, although they were still below the set target. However, challenges such as geographical conditions, limited raw water sources, and inadequate infrastructure are still the main obstacles in optimizing services.

In addition, community-based SPAM management also faces various obstacles, such as limited technical capacity, weak institutions, and suboptimal community participation. Many of the systems that have been built are not managed sustainably due to a lack of mentoring and capacity building. This shows that the success of the program is not only determined by the amount of funding allocation, but also by the effectiveness of governance and community involvement.

Based on these conditions, it is important to conduct an analysis of the effectiveness of the Physical Special Allocation Fund (DAK) Program for the Drinking Water Sector in increasing access to decent drinking water. This study aims to evaluate the management of community-based SPAM in three villages, namely Cipicung Village, Pasirangin Village, and Pusakamulya Village, by reviewing technical, institutional, financial, social, and environmental aspects. In addition, this study also aims to identify factors that affect the effectiveness of the program and develop an optimal management model to improve access to drinking water in Purwakarta Regency.

The benefits of this study are twofold. Theoretically, this research enriches the body of knowledge on the evaluation of community-based drinking water supply system (SPAM) management by integrating technical, institutional, financial, social, and environmental aspects based on Minister of Public Works and Housing Regulation No. 27 of 2016. It also contributes

to the development of evaluation methods using the Relative Importance Index (RII) and Confidence Interval (CI) in the context of infrastructure programs. Practically, the findings provide actionable recommendations for local governments, particularly in Purwakarta Regency, to improve the effectiveness of the Physical Special Allocation Fund (DAK) program by prioritizing water quality, regulatory enforcement, and community participation. The successful management model from Cipicung and Pasirangin villages can serve as a reference for other villages facing similar challenges. Furthermore, this study supports policymakers in designing more targeted and sustainable interventions to accelerate the achievement of the 81% drinking water access target in Purwakarta Regency by 2024 and beyond.

METHOD

This research was conducted in three villages that received the Physical Special Allocation Fund (DAK) Program for the Drinking Water Sector in Purwakarta Regency, namely Cipicung Village, Pasirangin Village, and Pusakamulya Village. The three villages have hilly characteristics that are a challenge in the distribution of drinking water from sources to households. The limited pipeline network causes some communities to still depend on alternative water sources such as dug wells and springs, which has an impact on the quality of life and increased household costs. In addition, the management of community-based Drinking Water Supply Systems (SPAM) in this region also faces various obstacles, such as limited technical capacity, suboptimal institutions, and low community participation due to lack of continuous training and mentoring.

This study uses a quantitative approach with evaluative and descriptive research types. This approach aims to evaluate the effectiveness of the Physical DAK Program in the Drinking Water Sector in improving access to drinking water, as well as measure the influence of SPAM management variables, such as technical, institutional, financial, social, and environmental aspects on the success of the program (Yuniarti et al., 2021; Joseph Anthony Hallatu, 2024). The quantitative approach was chosen because it allows the systematic testing of relationships between variables through statistical analysis.

The data used in this study consisted of primary data and secondary data. Primary data was obtained through field observations, structured interviews, documentation, and the distribution of questionnaires to the SPAM user community, managers (KPSPAM), and related agencies. This data includes the existing conditions of SPAM, such as raw water units, production, distribution, and home connection services, as well as the fulfillment of quality, quantity, and continuity (3K) aspects. In addition, primary data also includes the characteristics of respondents and management aspects, such as institutions, financing, community participation, transparency, and water source protection. Meanwhile, secondary data was obtained through literature studies and coordination with related agencies, which included data on the number of SPAM users, DAK fund allocation, water quality standards, and regulations relevant to the provision of drinking water.

The population in this study is all SPAM users and managers at the research site with a total of 987 home connections (SR). The sampling technique used is stratified random sampling to ensure the representation of each group in the population. The number of samples was determined using the Slovin formula with an error rate of 10%, so that a minimum of 90 respondents were obtained. Furthermore, the sample was distributed proportionally based on

the number of house connections in each village, namely 27 respondents in Cipicung Village, 31 respondents in Pusakamulya Village, and 32 respondents in Pasirangin Village. In addition to user respondents, this study also involves SPAM managers and related agencies as stakeholders, so that the total number of respondents analyzed reached 121 people.

Data analysis was carried out using descriptive and inferential statistical approaches to measure the level of effectiveness of SPAM management and identify factors that influence it. The evaluation is carried out based on technical, institutional, financial, social, and environmental indicators. In addition, stakeholder perception analysis is used to understand the factors that affect the success of the program. The results of this analysis are expected to provide a comprehensive picture of the effectiveness of the Physical DAK Program in the Drinking Water Sector in increasing access to drinking water in Purwakarta Regency.

RESULT AND DISCUSSION

Existing Technical Aspects

The identification of technical aspects shows that the water supply system in the three villages receiving the Physical DAK Program in the Drinking Water Sector still faces several obstacles in ensuring the sustainability of services. In general, the technical aspects include production units, distribution, house connections (SR), as well as the fulfillment of the 3K principle (quality, quantity, and continuity), which plays an important role in assessing the performance of SPAM (Juang et al., 2025; Glory et al., 2017).

In the production unit, the evaluation results show the need to increase the maintenance of reservoirs that are prone to leakage. In addition, the quality and continuity of water in the reservoir have not been optimally monitored. The three villages also still rely on a gravity-based distribution system without the use of pumps, so they are highly dependent on the condition of water sources. This poses a risk to supply stability, especially in the event of a decline in the quality or quantity of raw water.



Figure 1. Management of the KPSPAM Gemal Drinking Water System

Source: Results of Field Observations, (2025)

Distribution Unit

The distribution unit in SPAM consists of a reservoir and a piping distribution network, where the reservoir serves as a temporary storage place before water is distributed to the user. The types of reservoirs used include planting reservoirs and elevated reservoirs with poles.

The results of the observation showed that the distribution system in the three villages was in good condition, characterized by the absence of leaks in the reservoir or pipeline network. In addition, the main aspects of distribution, namely water availability, service pressure (continuity), and water quality from production units, have generally been met. This condition shows that the distribution unit has functioned optimally in supporting water distribution to the community.

Table 1. Reservoir Capacity Identification

Yes	SPAM	Existing (m ³)	Evaluation
1	Cipicung	36	Adequate
2	Pasirangin	54	Adequate
3	Pusakamulya	36	Less

Source: Results of field observations and calculations by the author based on SPAM technical data in Purwakarta Regency (2025)

Based on the identification results in Table 1, the condition of reservoir capacity in 3 (three) villages receiving the Physical DAK program in the Drinking Water Sector in Purwakarta Regency showed varying results. Of the three villages, only two SPAM units, namely KPSPAM Gemal Tirta Cipicung Village and KPSPAM Lawang Kahuripan Pasir Angin Village have adequate reservoir capacity. This is shown by the existing reservoir capacity of 36 m³ which is greater than the ideal capacity calculated based on the maximum hourly water requirement of 34.21 m³. And the Existing Capacity is 54 m³ which is greater than the ideal capacity calculated based on the maximum hourly water requirement of 40.31 m³.

Meanwhile, one other village, namely KPSPAM Tirta Kahuripan Pusaka Mulya Village, showed inadequate reservoir capacity conditions. where the existing capacity of 36 m³ is very incomparable to the ideal requirement which reaches 39.12 m³. The inability of this reservoir to accommodate the volume of water according to the needs of high-risk peak hours causes disruption of the continuity of water supply to the community. However, to deal with the deficit at KPSPAM Tirta Kahuripan Pusakamulya Village and maintain service continuity, the SPAM manager at the location has implemented an operational solution by providing a new reservoir with a size of 18 m³. This new reservoir is used to maximize the distribution of water directly from the source to the customer's network, especially during peak hours, so that the water supply can still be served optimally.

Analysis Relative Importance Index (RII)

The Relative Importance Index (RII) analysis was carried out to obtain the level of importance and compile a ranking of factors that affect the effectiveness of the governance of the Drinking Water Management System (SPAM) of the Physical DAK Drinking Water Sector in Purwakarta Regency. The calculation of RII is carried out for each indicator where the value of RII ranges from 0 (minimum) to 1 (maximum), the closer the value is to 1, the more

influential the factor will be on the effectiveness of the governance of the Drinking Water Management System (SPAM) of the Physical DAK Drinking Water Sector in Purwakarta Regency. The scores for each factor were obtained through the sum of the scores chosen by the respondents.

From the results of the calculation and graph of the value of RII it is known that the important factors that affect the effectiveness of the governance of the Drinking Water Management System (SPAM) of the Physical DAK Drinking Water Sector in Purwakarta Regency with the highest RII value are the water quality received (I.9). The next important factor that affects is the existence of regulations (II.4) and the quality of raw water (I.1). Then the Continuity of Water received (I.11). Then successively the Quantity of Water received (I.10), Availability of Raw Water (I.2), and Affordability of Community Contributions (III.2).

Confidence Interval (CI)

The Confidence Interval Test was conducted to support the data and strengthen the results obtained from the Relative Importance Index Test. In determining the limit of the ranking line in the Confidence Interval is done by looking at the interval value.

From the Confidence Interval Test the total of the 3 villages that were sampled obtained the results that the factors of Water Quality received (I.9), the existence of regulations (II.4), Raw Water Quality (I.1), response to user complaints (II.6), and community meetings with managers (IV.1), were ranked 1 (one), while for the affordability of community contributions (III.2), the existence of community contributions (III.1), protection of water sources (V.1) and raw water quality (I.1), quantity of water received (I.10), Management Performance (II.2), ranked 2nd (two), Availability of raw water (I.2) ranked 3rd (third), for user satisfaction (II.5), Availability of spare parts (I.4), Addition of house connections

(I.7), Conformity of contributions with maintenance costs (III.4), existence of managers (II.1), Transparency of managers (II.3), Regularity of Monthly Contribution Payments (III.3), are ranked 4th (fourth). The results of the Relative Importance Index and Confidence Interval Test of the total of 3 (Three) Villages can be seen in table 2

Table 2. Relative Importance Test Results of Index and Confidence Interval 3 Villages

Code	Factors assessed	RII	MT
I.9	Accepted Water Quality	0,97	1
II.4	Existence of Regulations	0,94	1
II.6	Responding to Consumer Complaints	0,93	1
IV.1	Community Meeting with the Manager	0,89	1
III.2	Affordability of Community Contributions	0,89	2
III.1	The Existence of Community Contributions	0,88	2
V.1	Water Source Protection	0,87	2
I.1	Raw Water Quality	0,87	2
I.10	Quantity of Water received	0,86	2
II.2	Manager Performance	0,85	2
IV.2	Continuous Desire	0,83	2
I.11	Received Water Continuity	0,80	2
I.2	Availability of Raw Water	0,72	3

II.5	User Satisfaction	0,71	4
I.4	Spare Parts Availability	0,70	4
I.7	Home Extension	0,69	4
III.4	Conformity of Contributions to Maintenance Costs	0,69	4
II.1	Existence of the Manager	0,69	4
II.3	Management Transparency	0,69	4
III.3	Regularity of Monthly Contribution Payments	0,68	4
I.8	Water Service Coverage	0,67	4
III.5	Existence of Development Costs	0,67	4
I.6	Distribution Pipeline Performance	0,67	4
I.5	Water Storage Building Performance	0,66	4
I.3	Pump Performance	0,00	5

Source: Results of questionnaire data analysis from 129 respondents using Relative Importance Index (RII) and Confidence Interval (CI) methods (2025)

CONCLUSION

Based on the results of the analysis and discussion, it can be concluded that the implementation of the provisions of the Minister of PUPR Number 27 of 2016 in the recipient villages of the Physical DAK Program in the Drinking Water Sector in Purwakarta Regency has not been completely evenly distributed. Of the three villages studied, namely Cipicung Village, Pasirangin Village, and Pusakamulya Village, there are two villages that have implemented all aspects of SPAM management (technical, institutional, financial, social, and environmental) well. Meanwhile, Pusakamulya Village still faces obstacles in environmental aspects, especially the protection of water sources, which has the potential to affect the sustainability of services. The results of the analysis show that technical factors are the most dominant factors in determining the effectiveness of SPAM management, especially related to water quality, raw water quality, and continuity of service. However, institutional, financial, social, and environmental factors also contribute significantly to the success of management. In general, the results of the Confidence Interval (CI) test show that most indicators have met the effectiveness criteria according to applicable regulations. The SPAM governance model formulated based on the results of the analysis shows that the comprehensive implementation of management aspects is able to improve the achievement of drinking water access. The model applied in Cipicung Village and Pasirangin Village, as well as some in Pusakamulya Village, can be used as a reference for other villages in optimizing the use of the Physical DAK Program in the Drinking Water Sector to increase access to proper and sustainable drinking water in Purwakarta Regency.

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