Published by University of Muhammadiyah Makassar

DOI: 10.26618

e-ISSN 2714-6294 | p-ISSN 2714-6308

Amnesty: Jurnal Riset Perpajakan

journal homepage: https://journal.unismuh.ac.id/index.php/ar-ribh

Evaluating the Effectiveness of Surface Water Tax Collection Mechanisms: A Case Study of the Samsat Office in Gowa Regency

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ARTICLE INFO

Keywords:
Surface Water Tax, Tax Collection Mechanism, Regional Revenue, Public Financial Administration, Tax Compliance

April 13, 2026 – Initial Submission
May 17, 2026 – Template Revision
May 29, 2026 – Author Response
May 28, 2026 – Editorial Decision
June 05, 2026 – Quick Response

ABSTRACT

This study examines the effectiveness of surface water tax collection mechanisms implemented by the Samsat Office of Gowa Regency, Indonesia, in the context of increasing regional revenue demands and the need for efficient public financial administration. Despite the significant potential of surface water taxation as a source of locally generated revenue, its realization has shown inconsistent patterns, particularly the recurring accumulation of payments near the end of the fiscal year. Using a qualitative descriptive approach, data were collected through interviews, observation, and documentation involving tax officers, local government representatives, and key taxpayers. The analysis reveals several key findings. First, administrative procedures for tax assessment and billing are generally well structured; however, operational implementation remains constrained by limited human resources, inadequate digital integration, and dependence on manual verification. Second, the concentration of payments in December is influenced by taxpayer behavior, corporate cash flow cycles, and external audit requirements, indicating structural weaknesses in periodic monitoring. Third, the tax revenue structure is highly dependent on a small group of major taxpayers, posing fiscal vulnerability for the region. Overall, while the tax collection mechanism meets regulatory requirements, its effectiveness is hindered by technical, behavioral, and institutional factors. The study recommends strengthening digital reporting systems, implementing periodic compliance reminders, enhancing inter-agency coordination, and diversifying the taxpayer base to ensure sustainable regional revenue.

1. Introduction

Regional taxation plays an increasingly strategic role in strengthening local fiscal capacity, particularly in developing countries undergoing decentralization reforms. Fiscal decentralization policies have expanded the authority of local governments to manage and optimize locally generated revenue (Pendapatan Asli Daerah/PAD) as a means of supporting regional development and reducing dependence on central government transfers (Astriana et al., 2024; Doan, 2026; Lekettey et al., 2025). Within this framework, regional taxes function not only as revenue-generating instruments but also as policy tools that influence economic activities, environmental management, and public service delivery (Li & Gu, 2025; Kristanto et al., 2026).

Among the various forms of regional taxation, the surface water tax represents a unique fiscal instrument because of its direct relationship with natural resource utilization, industrial production, and environmental sustainability (Li & Gu, 2025). Surface water serves as an essential resource for industrial, commercial, and agricultural activities, making its regulation and taxation increasingly important in regions experiencing economic growth. Consequently, the effectiveness of surface water tax collection has become a critical issue for local governments seeking to balance fiscal objectives with sustainable resource management (Putra et al., 2024; Zamhur & Marantika, 2026). Effective tax collection mechanisms are expected to ensure stable revenue generation while encouraging responsible water utilization practices (Li & Gu, 2025).

In Indonesia, the administration of surface water tax is governed by national and regional regulatory frameworks that establish procedures for tax assessment, collection, reporting, and monitoring. However, the practical implementation of these regulations often depends on institutional capacity, administrative efficiency, taxpayer compliance, and inter-agency coordination (Kristanto et al., 2026; Li & Gu, 2025). Although regulatory provisions provide a formal basis for tax administration, successful tax realization requires effective operationalization through accurate taxpayer databases, timely billing procedures, transparent verification mechanisms, and continuous monitoring of taxpayer obligations (Judijanto & Al-Amin, 2026; Noveliza et al., 2026; Saptono et al., 2026). Therefore, the effectiveness of tax collection cannot be assessed solely from regulatory compliance but must also consider operational and institutional dimensions (Jonathan et al., 2024; Kristanto et al., 2026).

The local context of Gowa Regency provides a relevant setting for examining these issues. The Samsat Office of Gowa Regency serves as the implementing institution responsible for administering several regional taxes, including surface water tax. Preliminary observations indicate that although the tax base consists of relatively stable corporate taxpayers, revenue realization often accumulates toward the end of the fiscal year, particularly in December. This recurring pattern suggests potential inefficiencies in monitoring tax obligations throughout the year or behavioral tendencies among taxpayers who postpone payments until external audits or financial reporting requirements necessitate compliance. Furthermore, the reliance on a limited number of major taxpayers creates fiscal concentration risks, whereby changes in the operational conditions of a few taxpayers may significantly affect regional revenue performance (Li & Gu, 2025).

Several administrative and technical challenges further influence the effectiveness of surface water tax collection. Existing collection procedures remain partially dependent on manual processes, including physical verification of water usage, manual documentation, and limited integration of digital reporting systems (Fauziah et al., 2025; Maulana et al., 2026; Noveliza et al., 2026). Although Indonesia has experienced substantial progress in digitalizing tax administration at the national level, technological adoption at regional tax offices remains uneven (Fauziah et al., 2025; Wijaya & Ulfa, 2026; Saptono et al., 2026). In the case of Gowa Regency, data synchronization among relevant institutions, such as environmental management agencies, water resource authorities, and taxation units, has not yet achieved optimal efficiency (Jonathan et al., 2024; Maulana et al., 2026). This situation may result in delays in updating taxpayer information, inconsistencies in water usage records, and administrative bottlenecks during tax assessment and collection processes (Judijanto & Al-Amin, 2026; Noveliza et al., 2026).

Human resource constraints also represent a significant challenge. Personnel responsible for tax assessment and collection frequently perform multiple administrative functions, reducing the time available for intensive monitoring, taxpayer engagement, and compliance enforcement activities (Jonathan et al., 2024; Kristanto et al., 2026). As regional governments increasingly emphasize proactive compliance strategies, including taxpayer education, routine inspections, and data-driven monitoring systems, the availability of specialized personnel becomes essential (Arsyad et al., 2026; Oktavianti et al., 2025; Serly Audia et al., 2026). The absence of dedicated staff for

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surface water tax administration may weaken institutional capacity and limit the effectiveness of tax collection mechanisms (Kristanto et al., 2026).

Despite the importance of regional tax administration, previous studies have predominantly focused on general tax compliance behavior, tax enforcement policies, taxpayer awareness, and the contribution of regional taxes to local revenue (Arsyad et al., 2026; Putra et al., 2024; Wijaya et al., 2025; Oktavianti et al., 2025). Research specifically examining the effectiveness of surface water tax collection mechanisms at the regional level remains limited. Existing studies have provided valuable insights into tax administration and compliance; however, they offer insufficient explanation regarding how local tax institutions operationalize regulatory frameworks, address administrative and technological constraints, and manage taxpayer behavior in the context of surface water taxation (Maulana et al., 2026; Noveliza et al., 2026; Zamhur & Marantika, 2026). This limitation indicates a significant research gap in understanding the institutional, operational, and behavioral factors that influence the effectiveness of surface water tax collection at the local government level.

Based on the foregoing discussion, the research problem can be formulated as follows: How effective is the surface water tax collection mechanism implemented by the Samsat Office of Gowa Regency, and what administrative, operational, institutional, and behavioral factors influence its effectiveness? Addressing this problem is important because ineffective tax collection mechanisms may reduce regional revenue performance, weaken fiscal sustainability, and hinder the effective governance of natural resources (Kristanto et al., 2026; Li & Gu, 2025; Zamhur & Marantika, 2026).

Accordingly, this study aims to evaluate the effectiveness of the surface water tax collection mechanism implemented by the Samsat Office of Gowa Regency. Specifically, the study examines administrative procedures, taxpayer behavior, operational capacity, institutional coordination, and challenges encountered during tax collection activities. Using a qualitative descriptive approach, the research seeks to provide a comprehensive understanding of how the collection mechanism operates in practice and identify factors that contribute to or impede its effectiveness.

This study contributes to the literature both theoretically and practically. Theoretically, it enriches the body of knowledge on regional taxation by extending understanding of how institutional capacity, administrative procedures, technological readiness, and taxpayer behavior interact in determining the effectiveness of tax collection mechanisms (Jonathan et al., 2024; Judijanto & Al-Amin, 2026; Fauziah et al., 2025; Ajzen, 1991). The study also contributes empirical evidence to an area that has received relatively limited scholarly attention, namely surface water taxation at the regional government level. Practically, the findings provide useful insights for policymakers, tax administrators, and local government authorities seeking to strengthen tax governance, improve administrative efficiency, enhance digital integration, and promote taxpayer compliance (Maulana et al., 2026; Wijaya & Ulfa, 2026; Noveliza et al., 2026). The results may support the development of evidence-based reforms aimed at reducing fiscal vulnerabilities and improving the sustainability of regional revenue systems (Zamhur & Marantika, 2026).

The novelty of this study lies in its comprehensive evaluation of surface water tax collection mechanisms from administrative, operational, institutional, and behavioral perspectives within a regional government setting. Unlike previous studies that primarily focus on general tax compliance or regional revenue performance, this research specifically investigates the implementation and effectiveness of a sector-specific tax instrument. By examining the case of Gowa Regency, the study provides context-specific insights into the challenges and opportunities

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associated with strengthening local tax administration and sustainable public financial management.

2. Literature Review

2.1 Conceptual and Theoretical Foundations

2.1.1 Surface Water Tax: Concept and Regulatory Framework

Surface water tax is a fiscal instrument imposed on the extraction and utilization of surface water resources for commercial, industrial, and institutional purposes. In Indonesia, its legal foundation is established under national tax regulations and regional government laws, which authorize local governments to manage tax assessment, billing, and collection. Within the framework of fiscal decentralization, regional taxation contributes not only to increasing locally generated revenue (PAD) but also to strengthening local financial autonomy and improving public governance (Astriana et al., 2024; Lekettey et al., 2025; Kristanto et al., 2026). Regional taxes therefore function not only as fiscal instruments for revenue generation but also as mechanisms supporting accountable public financial management and sustainable regional development (Li & Gu, 2025).

The effectiveness of surface water taxation is closely associated with the quality of tax administration, institutional governance, taxpayer compliance, and the capacity of regional governments to implement tax regulations consistently. Effective tax administration enables local governments to optimize tax revenue while maintaining transparent and accountable governance practices (Putra et al., 2024; Zamhur & Marantika, 2026). Consequently, the success of surface water tax collection depends not only on regulatory provisions but also on administrative effectiveness, institutional coordination, and taxpayer compliance.

2.1.2 Tax Collection Mechanisms in Regional Governments

Tax collection mechanisms generally involve several administrative stages, including taxpayer identification, tax assessment, billing, payment, reporting, monitoring, and enforcement. The effectiveness of these mechanisms depends on the availability of accurate taxpayer databases, standardized administrative procedures, integrated information systems, and continuous monitoring of taxpayer obligations (Judijanto & Al-Amin, 2026; Maulana et al., 2026).

Regional tax administration in Indonesia has experienced continuous transformation through digitalization initiatives intended to improve administrative efficiency and taxpayer services. Nevertheless, many regional governments continue to encounter challenges related to manual administrative procedures, fragmented taxpayer databases, and limited digital integration among government institutions (Fauziah et al., 2025; Noveliza et al., 2026; Wijaya & Ulfa, 2026). Studies further emphasize that effective tax collection requires collaboration among taxation authorities and other government agencies to facilitate timely data exchange and improve the accuracy of tax assessment and billing processes (Jonathan et al., 2024; Maulana et al., 2026). Therefore, efficient tax collection mechanisms require well-designed administrative workflows, competent human resources, and adequate technological infrastructure.

2.1.3 Tax Compliance Behavior

Tax compliance is widely recognized as one of the primary determinants of successful tax collection and regional revenue realization. The Theory of Planned Behavior proposed by Ajzen (1991) explains that taxpayer behavior is influenced by attitudes toward taxation, subjective norms, and perceived behavioral control, which together shape taxpayers' intentions to comply with tax obligations.

Recent studies indicate that taxpayer compliance is also affected by tax literacy, digital services, trust in government institutions, administrative simplicity, and perceived fairness of tax systems (Arsyad et al.,

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2026; Serly Audia et al., 2026). In addition, behavioral factors such as moral values and positive attitudes toward taxation significantly strengthen taxpayers' willingness to fulfill their tax obligations voluntarily (Oktavianti et al., 2025). Empirical evidence from regional taxation further demonstrates that taxpayer compliance contributes significantly to optimizing regional tax revenue and improving the effectiveness of tax administration (Putra et al., 2024; Wijaya et al., 2025).

In the context of regional taxes, taxpayer behavior is influenced not only by legal obligations but also by administrative convenience, transparency, institutional trust, and the effectiveness of government services. Consequently, strengthening taxpayer compliance requires integrated strategies combining effective administration, digital innovation, and continuous taxpayer engagement.

2.1.4 Institutional and Administrative Capacity

Institutional and administrative capacity plays a fundamental role in determining the effectiveness of regional tax collection. Effective tax administration depends on the availability of competent human resources, clear organizational structures, strong inter-agency coordination, transparent governance, and the adoption of appropriate administrative technologies. Within the context of fiscal decentralization, institutional quality significantly influences the ability of local governments to optimize regional revenue while maintaining accountability and improving public service delivery (Astriana et al., 2024; Kristanto et al., 2026).

Human resource capacity is particularly important because tax officers are responsible for taxpayer identification, assessment, verification, billing, monitoring, and enforcement. However, many local governments continue to experience staffing limitations and overlapping administrative responsibilities, reducing the effectiveness of taxpayer monitoring and compliance enforcement (Jonathan et al., 2024; Kristanto et al., 2026). Limited personnel frequently encourage reactive administrative practices rather than proactive supervision, thereby reducing the efficiency of tax administration.

Institutional coordination also represents a critical determinant of successful tax collection. The implementation of regional taxes requires collaboration among taxation authorities and other government agencies responsible for environmental management, water resource administration, and financial governance. Digital transformation has increased the importance of integrated governance systems that enable accurate information exchange and coordinated decision-making across institutions (Jonathan et al., 2024). Effective coordination supports timely updating of taxpayer databases, improves assessment accuracy, and minimizes administrative inconsistencies that may reduce regional tax revenue (Maulana et al., 2026; Zamhur & Marantika, 2026).

2.1.5 Digitalization and Public Financial Management

Digital transformation has become one of the principal strategies for improving tax administration and strengthening public financial management. The integration of digital technologies into tax administration enables governments to simplify administrative procedures, improve service quality, increase transparency, and enhance taxpayer compliance (Fauziah et al., 2025). Digital tax administration also facilitates more efficient monitoring, electronic reporting, automated billing systems, and real-time access to taxpayer information, thereby supporting more effective tax governance (Noveliza et al., 2026).

Although Indonesia has made considerable progress in digitalizing national tax administration, the implementation of digital systems at the regional government level remains uneven. Differences in technological infrastructure, financial resources, institutional readiness, and human resource capabilities continue to influence the

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effectiveness of digital transformation across local governments (Wijaya & Ulfa, 2026; Maulana et al., 2026). Consequently, many regional tax offices still rely on partially manual administrative procedures that reduce operational efficiency and increase the potential for administrative errors.

Successful digital transformation extends beyond the adoption of information technology. It also requires organizational readiness, continuous staff training, taxpayer acceptance, and effective integration among government institutions. Digital governance supported by coordinated institutional systems enables regional governments to improve administrative efficiency, strengthen accountability, and enhance taxpayer services (Jonathan et al., 2024; Judijanto & Al-Amin, 2026). Therefore, digitalization represents a strategic component of contemporary regional tax administration and contributes significantly to improving tax collection effectiveness.

2.1.6 Fiscal Sustainability and Revenue Concentration Risks

Fiscal sustainability is closely associated with the ability of regional governments to maintain stable and sustainable sources of locally generated revenue. Fiscal decentralization encourages local governments to strengthen financial independence through effective regional tax administration while reducing dependence on central government transfers (Lekettey et al., 2025; Astriana et al., 2024).

The sustainability of regional revenue may be affected when tax collections rely heavily on a relatively small number of taxpayers. Such conditions increase fiscal vulnerability because fluctuations in business performance, production activities, or taxpayer compliance among major taxpayers may substantially influence regional revenue realization (Li & Gu, 2025). Consequently, regional governments are encouraged to strengthen tax administration systems, improve monitoring mechanisms, and expand taxpayer compliance to minimize revenue concentration risks and maintain fiscal stability.

Furthermore, good governance, effective tax administration, and institutional capacity contribute significantly to strengthening regional fiscal resilience. Local governments with effective governance systems are generally better positioned to optimize tax collection, improve administrative efficiency, and support sustainable regional development (Kristanto et al., 2026; Zamhur & Marantika, 2026).

2.2 Review of Empirical Studies

Previous empirical studies have investigated regional taxation, taxpayer compliance, fiscal decentralization, institutional governance, and digital tax administration from various perspectives. Research consistently demonstrates that effective regional tax administration depends on the interaction between institutional capacity, taxpayer compliance, technological readiness, and governance quality.

Studies on fiscal decentralization indicate that greater local fiscal autonomy enables regional governments to optimize locally generated revenue while strengthening governance performance and public accountability. Astriana et al. (2024) found that fiscal decentralization contributes positively to governance quality at the local government level in Indonesia. Likewise, Lekettey et al. (2025), through a bibliometric review, concluded that fiscal decentralization strengthens local financial autonomy when supported by effective institutional governance and efficient public financial management. Furthermore, Li and Gu (2025) demonstrated that stronger tax administration under fiscal decentralization contributes significantly to high-quality economic development by improving tax collection effectiveness and administrative efficiency. Similarly, Kristanto et al. (2026) emphasized that governance quality plays an essential role in maximizing the benefits of fiscal decentralization while minimizing administrative inefficiencies and governance risks within Indonesian local governments.

Empirical studies on taxpayer compliance consistently identify compliance as one of the primary determinants of regional tax revenue. Arsyad et al. (2026) found that tax digitalization, tax literacy, and institutional trust significantly improve taxpayer compliance among micro, small, and medium-sized enterprises. Similarly, Serly Audia et al. (2026) reported that taxpayer literacy, perceived ease of use, and trust positively influence digital tax compliance. Supporting these findings, Oktavianti et al. (2025) demonstrated that taxpayer attitudes and moral values significantly shape compliance behavior, indicating that behavioral factors remain fundamental in achieving sustainable tax compliance. Furthermore, Putra et al. (2024) showed that taxpayer compliance significantly strengthens the optimization of regional tax revenue, while Wijaya et al. (2025) confirmed that administrative quality and taxpayer behavior remain important determinants of compliance within decentralized regional tax systems.

Recent studies also emphasize the growing importance of digital transformation in improving regional tax administration. Fauziah et al. (2025) concluded that digital transformation enhances administrative efficiency, service quality, transparency, and taxpayer satisfaction. Likewise, Noveliza et al. (2026) reported that digital tax administration systems improve taxpayer compliance by simplifying administrative procedures and supporting more effective tax management. Maulana et al. (2026) further demonstrated that implementing online payment systems in regional tax administration contributes positively to revenue realization and operational efficiency. Complementing these findings, Wijaya and Ulfa (2026) identified digital infrastructure, technological readiness, and institutional adaptation as major determinants influencing the successful implementation of tax digitalization across regional governments.

Institutional governance and inter-agency coordination have also received increasing attention in recent literature. Jonathan et al. (2024) argued that digital transformation supports decentralized public governance by improving collaboration, information sharing, and coordination among government institutions. Similarly, Judijanto and Al-Amin (2026) found that digital transformation in regional tax administration improves administrative efficiency and taxpayer compliance through better integration of information systems and public services. In addition, Zamhur and Marantika (2026) demonstrated that digital tax governance strengthens the optimization of locally generated revenue by improving administrative transparency, accountability, and institutional effectiveness.

Although previous studies have provided valuable insights into fiscal decentralization, taxpayer compliance, digital governance, and regional tax administration, empirical evidence specifically addressing the effectiveness of surface water tax collection mechanisms remains limited. Existing research generally focuses on regional taxation from a broad perspective, taxpayer compliance, or digital transformation, without specifically examining the administrative procedures, institutional coordination, operational implementation, and behavioral dynamics associated with surface water tax collection at the regional government level. Consequently, there remains a significant research gap concerning how regional institutions operationalize surface water tax collection mechanisms and address administrative, technological, institutional, and behavioral challenges in achieving effective tax collection.

Accordingly, the present study seeks to fill this gap by providing a comprehensive evaluation of the surface water tax collection mechanism implemented by the Samsat Office of Gowa Regency. Unlike previous studies that primarily examine general taxpayer compliance or digital tax administration, this

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research integrates administrative, institutional, operational, technological, and behavioral perspectives to provide a more comprehensive understanding of factors influencing the effectiveness of surface water tax collection within Indonesia's fiscal decentralization framework.

2.3 Identification of the Research Gap

The review of theoretical and empirical literature reveals several important research gaps. First, although substantial literature exists on regional taxation and taxpayer compliance, relatively few studies specifically examine the operational implementation of surface water tax collection mechanisms. Existing research tends to focus on broader regional tax performance or environmental taxation without providing detailed analysis of administrative processes associated with surface water taxation.

Second, limited empirical evidence exists regarding the administrative and behavioral factors that hinder the effectiveness of surface water tax collection. While prior studies discuss taxpayer compliance and institutional capacity separately, few investigations integrate these perspectives within the context of surface water taxation.

Third, the role of institutional and administrative capacity in influencing surface water tax revenue realization remains underexplored. Existing studies often examine institutional capacity at a general level but provide limited insight into how staffing constraints, coordination challenges, and technological limitations affect the collection of surface water taxes.

Accordingly, this study seeks to address these gaps by providing an in-depth evaluation of the surface water tax collection mechanism implemented at the Samsat Office of Gowa Regency, with particular attention to operational procedures, compliance behavior, and institutional capacity factors affecting revenue realization.

2.4 Development of the Conceptual Framework

This study does not employ a formal conceptual framework consisting of independent and dependent variables because its primary objective is to evaluate the implementation of the surface water tax collection mechanism rather than to test causal relationships among variables. Instead, the study is guided by an analytical framework derived from the literature on tax administration, taxpayer compliance, institutional capacity, digitalization, and fiscal sustainability.

The evaluation focuses on how tax collection procedures are implemented operationally, how taxpayer behavior influences revenue realization, and how institutional capacity—including human resources, inter-agency coordination, and technological support—affects the effectiveness of tax collection. These interconnected concepts provide the analytical basis for understanding the strengths, weaknesses, and challenges of surface water tax administration in Gowa Regency.

2.5 Research Propositions

Because this study adopts an evaluative approach aimed at examining the implementation of surface water tax collection mechanisms rather than testing causal relationships quantitatively, it does not formulate formal research hypotheses.

Instead, the study is guided by the following research propositions:

a. The effectiveness of surface water tax collection is influenced by the quality of administrative procedures and implementation mechanisms.
b. Taxpayer compliance behavior plays a significant role in determining surface water tax revenue realization.
c. Institutional and administrative capacity, including human resources, inter-agency coordination, and technological support, affects the effectiveness of surface water tax collection.

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d. Digitalization has the potential to improve the efficiency, transparency, and effectiveness of surface water tax administration.

3. Research Methods

3.1 Research Design

This study employs a qualitative descriptive design to evaluate the effectiveness of the surface water tax collection mechanism implemented by the Samsat Office of Gowa Regency. A qualitative approach is appropriate because the research aims to explore administrative processes, institutional dynamics, and taxpayer behavior in depth, which cannot be fully captured through quantitative measurements. The descriptive orientation allows the researcher to document actual practices, identify challenges, and interpret patterns that emerge from the tax collection system.

3.2 Research Context and Setting

The research was conducted at the Samsat Office of Gowa Regency, South Sulawesi, Indonesia, particularly within the administrative unit responsible for managing surface water tax administration. The selection of this research setting was based on its direct involvement in the assessment, billing, collection, and monitoring of surface water tax obligations.

As one of the institutions responsible for regional revenue collection, the Samsat Office plays a significant role in supporting local fiscal capacity through tax administration. Examining the implementation of surface water tax collection within this context provides valuable insights into institutional practices, operational challenges, and taxpayer compliance behavior, thereby contributing to the broader literature on regional taxation and public financial management.

3.3 Population and Sample / Research Participants

Participants were selected using purposive sampling, a technique commonly applied in qualitative research to identify individuals possessing relevant knowledge and experience related to the phenomenon under investigation. The selection criteria emphasized direct involvement in surface water tax administration, policy implementation, and tax compliance activities. The participants included:

a. Surface water tax officers;
b. The Head of the Tax Administration Division;
c. Representatives from the regional environmental and water resources agency;
d. Corporate taxpayers utilizing surface water resources.

This combination of participants was intended to provide a comprehensive understanding of both institutional perspectives and taxpayer experiences regarding the implementation of the surface water tax collection mechanism.

3.4. Data Sources and Data Collection

The study utilizes both primary and secondary data sources to ensure the comprehensiveness, accuracy, and credibility of the findings. Primary data were obtained through semi-structured interviews and direct observation of administrative procedures, while secondary data consisted of official tax records, regulatory documents, annual reports, Standard Operating Procedures (SOPs), billing records, and regional government publications. The integration of multiple data sources enhances the completeness of the analysis and supports data triangulation.

Data collection was conducted using three complementary techniques. First, semi-structured interviews were carried out with surface water tax officers, government officials, and selected corporate taxpayers. This interview format provided flexibility for exploring issues related to taxpayer compliance behavior, administrative constraints, institutional coordination, and perceptions regarding the effectiveness of the surface water tax collection mechanism.

Second, non-participant observation was

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employed to examine workflow processes, document handling practices, verification procedures, and daily interactions between tax officers and taxpayers. This approach enabled the researcher to gain firsthand insights into operational practices, administrative bottlenecks, and practical challenges encountered during tax administration activities.

Third, documentation analysis was conducted by reviewing tax regulations, billing records, annual reports, internal administrative reports, and other relevant documents covering the period 2021–2024. Documentary evidence was used to validate interview findings, provide contextual understanding of administrative practices, and identify historical trends in surface water tax revenue performance.

The combination of interviews, observations, and documentary evidence contributes to data triangulation and strengthens the overall credibility, accuracy, and completeness of the study.

3.5 Measurement of Variables and Research Instruments

As a qualitative study, this research does not employ measurable variables in the same manner as quantitative research. Instead, the investigation focuses on several key concepts related to the effectiveness of the surface water tax collection mechanism, including administrative procedures, institutional coordination, taxpayer compliance behavior, operational constraints, and perceptions of tax implementation effectiveness.

The primary research instruments consisted of:

a. Semi-structured interview guides designed to explore participants' experiences and perspectives regarding tax administration processes;
b. Observation checklists used to document operational activities, workflow procedures, and interactions between officers and taxpayers;
c. Document review protocols employed to systematically examine regulatory documents, tax records, annual reports, and internal administrative reports.

The interview questions and observation indicators were developed based on the study objectives and relevant concepts in public sector taxation and tax administration literature, ensuring alignment between the research questions, data collection process, and analytical framework.

3.6 Data Analysis Techniques

Data were analyzed using thematic analysis following the six-step framework proposed by Braun and Clarke (2006). This analytical approach enables systematic identification, organization, and interpretation of patterns within qualitative data.

The analytical process consisted of the following stages:

a. Familiarization with the data;
b. Generating initial codes;
c. Searching for themes;
d. Reviewing themes;
e. Defining and naming themes;
f. Producing the final report.

Thematic analysis was selected because it allows the researcher to explore recurring patterns related to tax administration effectiveness, institutional practices, and taxpayer behavior. To enhance analytical rigor, findings derived from interviews were continuously compared and verified through observations and documentary evidence using triangulation techniques.

3.7 Validity, Reliability, and Trustworthiness

To ensure methodological rigor, the study adopts the four trustworthiness criteria by Lincoln and Guba (1985):

a. **Credibility:** achieved through triangulation of data sources and participant validation (member checking).
b. **Transferability:** supported by detailed contextual descriptions of the setting, participants, and administrative processes.
c. **Dependability:** enhanced through

maintaining an audit trail of field notes, interview records, and document analyses.

d. **Confirmability:** ensured through reflexive documentation, avoiding researcher bias and maintaining neutrality in interpretation.

3.8 Ethical Considerations

The research adheres to ethical standards for qualitative inquiry. All participants were informed about the study's purpose and provided verbal consent. Personal identities were anonymized to protect confidentiality. Access to official documents was obtained with permission from the Samsat Office and in accordance with regional administrative procedures.

3.9 Research Procedure

Data were analyzed using thematic analysis, following Braun and Clarke's (2006) widely accepted six-step framework:

a. Familiarization with the data,
b. Generating initial codes,
c. Searching for themes,
d. Reviewing themes,
e. Defining and naming themes,
f. Producing the report.

This approach enables systematic interpretation of qualitative findings and ensures analytical rigor. Triangulation across interviews, observations, and documents was applied to strengthen credibility.

3.10 Methodological Limitations

Several limitations should be acknowledged in interpreting the findings of this study. First, the research focuses on a single regional institution, namely the Samsat Office of Gowa Regency, which may limit the transferability of findings to other regions with different administrative structures and fiscal conditions.

Second, the study relies primarily on qualitative evidence obtained from interviews, observations, and document analysis, making the findings context-dependent and subject to participants' perspectives and experiences.

Third, access to certain administrative records may have been restricted due to confidentiality considerations, potentially limiting the breadth of documentary evidence available for analysis.

Despite these limitations, the use of multiple data sources, triangulation techniques, and established trustworthiness procedures contributes to the credibility and robustness of the study's findings. Future studies may incorporate comparative case studies or mixed-method approaches to provide broader generalization and deeper insights into the effectiveness of regional tax administration systems.

4. Results and Discussion

4.1 Research Results

4.1.1 Sample Description and Descriptive Findings

This study examined the implementation and effectiveness of the surface water tax collection mechanism at the Samsat Office of Gowa Regency. The findings were generated through interviews, direct observations, and document analysis. The analysis identified five major themes that characterize the current tax administration system: (1) administrative structure and workflow, (2) human resource capacity, (3) digitalization and data management, (4) taxpayer behavior, and (5) fiscal dependence on key taxpayers.

4.1.2 Data Quality and Preliminary Analysis

As a qualitative study, data quality was ensured through triangulation of multiple sources, including interviews, observations, and documentary evidence. Cross-validation was conducted by comparing information obtained from tax officers, administrative records, and field observations. This process enhanced the credibility and consistency of the findings and ensured that the identified themes accurately reflected the operational realities of surface water tax administration in Gowa Regency.

4.1.3 Main Analytical Results

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This study examined the implementation and effectiveness of the surface water tax collection mechanism at the Samsat Office of Gowa Regency. Findings were obtained through interviews, observations, and document analysis. The results reveal several major themes: (1) administrative structure and tax workflow, (2) human resource capacity, (3) digitalization and data management, (4) taxpayer behavior, and (5) fiscal dependence on key taxpayers.

a. Administrative Structure and Workflow

The administrative mechanism for surface water tax collection follows standard regional tax regulations, beginning with taxpayer identification, followed by assessment, billing, and payment verification. The study found that the regulatory framework is clear and comprehensive, outlining responsibilities across units. However, implementation remains partially manual. Taxpayer identification depends heavily on periodic updates from the Environmental and Water Resource Agency, which are not always timely. Officers reported delays in receiving usage data from several companies, resulting in postponed assessments.

The billing process uses printed invoices and official notifications sent directly to taxpayers. Although the regional government has introduced digital billing options, adoption remains low. Field observations indicate that the verification process still involves checking physical receipts and matching them with printed records, which increases workload and risk of human error.

b. Human Resource Capacity

Human resource constraints emerged as one of the most significant challenges. The tax unit responsible for surface water tax consists of only a few officers who also manage other types of regional taxes. This multitasking limits the frequency of monitoring activities, especially mid-year evaluations. Officers expressed difficulties in conducting routine field verification due to limited personnel, transportation, and administrative time.

The absence of specialized staff dedicated to data verification leads to inconsistent monitoring of actual water usage by industries. Moreover, officers rely on manual calculations and taxpayer-provided documents, increasing the potential for discrepancies between reported and actual water usage.

c. Digitalization and Data Management

Despite national advances in taxation digitalization, regional adoption remains fragmented. The Samsat Office has begun implementing digital reporting tools for some tax types, but surface water tax is not yet fully integrated into the regional digital tax system. Officers identified several issues: lack of integrated databases, limited IT infrastructure, and insufficient training for staff.

Inter-agency data sharing remains a bottleneck. Usage data from the water resources agency often comes in different formats, not standardized for tax administration needs. This results in time-consuming manual consolidation. Tax records from 2021–2024 show inconsistencies in the timing of assessments, partially due to delayed or incomplete data.

d. Taxpayer Behavior

One of the most notable findings is the consistent concentration of tax payments in December. Corporate taxpayers tend to delay payment until the end of the fiscal year, and this pattern has remained constant over the past four years. Interviews indicate several reasons: companies coordinate payments with annual audits, budget cycles, and internal approval processes. Some taxpayers expressed preference for paying all obligations at once when finalizing annual financial statements.

Tax compliance is generally high, but proactive engagement from tax officers is limited. Taxpayers reported that reminders are sent only near deadlines, contributing to end-of-year payment accumulation.

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e. Fiscal Dependence on Major Taxpayers

Document analysis reveals a high concentration of revenue from a small group of industrial taxpayers. In 2023, more than 70% of total surface water tax revenue came from only four companies. This concentration poses a fiscal risk: any operational disruption in one major taxpayer could significantly affect revenue realization. This structure also places pressure on tax officers to maintain strong relationships with key contributors.

4.1.4 Hypothesis Testing Results / Key Findings

The study produced four principal findings:

a. Surface water tax administration operates under a clear regulatory framework but remains highly dependent on manual procedures.

b. Human resource limitations constrain monitoring effectiveness, field verification, and compliance management.

c. Digital integration among government agencies remains inadequate, creating inefficiencies in data management and assessment processes.

d. Revenue collection exhibits a high degree of dependence on a small group of taxpayers, generating potential fiscal risks for regional revenue sustainability.

4.1.5 Visual Presentation of Results

The findings presented above were derived from interview transcripts, field observations, and documentary analysis. The thematic categorization into administrative structure, human resource capacity, digitalization, taxpayer behavior, and fiscal dependence provides a structured representation of the operational conditions affecting surface water tax collection effectiveness in Gowa Regency.

4.2 Research Discussion

4.2.1 Interpretation of Key Findings

The findings provide important insights into the effectiveness of the surface water tax collection mechanism in Gowa Regency. The discussion is organized into thematic components that connect empirical results with theoretical perspectives and prior research.

a. Administrative Efficiency and Regulatory Implementation

Although the regulatory framework provides clear guidelines for tax collection, administrative implementation remains below expected standards. The persistence of manual administrative workflows is consistent with studies showing that regional tax administration continues to experience operational challenges related to limited digital transformation, fragmented information systems, and administrative inefficiencies (Fauziah et al., 2025; Maulana et al., 2026; Noveliza et al., 2026). The continued reliance on physical documentation increases administrative workloads, prolongs processing time, and reduces overall operational efficiency.

The delays in obtaining water usage data further indicate weaknesses in inter-agency coordination. Previous studies emphasize that effective digital governance requires integrated information systems and continuous collaboration among government institutions to facilitate accurate and timely data exchange (Jonathan et al., 2024). Likewise, regional tax administration performs more effectively when digital integration supports information sharing across institutions responsible for taxation and public administration (Judijanto & Al-Amin, 2026; Zamhur & Marantika, 2026). Consequently, the gap between regulatory provisions and administrative implementation reduces the overall effectiveness of the tax collection mechanism.

b. Human Resource Constraints and Public Management Implications

Human resource limitations constitute one of the primary structural challenges affecting the effectiveness of surface water tax administration. Institutional performance

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depends heavily on competent personnel, effective organizational governance, and adequate administrative capacity (Kristanto et al., 2026). In the case of Gowa Regency, tax officers simultaneously perform multiple administrative responsibilities across several tax categories, thereby limiting the time available for taxpayer supervision, field verification, and compliance monitoring.

These findings indicate that staffing shortages reduce opportunities for proactive administrative practices and continuous taxpayer engagement. Similar findings have been reported in studies on digital public governance, which emphasize that institutional effectiveness depends not only on technological innovation but also on organizational readiness and competent human resources (Jonathan et al., 2024). Therefore, strengthening organizational capacity through additional personnel, specialization of duties, and continuous professional development would substantially improve tax administration effectiveness.

c. Digitalization Gaps and the Need for Integrated Systems

The limited implementation of digital technology identified in this study supports previous findings indicating that digital transformation within regional tax administration remains uneven across Indonesian local governments (Fauziah et al., 2025; Wijaya & Ulfa, 2026). Although digital technologies have considerable potential to improve administrative efficiency and taxpayer services, many regional governments continue to rely on partially manual administrative procedures that reduce operational effectiveness (Noveliza et al., 2026).

The absence of integrated information systems requires tax officers to manually verify data originating from multiple government institutions, thereby increasing administrative complexity and the likelihood of data inconsistencies. Previous studies similarly conclude that digital transformation improves administrative efficiency only when supported by institutional readiness, integrated information systems, and coordinated governance structures (Jonathan et al., 2024; Judijanto & Al-Amin, 2026). Moreover, online tax administration and digital governance have been shown to improve revenue collection, transparency, and operational efficiency within regional governments (Maulana et al., 2026; Zamhur & Marantika, 2026).

d. Taxpayer Behavior and Compliance Patterns

The limited implementation of digital technology identified in this study supports previous findings indicating that digital transformation within regional tax administration remains uneven across Indonesian local governments (Fauziah et al., 2025; Wijaya & Ulfa, 2026). Although digital technologies have considerable potential to improve administrative efficiency and taxpayer services, many regional governments continue to rely on partially manual administrative procedures that reduce operational effectiveness (Noveliza et al., 2026).

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e. Taxpayer Behavior and Compliance Patterns

The concentration of tax payments toward the end of the fiscal year reflects taxpayer behavior that is influenced by

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organizational financial planning and compliance considerations. According to the Theory of Planned Behavior, taxpayer decisions are shaped by attitudes, subjective norms, and perceived behavioral control, all of which influence compliance intentions (Ajzen, 1991). These behavioral factors provide an important theoretical explanation for the observed timing of corporate tax payments.

Recent empirical studies similarly indicate that taxpayer compliance is influenced by tax literacy, trust in tax authorities, perceived ease of tax administration, and positive attitudes toward taxation (Arsyad et al., 2026; Serly Audia et al., 2026). Furthermore, Oktavianti et al. (2025) found that taxpayer attitudes and moral values significantly influence voluntary compliance behavior. These findings suggest that the observed payment patterns are not solely driven by financial considerations but also reflect behavioral responses to administrative practices and institutional interactions.

The limited frequency of taxpayer engagement and monitoring throughout the fiscal year may further contribute to delayed payment behavior. Accordingly, strengthening taxpayer communication, providing periodic reminders, and improving administrative services are expected to encourage more consistent compliance throughout the fiscal year (Putra et al., 2024; Wijaya et al., 2025).

f. Revenue Concentration and Fiscal Sustainability

The dependence of regional revenue on a relatively small number of taxpayers represents an important fiscal sustainability challenge. Previous studies indicate that fiscal decentralization requires local governments to strengthen revenue resilience by optimizing tax administration and expanding local financial capacity (Lekettey et al., 2025; Astriana et al., 2024). Heavy dependence on a limited taxpayer base increases vulnerability because operational changes affecting a small number of taxpayers may substantially influence regional revenue realization.

Furthermore, effective tax administration has been shown to contribute significantly to fiscal sustainability by improving tax collection efficiency and strengthening local financial autonomy (Li & Gu, 2025). Consequently, expanding the taxpayer base, improving taxpayer monitoring, and strengthening digital governance are essential strategies for reducing fiscal concentration risks and maintaining sustainable regional revenue (Kristanto et al., 2026; Zamhur & Marantika, 2026).

g. Overall Effectiveness of the Tax Collection Mechanism

Overall, findings indicate that the surface water tax collection mechanism is procedurally compliant but operationally constrained. Implementation gaps stem from human resource limitations, technological barriers, and behavioral patterns among taxpayers. These issues collectively reduce the mechanism's ability to achieve optimal performance.

To enhance effectiveness, several improvements are needed:

a. Strengthening inter-agency digital integration,
b. Increasing staff capacity and specialized roles,
c. Implementing automated reminders and mid-year monitoring,
d. Reducing dependency on major taxpayers.

These reforms align with international best practices for improving subnational tax administration.

4.2.2 Comparison with Previous Studies

The findings of this study generally support recent empirical evidence on regional tax administration, digital governance, taxpayer compliance, and fiscal decentralization. However, this study extends previous research by specifically examining the effectiveness of surface water tax collection mechanisms within a regional government context.

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The persistence of manual administrative procedures identified in this study is consistent with previous findings indicating that regional tax administration in Indonesia continues to experience operational challenges associated with limited digital transformation and incomplete administrative integration. Fauziah et al. (2025) reported that although digital transformation has significantly improved tax administration, implementation remains uneven across government institutions. Similarly, Maulana et al. (2026) found that the adoption of digital systems and online payment mechanisms contributes substantially to improving administrative efficiency and regional revenue realization. Supporting these findings, Noveliza et al. (2026) concluded that digital tax administration systems simplify administrative procedures and improve tax management effectiveness.

The difficulties encountered in inter-agency coordination also correspond with previous studies emphasizing the importance of integrated governance. Jonathan et al. (2024) demonstrated that digital transformation strengthens decentralized public governance by facilitating institutional collaboration and information sharing. Likewise, Judijanto and Al-Amin (2026) highlighted that integrated digital systems improve both administrative efficiency and taxpayer compliance, while Zamhur and Marantika (2026) showed that digital tax governance enhances transparency, accountability, and regional revenue optimization.

The human resource limitations identified in this study are consistent with research highlighting institutional capacity as a fundamental determinant of administrative effectiveness. Kristanto et al. (2026) emphasized that governance quality and institutional capacity strongly influence the effectiveness of local government administration under fiscal decentralization. Similarly, Jonathan et al. (2024) argued that successful digital governance requires not only technological innovation but also adequate organizational readiness and competent human resources capable of implementing administrative reforms effectively.

Regarding taxpayer behavior, the findings are consistent with the Theory of Planned Behavior proposed by Ajzen (1991), which explains that taxpayer compliance is influenced by behavioral intentions shaped by attitudes, subjective norms, and perceived behavioral control. Empirical evidence further supports this interpretation. Arsyad et al. (2026) found that tax literacy, digitalization, and institutional trust positively influence taxpayer compliance. Likewise, Serly Audia et al. (2026) reported that perceived ease of use, tax literacy, and trust encourage digital tax compliance, while Oktavianti et al. (2025) demonstrated that positive attitudes and moral values significantly strengthen voluntary compliance. These findings suggest that improving taxpayer compliance requires not only regulatory enforcement but also supportive administrative services and effective communication.

The findings concerning fiscal sustainability also support previous studies on fiscal decentralization and regional financial autonomy. Lekettey et al. (2025) concluded that strengthening local financial autonomy requires effective regional tax administration and institutional governance. Similarly, Li and Gu (2025) demonstrated that stronger tax administration contributes significantly to sustainable economic development through improved revenue performance. Furthermore, Kristanto et al. (2026) emphasized that good governance and effective institutional management strengthen fiscal resilience within decentralized government systems.

Although previous studies have extensively discussed digital tax administration, taxpayer compliance, fiscal decentralization, and governance, relatively limited attention has been devoted specifically to surface water tax collection mechanisms. Therefore, the present study complements existing literature by providing empirical

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evidence regarding how administrative procedures, institutional coordination, digital readiness, and taxpayer behavior collectively influence the effectiveness of surface water tax collection within Indonesian regional governments.

4.2.3 Theoretical Contributions

This study contributes to the development of regional taxation and public financial administration literature by demonstrating that the effectiveness of surface water tax collection is determined by the interaction of administrative capacity, institutional governance, digital readiness, and taxpayer behavior. The findings reinforce the importance of fiscal decentralization theory by showing that local governments require not only legal authority but also effective institutional capacity and administrative systems to optimize regional tax collection (Astriana et al., 2024; Lekettey et al., 2025; Kristanto et al., 2026).

The findings also extend the application of the Theory of Planned Behavior (Ajzen, 1991) within the context of regional taxation. This study demonstrates that taxpayer compliance is influenced not only by individual behavioral intentions but also by organizational financial planning, institutional trust, administrative convenience, and the quality of interactions between taxpayers and tax authorities. These findings are consistent with recent empirical studies highlighting the importance of tax literacy, trust, perceived ease of use, and positive taxpayer attitudes in strengthening compliance behavior (Arsyad et al., 2026; Oktavianti et al., 2025; Serly Audia et al., 2026).

Furthermore, this study contributes to the growing literature on digital tax administration by providing qualitative evidence that digital transformation alone is insufficient to improve tax collection effectiveness. Instead, successful implementation requires integrated governance, organizational readiness, competent human resources, and effective collaboration among government institutions. These findings support previous research emphasizing that digital governance enhances administrative efficiency only when accompanied by institutional strengthening and coordinated information systems (Jonathan et al., 2024; Judijanto & Al-Amin, 2026; Maulana et al., 2026; Zamhur & Marantika, 2026).

Finally, this study contributes to the literature on fiscal sustainability by demonstrating that excessive dependence on a limited number of taxpayers may increase fiscal vulnerability within regional governments. The findings therefore highlight the importance of strengthening tax administration, expanding the taxpayer base, improving institutional governance, and accelerating digital transformation as integrated strategies for achieving sustainable regional revenue under Indonesia's fiscal decentralization framework (Li & Gu, 2025; Lekettey et al., 2025; Kristanto et al., 2026).

4.2.4 Practical and Policy Implications

Several practical implications emerge from the findings. First, regional governments should strengthen digital integration among relevant agencies through unified databases and real-time information-sharing mechanisms. Second, staffing capacity should be enhanced through recruitment, role specialization, or organizational restructuring to improve monitoring and verification activities.

Third, proactive compliance strategies should be implemented, including automated reminders, periodic taxpayer engagement programs, and mid-year monitoring initiatives. Finally, policymakers should reduce fiscal dependence on major taxpayers by expanding the taxpayer base and identifying additional revenue opportunities related to natural resource management.

4.2.5 Integration with the Research Gap

Previous studies have primarily focused on regulatory aspects of regional taxation,

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taxpayer compliance, or digital taxation systems independently. Limited research has examined how administrative structures, human resource capacity, digital readiness, taxpayer behavior, and revenue concentration interact simultaneously within the context of surface water taxation. This study addresses that gap by providing a comprehensive qualitative assessment of operational effectiveness in surface water tax administration and identifying the interconnected institutional factors that influence tax collection performance.

4.2.6 Acknowledgement of Study Limitations

Several limitations should be considered when interpreting the findings. The study was conducted within a single regional context, which may limit the transferability of findings to other districts or provinces. In addition, the analysis focused primarily on administrative and institutional dimensions of tax collection, which may not fully capture broader political or economic factors influencing regional revenue performance. Access restrictions to certain internal documents also constrained the depth of historical trend analysis.

5. Conclusion

5.1 Summary of Findings

This study evaluated the effectiveness of the surface water tax collection mechanism implemented by the Samsat Office of Gowa Regency. The findings reveal that although the regulatory framework governing surface water taxation is structurally sound, operational implementation remains hindered by several constraints. Administrative procedures still rely heavily on manual processes, human resource capacity is insufficient to support consistent monitoring, and digital integration across agencies remains limited. In addition, taxpayer behavior—particularly the tendency to accumulate payments at the end of the fiscal year—further reduces the efficiency of revenue realization. The region's heavy reliance on a small group of major taxpayers poses additional fiscal vulnerability. Overall, the study concludes that the current mechanism is regulatory compliant but operationally suboptimal, requiring systemic improvements to enhance effectiveness.

5.2 Theoretical Contributions

This research contributes to public financial administration literature by demonstrating how institutional capacity, technology readiness, and behavioral dynamics jointly shape the effectiveness of subnational tax systems. The findings reinforce existing theories on administrative capacity and compliance behavior (Ajzen, 1991), while providing empirical evidence specific to natural resource-based taxation. Furthermore, the study highlights the risks associated with revenue concentration, supporting fiscal sustainability frameworks that emphasize diversification of the taxpayer base.

5.3 Practical and Policy Implications

The study offers several actionable recommendations for policymakers and regional tax administrators:

a. Strengthening digital integration by adopting unified data platforms that support real-time monitoring of water usage and automated billing.
b. Enhancing human resource capacity, either through additional staffing or restructuring roles to ensure specialized personnel manage surface water tax operations.
c. Implementing proactive compliance strategies, including scheduled reminders, mid-year reviews, and taxpayer engagement programs.
d. Reducing fiscal dependence by broadening the taxpayer base and exploring alternative sources of regional revenue related to natural resource management. These practical steps can significantly improve efficiency, accuracy, and sustainability in surface water tax administration.

5.4 Limitations of the Study

Although the study provides

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comprehensive qualitative insights, several limitations must be acknowledged:

a. The study involved a limited number of participants due to administrative restrictions; broader participation could yield more diverse perspectives.
b. The study relies on qualitative data, which limits statistical generalization.
c. Access to certain internal documents was restricted, constraining full analysis of historical data trends.
d. The research setting focuses on one region; therefore, findings may not fully represent conditions in other districts or provinces.

5.5 Directions for Future Research

Future research could explore several promising directions to deepen understanding of regional taxation systems:

a. Comparative studies across multiple regions to identify best practices and structural differences in tax administration.
b. Quantitative assessments of tax performance metrics to complement qualitative insights and provide measurable indicators of effectiveness.
c. Explorations of digital transformation readiness, evaluating technological capacity, user acceptance, and sustainability of e-tax systems.
d. Behavioral studies on corporate taxpayers to analyze factors influencing compliance timing and decision-making patterns.
e. Fiscal resilience analysis, particularly regarding risks associated with revenue concentration in natural resource-dependent regions.

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