



THE EFFECTIVENESS OF GROUNDWATER TAX SERVICES IN ENHANCING REGIONAL ORIGINAL REVENUE: A POLICY IMPLEMENTATION ANALYSIS IN LOCAL GOVERNMENT

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ABSTRACT

This study examines the effectiveness of groundwater tax (Pajak Air Tanah) services as a source of Regional Original Revenue (Pendapatan Asli Daerah/PAD) in Medan City by adopting a public service effectiveness perspective. Unlike previous studies that primarily emphasize fiscal performance, this research applies Steers' organizational effectiveness framework, which includes goal attainment, integration, and adaptation, to provide a multidimensional analysis of tax service performance. A descriptive qualitative approach was employed to capture institutional practices, service processes, and stakeholder perspectives that cannot be adequately explained through quantitative indicators alone. Data were collected through interviews, observations, and document analysis involving officials of the Regional Revenue Agency (Bapenda) of Medan City. The findings reveal that groundwater tax services have been administratively implemented in accordance with existing regulations, particularly in terms of registration, assessment, and collection procedures. However, the contribution of groundwater tax to PAD remains relatively low due to structural limitations, including a restricted tax base, regulatory policies aimed at controlling groundwater extraction, and the transition toward piped water consumption. From the perspective of goal attainment, service outputs are achieved, yet fiscal targets are only partially fulfilled. In terms of integration, limited communication and weak inter-agency coordination hinder the expansion of the tax base and reduce data accuracy. Meanwhile, adaptation capacity remains reactive, constrained by limited resources and the absence of systematic innovation in service delivery. The study concludes that groundwater tax should not be evaluated solely as a revenue-generating instrument but also as a regulatory tool for environmental governance. Therefore, improving service effectiveness requires strengthening institutional coordination, enhancing data integration systems, and developing adaptive service strategies to balance fiscal objectives with sustainable resource management.

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1. INTRODUCTION

Regional Original Revenue (Pendapatan Asli Daerah / PAD) is a central indicator of local fiscal capacity in the context of decentralization, as it reflects the extent to which local governments can finance development programs independently and sustainably. In Indonesia, however, many local governments still rely heavily on intergovernmental transfers, indicating that the optimization of local revenue sources remains limited. The enactment of Law Number 1 of 2022 concerning Fiscal Relations between the Central Government and Regional Governments reaffirms the strategic position of local taxation as an instrument for strengthening fiscal autonomy. Within this framework, local taxes are not merely administrative obligations, but are expected to function as policy instruments that support governance effectiveness and public welfare. Among the various local taxes, groundwater tax (pajak air tanah / PAT) occupies a distinctive position because it is directly related to the utilization of natural resources and the protection of environmental sustainability (Undang-Undang Republik Indonesia No. 1 Tahun 2022; Mardiasmo, 2018).

Conceptually, taxation has a dual function. On the one hand, it serves a budgetary purpose by generating public revenue; on the other hand, it functions as a regulatory mechanism that shapes social and economic behavior. In the context of groundwater use, this duality becomes particularly visible because taxation is not only designed to increase PAD but also to control excessive groundwater extraction that may threaten ecological balance. This makes groundwater tax different from other local taxes whose primary orientation is fiscal accumulation. In local public administration, therefore, the effectiveness of groundwater tax should not be understood narrowly in terms of revenue realization alone, but should also be interpreted in relation to administrative quality, compliance management, and environmental governance outcomes (Mahmudi, 2016; Dwiyanto, 2017; Republik Indonesia, 2009).

The case of Medan City illustrates this complexity. As one of the largest urban centers in Indonesia, Medan has substantial economic activity involving hotels, industries, commercial buildings, and other business actors that potentially utilize groundwater for operational purposes. In principle, this condition should provide a meaningful tax base for groundwater tax collection. However, empirical data indicate that groundwater tax contributes only a relatively small share to PAD compared to other local taxes. In 2024, for example, groundwater tax revenue realization was far below major local tax categories such as land and building tax and the duty on acquisition of land and building rights. In addition, the realization rate of groundwater tax revenue during the 2022–2024 period fluctuated and did not demonstrate a stable pattern of optimal achievement. This discrepancy between potential and realization raises an important analytical question: is the limited contribution of groundwater tax primarily a matter of weak fiscal performance, or does it reflect broader institutional and regulatory dynamics within service delivery and environmental control? (Badan Pendapatan Daerah Kota Medan, 2025).

Previous studies on groundwater tax and local tax performance in Indonesia have generally focused on quantitative indicators such as contribution ratios, target achievement, and revenue growth. While such studies are useful in measuring fiscal output, they often overlook the institutional processes through which tax effectiveness is produced or constrained. In particular, limited attention has been given to the role of service quality, inter-agency coordination, taxpayer communication, monitoring capacity, and organizational responsiveness in shaping tax performance. As a result, the existing literature tends to treat tax effectiveness as a purely financial issue, rather than as a multidimensional public service and governance issue. This creates an important research gap, especially for taxes such as groundwater tax that operate simultaneously as fiscal tools and environmental regulatory instruments (Astuti & Prasetyo, 2019; Putri & Hidayat, 2020; Rahmawati & Yuliana, 2022).

To address this gap, the present study adopts Steers' organizational effectiveness framework, which emphasizes three key dimensions: goal attainment, integration, and adaptation. This framework is particularly relevant because it enables a broader understanding of effectiveness beyond numerical target achievement. Goal attainment makes it possible to examine whether the service outputs and policy objectives of groundwater taxation are fulfilled. Integration highlights the importance of communication with taxpayers and coordination across institutions responsible for licensing, supervision, and revenue administration. Adaptation, meanwhile, focuses on the capacity of the organization to respond to regulatory changes, taxpayer diversity, and operational constraints. By using this framework, the study moves beyond a revenue-centered perspective and repositions groundwater tax effectiveness as a matter of institutional performance, service capacity, and policy coherence in local governance (Steers, 1999; Siagian, 2001; Wahab, 2009).

Based on this background, this study aims to analyze the effectiveness of groundwater tax services as a source of Regional Original Revenue in Medan City from a public service perspective and to identify the factors that constrain the achievement of its fiscal and administrative objectives. The study specifically argues that the effectiveness of groundwater tax cannot be evaluated solely through revenue contribution, because

its implementation is also embedded in environmental protection objectives and sustainable resource management. Accordingly, this research offers two main contributions. Theoretically, it enriches the study of public administration and local taxation by applying a multidimensional organizational effectiveness approach to a tax instrument that is both fiscal and regulatory in nature. Practically, it provides policy-relevant insights for improving groundwater tax administration through stronger institutional coordination, better data integration, and more adaptive service strategies in urban local government settings.

2. RESEARCH METHOD

This study employed a descriptive qualitative research design to obtain an in-depth understanding of the effectiveness of groundwater tax services as a source of local revenue. The qualitative approach was chosen to explore institutional practices, service mechanisms, and stakeholder perspectives within their natural context, emphasizing meaning and process rather than statistical generalization. This design is appropriate for examining the implementation of Law No. 28 of 2009 Article 1 Paragraphs 33 and 34 concerning regional taxes and levies, particularly in relation to groundwater tax management at the local government level.

The research was conducted at the Regional Revenue Agency (Badan Pendapatan Daerah) of Medan City, located at Jl. Abdul Haris Nasution No. 32, Pangkalan Mansyur Subdistrict, Medan Johor District. The selection of this site was based on its institutional authority in managing groundwater tax as part of locally generated revenue (PAD). Data collection was carried out over a two-month period, from December 2025 to January 2026. Informants were selected using purposive sampling based on their roles, responsibilities, and involvement in groundwater tax administration, enabling the researcher to obtain relevant and credible information. A total of six informants participated in this study, consisting of officials and staff formally appointed under the Mayor of Medan's Decree concerning groundwater tax management.

Data were obtained from both primary and secondary sources. Primary data were collected directly from informants through structured interviews and field observations, including interview transcripts, observation notes, and basic informant profiles. Secondary data were derived from official documents, government regulations, institutional reports, and relevant academic literature related to groundwater tax policy and public service effectiveness.

Data collection techniques consisted of interviews, observation, and documentation. Structured interviews were conducted using predetermined guidelines to ensure consistency and depth of information, focusing on service procedures, implementation challenges, and policy effectiveness related to groundwater tax services. Observation was conducted before, during, and after the data collection process to examine service processes, institutional interactions, and operational practices within the Regional Revenue Agency. Documentation involved the analysis of regulations, official reports, service records, and policy documents related to groundwater tax administration and local revenue performance.

Data analysis followed an interactive qualitative model consisting of four stages: data collection, data reduction, data display, and conclusion drawing. All interview, observation, and documentation data were compiled systematically according to the research objectives. Relevant data were selected, summarized, and categorized to identify patterns and key themes concerning service effectiveness and revenue performance. The reduced data were then presented in narrative and thematic forms to facilitate interpretation and analytical reasoning. Conclusions were drawn inductively based on empirical findings and were continuously verified through triangulation and member checking to ensure the credibility and consistency of the results.

3. RESULTS AND ANALYSIS

Goal Attainment (Service Output of Groundwater Tax)

The findings indicate that the implementation of groundwater tax (Pajak Air Tanah/PAT) services at the Regional Revenue Agency (Bapenda) of Medan City is oriented not only toward revenue collection but also toward the regulatory function of controlling groundwater utilization. Administratively, the service outputs are reflected in several routine activities, including taxpayer registration, verification of groundwater usage, determination of tax payable, and facilitation of payment procedures. These outputs demonstrate that the basic organizational objectives related to service provision have been operationally achieved.

However, empirical evidence suggests that the achievement of these outputs does not necessarily translate into optimal fiscal outcomes. The contribution of PAT to Regional Original Revenue (Pendapatan

Asli Daerah/PAD) remains relatively low compared to other local taxes. This condition is influenced by structural factors such as the limited number of groundwater users who meet the criteria as taxable entities, the relatively small scale of groundwater extraction in certain sectors, and policy restrictions intended to reduce excessive groundwater exploitation. Consequently, the fiscal goal of increasing PAD through PAT is constrained by the broader environmental policy framework.

From the perspective of organizational effectiveness theory, goal attainment refers to the degree to which organizational outputs correspond with predetermined objectives (Steers, 1999). In this study, the formal objectives of service delivery are largely fulfilled, yet fiscal targets are only partially achieved. This discrepancy suggests that effectiveness in public sector organizations should not be measured solely by revenue outcomes but also by the extent to which services support regulatory and governance objectives (Mahmudi, 2005). Groundwater taxation thus operates as a dual-purpose instrument, combining fiscal extraction with environmental regulation, which aligns with the conception of taxes as both budgetary and behavioral policy tools (Mardiasmo, 2011).

Furthermore, the findings highlight that service effectiveness must be contextualized within the nature of the policy being implemented. Unlike other local taxes that are purely revenue-oriented, groundwater tax is inherently linked to environmental sustainability. Therefore, lower revenue figures do not necessarily indicate administrative inefficiency but may reflect successful regulatory control over groundwater use. This reinforces the argument that public service effectiveness should be assessed multidimensionally, incorporating administrative performance, policy coherence, and social outcomes (Siagian, 2001).

Integration (Communication and Institutional Coordination)

Integration concerns the organization's ability to establish effective communication and coordination with both internal and external stakeholders, particularly taxpayers and related government agencies (Steers, 1999). The results show that Bapenda Medan City has conducted socialization activities related to groundwater tax primarily through direct interactions with registered taxpayers, including consultations during registration and payment processes. Information dissemination is also carried out through official circulars and limited digital media platforms.

Despite these efforts, the scope of socialization remains narrow and tends to focus on existing taxpayers rather than potential ones. This condition contributes to the persistence of unregistered groundwater users and limits the expansion of the tax base. Communication patterns are largely reactive, occurring mainly when taxpayers initiate contact or when administrative procedures require clarification. Proactive educational campaigns designed to increase awareness of groundwater tax obligations and environmental impacts are still limited.

Inter-agency coordination constitutes another critical dimension of integration. The findings reveal that cooperation between Bapenda and technical agencies responsible for groundwater licensing and environmental management has been initiated but is not yet fully institutionalized. Data exchange between agencies remains fragmented, and there is no integrated information system that comprehensively links licensing data with tax administration records. As a result, discrepancies may occur between actual groundwater use and registered tax data.

This limited level of integration affects both compliance and monitoring capacity. Effective public service delivery depends on coherent inter-organizational coordination and consistent information flows (Siagian, 2001). When institutional linkages are weak, enforcement becomes less effective, and the potential for data inaccuracies increases. In the context of groundwater tax administration, insufficient integration reduces the government's capacity to identify new taxable objects and to ensure accurate reporting of groundwater usage.

These findings are consistent with previous studies emphasizing that tax compliance is strongly influenced by the quality of communication and institutional trust between taxpayers and authorities (Wahab, 2009). Strengthening integration through systematic socialization programs, coordinated inspections, and shared databases would enhance both fiscal performance and regulatory oversight.

Adaptation (Organizational Adjustment Capacity)

Adaptation refers to the organization's ability to adjust to changes in its environment, including regulatory frameworks, resource availability, and stakeholder characteristics (Steers, 1999). The results show that Bapenda Medan City has made adjustments following the enactment of Law Number 1 of 2022 on Fiscal Relations between the Central and Regional Governments. These adjustments include modifications in administrative procedures, reporting mechanisms, and internal guidelines related to groundwater tax management.

At the operational level, officers demonstrate situational adaptability by providing informal guidance to taxpayers who experience difficulties in understanding regulations or fulfilling their obligations. This

practice reflects a pragmatic response to heterogeneous taxpayer characteristics, particularly among small and medium enterprises that rely on groundwater for operational purposes. However, such adaptive practices are largely individual-based and have not yet been formalized into standardized service protocols.

In terms of organizational resources, adaptation has been achieved mainly through task prioritization rather than through structural reform or technological innovation. Limited human resources and technical capacity constrain the ability to conduct comprehensive monitoring of groundwater extraction. As a result, adaptation remains reactive, aimed at maintaining routine service delivery rather than enhancing long-term institutional performance.

According to organizational theory, sustainable effectiveness requires anticipatory and planned adaptation strategies rather than short-term adjustments (Steers, 1999). The findings suggest that Bapenda's adaptive capacity is still oriented toward procedural compliance rather than strategic innovation. This condition limits the potential for improving service quality and regulatory effectiveness in the long run.

Effectiveness of Groundwater Tax Services

Overall, the effectiveness of groundwater tax services can be characterized as administratively functional but substantively constrained. Service procedures are implemented in accordance with established regulations, and taxpayers are provided with formal mechanisms for registration, reporting, and payment. Nevertheless, data accuracy regarding groundwater usage remains a critical challenge due to limited technical supervision and monitoring instruments.

Compliance levels among registered taxpayers are moderate, with some instances of delayed reporting and underreporting of groundwater extraction volumes. Additionally, several potential taxpayers remain outside the administrative system, which further reduces the comprehensiveness of tax coverage. These issues reflect structural weaknesses in both integration and adaptation dimensions.

From a fiscal perspective, the contribution of PAT to PAD has not reached optimal levels. However, this outcome should be interpreted within the broader regulatory context. Restrictions on groundwater exploitation are designed to preserve environmental sustainability and prevent ecological degradation. Thus, the limited revenue from PAT partly reflects successful policy constraints rather than purely administrative shortcomings.

This dual role of groundwater tax as both a revenue source and a regulatory instrument aligns with the legal framework governing local taxation in Indonesia (Undang-Undang Republik Indonesia No. 28 Tahun 2009). In this sense, effectiveness should be evaluated not only by revenue performance but also by the extent to which taxation contributes to sustainable resource management (Mardiasmo, 2011).

Discussion

The findings demonstrate that the effectiveness of groundwater tax services in Medan City is shaped by the interaction between fiscal objectives and environmental policy goals. While revenue targets have not been fully achieved, the regulatory function of groundwater taxation has been partially realized through administrative control and licensing mechanisms. This supports the argument that public sector effectiveness should be assessed through both fiscal and governance dimensions (Mahmudi, 2005).

Consistent with Steers' (1999) framework, effectiveness in this study is determined by three interrelated dimensions: goal attainment, integration, and adaptation. Weaknesses in integration and adaptation limit overall effectiveness, even when administrative outputs are achieved. This finding extends previous studies that focused primarily on revenue realization by highlighting the importance of institutional capacity and service quality in tax administration.

Policy-wise, enhancing groundwater tax effectiveness requires a comprehensive strategy that integrates fiscal management with environmental governance. Strengthening inter-agency coordination, expanding socialization to potential taxpayers, and institutionalizing adaptive service practices would improve both compliance and regulatory oversight. Moreover, the development of integrated data systems linking licensing and taxation records would support more accurate monitoring of groundwater utilization.

In theoretical terms, this study reinforces the relevance of organizational effectiveness theory in analyzing public service delivery. It also illustrates the complexity of evaluating tax effectiveness when fiscal instruments are simultaneously used as regulatory tools. Therefore, future research should consider incorporating environmental impact indicators alongside fiscal metrics to provide a more holistic assessment of groundwater tax performance.

4. CONCLUSION

This study concludes that the effectiveness of groundwater tax (Pajak Air Tanah) services as a source of Regional Original Revenue (Pendapatan Asli Daerah/PAD) in Medan City remains limited when assessed from a fiscal contribution perspective. Groundwater tax revenue has not provided a significant share of PAD compared to other types of local taxes. This condition is influenced by structural factors, including the restricted number of taxable objects, the narrowing tax base due to policies aimed at controlling groundwater exploitation, and the gradual shift of water consumption from groundwater sources to piped water services provided by the municipal water utility (PDAM).

From an administrative standpoint, groundwater tax services at the Regional Revenue Agency (Bapenda) of Medan City have generally been implemented in accordance with prevailing legal and regulatory frameworks. Core administrative processes—such as taxpayer registration, tax assessment, and tax collection have been carried out systematically. Nevertheless, persistent challenges remain in terms of monitoring capacity and data accuracy regarding actual groundwater utilization, which limits the precision of tax calculation and enforcement.

The findings further indicate that taxpayer compliance with groundwater tax obligations has not yet reached an optimal level. Several taxpayers do not report groundwater usage accurately, and a number of bore wells remain outside the formal administrative database. This situation contributes to discrepancies between potential and realized revenue and weakens the overall effectiveness of tax administration.

Importantly, the relatively low effectiveness of groundwater tax as a source of PAD does not necessarily reflect weak institutional performance on the part of Bapenda Medan City. Rather, it represents a policy outcome shaped by broader public objectives that prioritize environmental protection and sustainable water resource management. In this context, groundwater tax in Medan City functions more as a regulatory instrument for controlling groundwater extraction than as a primary revenue-generating tool. Accordingly, the effectiveness of groundwater tax should be interpreted not solely in fiscal terms but also in relation to its role in supporting environmental governance and sustainable development goals.

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