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A Financial Management System to Mitigate Revenue Leakage: The Case of City of Harare

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Abbreviations and Acronyms

BIQ - Business Intelligence Quotient

COH - City of Harare

CSV - Comma-Separated Values

ERP - Enterprise Resource Planning

FMS - Financial Management System

GIS - Geographic Information System

GRV - Goods Received Voucher

IFMIS - Integrated Financial Management Information System

IPSAS - International Public Sector Accounting Standards

KPI - Key Performance Indicator

M – Pesa Mobile Money Payment Platform

OECD - Organisation for Economic Co-operation and Development

PFMA - Public Finance Management Act

RBZ - Reserve Bank of Zimbabwe

SD - Standard Deviation

SDG - Sustainable Development Goals

SPSS - Statistical Package for the Social Sciences

UN - United Nations

USD - United States Dollar

VAT - Value Added Tax

ZACC - Zimbabwe Anti-Corruption Commission

ZIMRA - Zimbabwe Revenue Authority

ZIMSTAT - Zimbabwe National Statistics Agency

ZWL - Zimbabwean Dollar

ABSTRACT

The City of Harare has experienced a sustained and worsening revenue leakage crisis since the discontinuation of its BIQ billing system in 2019, with the annual revenue collection rate declining from 69.1 percent in 2021 to an estimated 25.1 percent by 2025, representing a 44-percentage point deterioration that has severely compromised the municipality's capacity to deliver water, sanitation, roads, and public health services to its two million residents. This study addressed three research questions concerning the causes of revenue leakage, its financial extent, and the components required in a Financial Management System (FMS) to mitigate it.

A concurrent mixed-methods Design Science Research approach was adopted. Primary quantitative data were collected from 35 City of Harare Finance Department officials through a structured 28-item Likert-scale questionnaire administered via Google Forms, achieving a response rate of 70 percent. Data were analysed using RStudio, with Cronbach's alpha, Pearson correlation, and multiple linear regression computed using the psych package. Secondary financial data were drawn from official City of Harare cashflow statements for 2021 to 2025. The primary research artefact, which is a web-based Financial Management System built using Python, FastAPI, and SQLite, was demonstrated from live system data on 24 April 2026.

Pearson correlation analysis confirmed a strong positive relationship between Revenue Management Dysfunction and Revenue Leakage Severity ($r = 0.788$, $p < 0.001$), with regression modelling establishing that dysfunction accounts for 62.1 percent of the variance in leakage severity ($R^2 = 0.621$). FMS Support was strongly endorsed by respondents (composite mean = 1.803, $\alpha = 0.831$), with D1, namely transparency improvement, achieving the highest individual endorsement. The FMS artefact generated a collection rate of 47.0 percent, a Leakage Risk Index of USD 10,437.64, and six automated leakage alerts from live system data. Triangulation confirmed full convergence across questionnaire, artefact, and financial data evidence streams. The study recommends phased pilot deployment of the developed FMS

CHAPTER 1

INTRODUCTION

1.0 Introduction

The City of Harare is failing to deliver essential services under its Section 276 constitutional mandate, with waste management, water supply, and road infrastructure inadequate and public confidence in local government eroded. Williams (2025) attributes annual revenue leakage of US$200 million to the absence of a Financial Management System (FMS). This chapter introduces the study, covering the background, problem statement, research questions, justification, significance, assumptions, delimitations, limitations, and summary.

1.1 Background of the Study

Municipal governments worldwide face unprecedented challenges in revenue control and financial sustainability. The World Bank (2021) estimates that local governments globally lose 10 to 15 percent of potential revenue through inefficient collection, weak enforcement, and technological gaps, undermining service delivery, infrastructure development, and governance. Digitisation of financial management systems has emerged as a key strategy for promoting efficiency and transparency in public-sector revenue collection (International Monetary Fund, 2022). Gomez-Barroso and Feijoo (2021) found that cities with integrated financial management systems achieved 15 to 35 percent improvements in revenue collection within three years of implementation. The United Nations (2022) further identifies sound municipal finance as critical to achieving Sustainable Development Goal 11 on sustainable cities and communities.

The COVID-19 crisis worsened municipal revenue losses, with cities reporting average losses of 20 to 25 percent in 2020 to 2021 (UCLG, 2021). The crisis accelerated digital transformation in municipal financial management, as paper-based manual systems proved highly vulnerable to disruption. The International City/County Management Association (2023) reports that 78 percent of municipalities in developed countries have adopted integrated financial management systems, compared with only 23 percent in developing countries, highlighting a significant digital divide.

Revenue leakage in African local authorities is acute, driven by rapid urbanisation, weak technology infrastructure, and poor governance. African cities are growing at over 3 percent annually, placing enormous pressure on municipal budgets and service delivery

(UN-Habitat, 2022). The African Development Bank (2021) reports that sub-Saharan municipalities collect only 40 to 60 percent of potential revenue, well below the global benchmark of 85 to 90 percent. This shortfall directly undermines provision of water, sanitation, refuse collection, and road maintenance, perpetuating poverty and underdevelopment (World Bank, 2023).

Integrated Financial Management Information Systems (IFMIS) are widely seen as transformative for African public financial management. Chêne (2021) and Diamond and Khemani (2022) show that properly implemented IFMIS can reduce revenue leakage by 30 to 40 percent through improved transparency, automated billing, real-time monitoring, and stronger accountability. Agenda 2063 (2021) identifies digital technologies as critical infrastructure for the economic transformation of African cities. However, IFMIS success has been hindered by political resistance, capacity constraints, poor change management, and limited technical support (Njavike and Meela, 2025).

Gupta and Tareq (2021), in a study of 15 African nations, found municipal revenue leakage rates of 25 to 45 percent, with corruption accounting for around 60 percent of losses. Cities with functioning IFMIS recorded stronger fiscal discipline, higher budget execution, and greater public trust in local institutions. The Economic Commission for Africa (2022) argues that strengthening municipal financial management is not merely a technical exercise but a precondition for sustainable urban development and democratic governance in Africa.

Zimbabwean local governments face compounded revenue administration challenges driven by economic instability, currency volatility, and governance failures. The Ministry of Local Government and Public Works (2023) estimates annual revenue losses exceeding US$500 million in urban councils, representing 35 to 75 percent of projected municipal revenue. This leakage has caused infrastructure decline, poor service delivery, and erosion of public trust. The Zimbabwe Local Government Association (2024) attributes these losses primarily to outdated manual accounting, weak internal controls, and the absence of integrated technological solutions.

The macroeconomic environment compounds municipal financial management challenges in Zimbabwe. Repeated currency changes between 2019 and 2024 have undermined revenue collection and financial planning (Reserve Bank of Zimbabwe, 2024). Makwavarara and Bogere (2022) argue that hyperinflation, dollarisation, parallel market

exchange rates, and complex multi-currency accounting demands cannot be handled by manual systems. The Zimbabwe Anti-Corruption Commission (2023) recorded 147 cases of municipal financial mismanagement between 2020 and 2023, with 68 percent occurring in urban councils lacking effective financial management frameworks.

Parliamentary investigations (Parliament of Zimbabwe, 2023) identified key weaknesses in municipal financial controls, including absence of segregation of duties, lack of real-time monitoring, poor record-keeping, and weak audit capacity, all of which enable fraud and misappropriation. Chatiza and Mlalazi (2021) argue that Zimbabwe's urban governance crisis is fundamentally a financial management crisis, since weak controls undermine both revenue collection and democratic accountability.

The City of Harare is failing its service delivery mandate, breaching public trust. The Harare Residents Trust (2024) reports persistent complaints about cholera outbreaks from untreated water, sewage bursts, uncollected refuse, and poor roads. The Standard (2018) reported that water supplied by the City is dirty and foul-smelling when available, risking cholera outbreaks.

Figure 1.0: Dirty tap water supplied by the City of Harare to residents, posing a public health risk including cholera outbreaks.



Source: The Herald (2023). Harare's water crisis deepens amid ageing infrastructure.

The City of Harare is also failing to rehabilitate roads, which leads to daily congestion and accidents across the city. An estimated 2000 km of its 4000 km road network is in poor condition due to underfunding, mismanagement, and inadequate maintenance. Major roads and streets are affected by potholes, such as Kirkman Drive, Chiremba Road, and George Silundika Street.

Figure 1.1: A severely potholed road in Harare, reflecting the City of Harare's failure to maintain roads due to underfunding and financial mismanagement.



Source: The Herald (2024). Harare in crisis: Potholes paralyse the city. Harare: Zimbabwe.

The root cause of poor service delivery is revenue leakage from the absence of a Financial Management System. The Auditor-General Report (2022) confirms the City of Harare has operated without financial management software since the BIQ billing system was terminated in March 2019. This technological gap forced reliance on manual processes, with financial records stored on unsecured memory sticks rather than secure databases such as Amazon Redshift, creating loopholes for fraud and misappropriation (Zimbabwe Anti-Corruption Commission, 2023). The Herald (2024) reports the City raised only 40 percent of its budgeted revenue from January to September 2024, crippling service delivery. The

absence of an FMS also prevents tracing debts owed by residents and businesses. Councillor Costa Mande reported debts rose 9.9 percent in September 2024 alone, from Zig 2.55 billion to Zig 2.75 billion (The Herald, 2024). The Commission of Inquiry into City of Harare Affairs (2023) found that the lack of automated systems eliminated audit trails, enabled fake receipts exceeding US$15 million between 2020 and 2023, unauthorised account adjustments of US$8.7 million, and systematic misappropriation of public funds.

Independent investigations by Transparency International Zimbabwe (2024) identified specific leakage cases including unaccounted service-centre cash receipts, falsified property valuations, ghost workers, overstated procurement contracts, and unauthorised debt waivers for politically connected persons. The Combined Harare Residents Association (2024) estimates that an FMS could reduce current leakage by at least 60 percent, freeing approximately US$30 million annually for service provision.

Public Financial Management (PFM) theory holds that strong PFM systems are essential to development outcomes, linking resources to service delivery and policy goals (PEFA Secretariat, 2016). Evidence shows well-managed PFM improves service delivery, reduces poverty, supports economic growth, and strengthens citizen trust (UNDP Oslo Governance Centre, 2021). Njavike and Meela (2025) identify three drivers of public-sector revenue leakage: process design failures, technological gaps, and governance weaknesses, all manifest in the City of Harare.

The Technology Acceptance Model (TAM) and Diffusion of Innovation Theory further explain adoption challenges and success factors for FMS in developing countries (Rahaman et al., 2023). Yeboah-Boateng and Cudjoe (2021) note that successful IFMIS implementation requires not only technical infrastructure but also organisational readiness, intensive training, and effective change management. Introducing an integrated FMS is therefore an urgent intervention to address systemic failures, restore fiscal sustainability, and improve municipal service delivery in Zimbabwe's capital.

1.2 Statement of the Problem

The problem is poor service delivery caused by revenue leakage in the City of Harare. The City faces annual revenue losses exceeding US$200 million, with severe consequences for its 2 million residents and development. The crisis manifests in three interconnected dimensions. First, a technology gap: since 2019, the City has lacked an ERP system, relying

on manipulable manual processes and storing records on unsecured memory sticks with no audit trail. Second, process design failures: absence of segregation of duties enables fake receipts, unauthorised account manipulation, and systematic misappropriation. Third, governance weaknesses: without real-time monitoring and audit trails, controls fail, public trust erodes, and impunity flourishes. This study proposes a holistic Financial Management System to address revenue leakage and restore fiscal sustainability.

1.3 Research Objectives

1.3.1 Primary Objective

To develop an integrated financial management system designed to mitigate revenue leakage within the City of Harare.

1.3.2 Secondary Objectives

1. To examine the causes of revenue leakage within the City of Harare's financial operation from 2019 to 2024.
2. To evaluate the effectiveness of the revenue control mechanism and quantify the financial impact of identified leakages using data from the 2024 fiscal year.
3. To design a comprehensive financial management system integrating automated billing, real-time monitoring, and fraud detection.

1.4 Research Questions

1. What are the primary causes of revenue leakage in the City of Harare's financial operation from 2019 to 2024?
2. To what extent do manual processes and a lack of a financial management system contribute to revenue loss?
3. What components should be included in the development of a financial management system to ensure effective management of public funds in the City of Harare?

1.5 Justification of the Study

This research is justified by the scale of revenue leakage in the City of Harare. Williams (2025) estimates annual losses of approximately US$200 million from the absence of an ERP system. Current manual processes are easily manipulated, error-prone, opaque, and open to abuse, undermining the City's ability to provide clean water, healthcare, infrastructure, and waste management.

ZIMRA (2023) reports that the TaRMS system has successfully automated and increased national revenue collection, yet the City of Harare lacks an equivalent integrated system for municipal revenue. ICTD (2023) shows that Kenya's iTax has reduced manual errors, improved compliance, and increased government revenue. South Africa's SARS e-Filing similarly improves taxpayer convenience, business participation, and financial accountability.

This study aims to fill a critical gap by designing a tailored financial management system for the City of Harare, which aims to curb revenue leakage, ensure transparency, and improve service delivery, driving urban development.

1.6 Significance of the Study

This research benefits multiple stakeholders, including the City of Harare, businesses, residents, policymakers, and academic institutions such as the University of Zimbabwe, as outlined below.

1.6.1 City of Harare

The study delivers a modern automated FMS to mitigate revenue leakage, enabling real-time reporting, revenue collection, and audit trails that reduce inefficiencies and corruption. It also provides tools and frameworks for effective municipal resource management.

1.6.2 Harare Residents

Mitigating revenue leakage will enable the City to provide essential services such as clean water, waste management, and road infrastructure. Transparency in managing public funds will rebuild trust in local government, while digital payment options give citizens a faster, easier way to pay property taxes and rates.

1.6.3 Policymakers and Regulatory Bodies

The study provides empirical evidence to guide policymakers in adopting advanced FMS at local and national levels. Transparency empowers regulatory bodies to detect fraud and mismanagement, and the study offers a blueprint for other municipalities seeking improved financial performance.

1.6.4 Zimbabwe National Government

The study aligns with the national digitalisation agenda, building on TaRMS to promote digital financial governance. Improved revenue management supports infrastructure development and can boost GDP through foreign investment.

1.6.5 Academic Institutions

The research adds scholarly insight into municipal financial challenges and technological solutions for urban governance, enriching the literature and providing a case study for future work at universities such as the University of Zimbabwe.

1.6.6 Theoretical Significance

The study advances Public Financial Management theory with empirical findings on mitigating revenue leakage in developing nations and broadens understanding of FMS in local government. It contributes to the literature on e-governance and municipal financial sustainability, examining how digital transformation addresses governance challenges in African municipalities. By focusing on the interaction of technology, process design, and governance, it provides theoretical explanations of systemic failures in public financial management and adds to knowledge on using automated systems for internal control, transparency, and fiscal discipline in urban councils.

1.6.7 Practical Significance

The research delivers a functional revenue management system to curb leakage, providing source code, database structure, and implementation documentation with built-in control mechanisms to prevent fraud and improve accountability. It informs national policy on municipal financial management with evidence-based recommendations for legislative and regulatory reform. The framework is adaptable across developing economies and can be deployed in other Zimbabwean and African municipalities. It aligns with Zimbabwe's National Development Goals and directly benefits Harare's 2 million residents through improved service delivery and transparency.

1.7 Assumptions

- The management of the city of Harare will provide financial reports and operational documents that would be needed to conduct the research, and will be adequate to provide meaningful analysis.
- The key stakeholders of the City of Harare will collaborate and offer proper information about the revenue management practices, challenges, and system requirements without causing any unnecessary political influence.

- The City of Harare has a minimum IT infrastructure such as computer facilities, network connectivity and access to electricity which will serve in the implementation of an integrated financial management system.
- The existing legal system and legislation that comprise Public Finance Management Act, Urban Councils Act, and the applicable procurement laws will facilitate the implementation of proposed systems throughout the study duration without significant revisions.
- The management and political leadership in the city of Harare will show sufficient commitment towards financial management reforms and will sanction the move towards automated financial management systems, even though some harmed stakeholders may resist the change.
- There are sufficient human resources who have little computer literacy at the City of Harare or are trainable to operate and maintain the proposed financial management system successfully in the long term.

1.8 Limitations

The following limitations may affect the research:

1.8.1 Data Quality and Accessibility Limitations

Financial records for the City of Harare may not be complete, constantly maintained, or may be classified as sensitive, potentially limiting revenue leakage analysis. Historical data from the manual accounting period 2019 to 2025 may lack the precision necessary for detailed trend analysis.

Mitigation Strategy: Triangulation of data sources, including official budget speeches, Auditor-General reports, Commission of Inquiry testimony, media investigations, and primary data collection through interviews and observation.

1.8.2 Response Bias and Sensitivity

Council Officials may not disclose accurate information about revenue leakage due to fear of implicating colleagues in fraudulent activities, accountability concerns, and ongoing investigations.

Mitigation Strategy: Assurance of confidentiality and anonymity by clearly stating that responses will be kept confidential. Use of anonymous questionnaires instead of face-to-face interviews, where appropriate.

1.8.3 Implementation Context Uncertainty

The ongoing procurement controversies surrounding the new BIQ system (cost escalation to US$1.7 million, allegations of deliberate delays) create uncertainty about institutional readiness for system implementation.

Mitigation Strategy: Development of implementation roadmaps with multiple scenario branches, emphasis on governance prerequisites, and stakeholder coalition-building to support reform.

1.9 Delimitation of the Study

- Geographic Scope: Limited to the City of Harare only, excluding other Urban Councils in Zimbabwe.
- System Scope: Focuses on software development and procedural framework, ignoring hardware procurement specifications.
- Organizational Level: Addresses the City of Harare's financial management only, while national policy reforms are considered as contextual factors.
- Temporal Scope: The study focuses on revenue leakage data and financial records from 2019 to 2024, with primary emphasis on the 2024 fiscal year for detailed quantitative analysis.
- Functional Scope: The system development concentrates on core financial management functions, including billing, revenue collection, accounting, and reporting, excluding ancillary systems such as human resource management, asset management, or citizen relationship management.
- Implementation Scope: The research focuses on system design, development, and piloting, but does not extend to full-scale citywide deployment, long-term maintenance contracts, or comprehensive change management across all City of Harare departments.

1.10 Organization of the Study

This research is structured into five chapters, each contributing to the objective of proposing an integrated FMS to mitigate revenue leakage in the City of Harare:

Chapter 1 – Introduction

This chapter provides an overview of the study, starting with the main problem, poor service delivery, narrowing to the root cause, which is revenue leakage and the absence of an Enterprise Resource Planning System (ERP) since 2019.

Chapter 2 – Literature Review

This chapter reviews existing studies on revenue management, FMS, ERP adoption, and digitalisation globally and locally, focusing on how revenue leakage affects service delivery and how digital systems address the challenge.

Chapter 3 – Research Methodology

This chapter outlines the research design, data collection methods, and tools, describing how data on revenue leakage, financial inefficiencies, and system gaps will be gathered and analysed, and how the ERP-based FMS will be evaluated and stakeholders engaged.

Chapter 4 – Findings and Discussion

This chapter presents findings on the City's financial challenges, the impact of revenue leakage, and gaps in existing frameworks, then discusses them in the context of the proposed FMS, comparing it with successful systems such as ZIMRA's TaRMS and Kenya's iTax.

Chapter 5 – Conclusions and Recommendations

The final chapter summarises key findings and their implications for the City of Harare, recommends steps for implementing the integrated FMS (infrastructure, development, and stakeholder engagement), and notes study limitations and directions for future research.

1.11 Chapter Summary

Chapter 1 identifies poor service delivery in the City of Harare as caused by revenue leakage and misuse of public funds, traced to the absence of an FMS since 2019, and proposes that an integrated FMS can automate revenue collection, improve transparency, and enhance service delivery. The chapter sets out the study's objectives, significance, and scope, establishing the need for digital intervention. Chapter 2 reviews literature on revenue leakage, FMS, and the role of digitalisation in urban council finance, evaluating comparable systems such as ZIMRA's TaRMS and Kenya's iTax.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter reviews theoretical and empirical literature on financial management systems, revenue leakage, and public sector financial governance. It covers five theoretical perspectives (PFM, Agency, Information Systems, Fraud Triangle, and Institutional Theory), a conceptual framework, an empirical review, and gap analysis. Revenue leakage is a critical urban governance challenge in developing countries. Muriithi and Wanjiru (2022) note that municipal revenue gaps in sub-Saharan Africa have widened due to technological deficiencies, governance failures, and the absence of integrated financial platforms. In Zimbabwe, the City of Harare has operated without formal financial management software since 2019, creating systemic vulnerabilities to fraud (Zimbabwe Anti-Corruption Commission, 2023).

2.1 Theoretical Perspectives

Several interlocking theories collectively explain revenue leakage in the City of Harare and the potential of FMS to address it. This section examines five foundational theories: Public Financial Management, Agency, Information Systems, Fraud Triangle, and Institutional Theory, each with specific reference to the City of Harare and the proposed system.

2.1.1 Public Financial Management Theory

The primary theoretical perspective used in this study is Public Financial Management (PFM) Theory. The PEFA Secretariat (2022) maintains that effective PFM mechanisms are crucial to sustainable fiscal policy, resource mobilisation, and service delivery. PFM theory holds that governments must operate strong systems of revenue mobilisation, budget implementation, financial reporting, and external audit, focusing on three interconnected aspects: the institutional structure of state finances, the methods of raising and spending revenues, and the technological foundation of financial activities (Allen et al., 2022).

Schiavo-Campo and Tommasi (2022) argue that PFM reforms in developing economies must be situated within local political economy, considering technical capacity and political will. Applied to the City of Harare, PFM theory identifies the lack of systematic revenue collection, budget monitoring, and financial reporting as the main cause of leakage. Aziz and Dabla-Norris (2022) further argue that isolated PFM systems cannot deliver fiscal

discipline, as they prevent integrated control over revenue and expenditure for effective planning and service delivery.

The World Bank (2023) reports that municipalities adopting comprehensive PFM reforms (automated billing, real-time reporting, and built-in audit systems) achieve significant improvements in revenue performance and leakage prevention. This grounds the study's central proposition: that an integrated FMS for the City of Harare is a direct application of PFM principles to a specific institutional problem.

2.1.2 Agency Theory

Agency Theory, originating with Jensen and Meckling (1976) and extended to the public sector by Moe (1984), analyses the interaction between principals (residents, elected councillors, oversight bodies) and agents (municipal officials) in managing state resources. The theory holds that where information asymmetries and weak monitoring exist, agents may pursue self-interest using their authority over entrusted resources (Eisenhardt, 1989).

In the City of Harare, Agency Theory explains how the lack of real-time monitoring, weak audit trails, and the removal of automated systems after the BIQ shutdown in 2019 allowed agency problems to flourish. Muriithi and Wanjiru (2022) show that in municipalities with weak principal-agent accountability, revenue misappropriation is high because agents exploit information advantages. The Commission of Inquiry into City of Harare Affairs (2023) found that fraudulent receipts of US$15 million and unauthorised account adjustments of US$8.7 million between 2020 and 2023 are classic examples of agency problems in public finance.

Applying Agency Theory to digital governance, Ndung'u and Shimba (2023) argue that integrated FMS act as control mechanisms that reduce information asymmetry between principals and agents. By automating financial procedures, generating tamper-proof audit trails, and enabling real-time monitoring, such systems make opportunistic behaviour far harder. The proposed FMS for the City of Harare is therefore conceptualised, in agency-theoretic terms, as a monitoring and control mechanism aligning municipal officials' interests with those of residents.

2.1.3 Information Systems Theory and Technology Acceptance Model.

Information Systems (IS) Theory, as synthesised by Laudon and Laudon (2022), explains how technology transforms organisational processes, information quality, and decision-making. Within IS theory, the Technology Acceptance Model (TAM), introduced by Davis

(1989) and extended by Venkatesh and Morris (2000), explains when financial management systems are adopted and used effectively in public-sector organisations.

TAM holds that system use depends on two user perceptions: perceived usefulness (the system will improve performance) and perceived ease of use (the system requires little cognitive effort). Otieno et al. (2023) found TAM variables, especially perceived usefulness among senior managers and finance officers, the strongest predictors of IFMIS adoption success in Kenyan county governments. Similarly, Mensah et al. (2022) show that user-friendly interfaces and comprehensive training significantly increased user acceptance of Ghana's e-government financial system.

Socio-Technical Theory (Trist and Bamforth, 1951; Mumford, 2006) complements TAM by stressing that successful information systems must balance technical design with the social and organisational realities of use. Rahaman et al. (2023) apply this view to public-sector financial systems in developing countries, concluding that those ignoring organisational culture, employee resistance, and change management have higher failure rates. This applies directly to the City of Harare, where the proposed FMS must meet performance requirements and secure active uptake by finance staff across departments.

2.1.4 The Fraud Triangle Theory

The Fraud Triangle Theory (Cressey, 1953; Wells, 2005; Dorminey et al., 2022) identifies three factors predisposing individuals to fraud: perceived pressure (financial or situational motivation), perceived opportunity (weak controls), and rationalisation (cognitive justification). It is the dominant model for understanding financial misconduct in forensic accounting and public-sector audit (ACFE, 2024).

Applied to the City of Harare, the Fraud Triangle is diagnostic. Opportunity is the factor most directly influenced by financial management systems. Dorminey et al. (2022) argue that automated controls, real-time monitoring, and digital audit trails sharply reduce fraud opportunities. The Zimbabwe Anti-Corruption Commission (2023) found that fraudulent receipts, falsified property valuations, and cash theft at service centres all exploited the absence of automated controls, which an integrated FMS restores.

Njavike and Meela (2025) apply the Fraud Triangle to Zimbabwean municipalities, showing all three of Cressey's factors are present in urban councils lacking effective financial systems. Their study found that automated systems reduced fraud-related revenue

losses by an average of 42 percent within three years, providing strong empirical support for this study's system development.

2.1.5 Institutional Theory

Institutional Theory (DiMaggio and Powell, 1983; Scott, 2008) examines how organisations are shaped by the formal rules, informal norms, and culture of their environments. It identifies three pressure mechanisms: coercive (legal and regulatory demands), normative (professional standards and expectations), and mimetic (imitating organisations perceived as successful under uncertainty).

Institutional Theory explains both the drivers and obstacles of municipal financial management reform. Nyamadzawo and Chirisa (2022) apply it to Zimbabwean urban governance, showing that resistance to technological change among municipal officials reflects strong institutional norms favouring personal relationships and discretionary decision-making over rule-based systems. These barriers apply directly to the City of Harare, where the Commission of Inquiry (2023) found systemic official resistance to reform that an integrated FMS would constrain.

Institutional Theory also points to enablers of reform. Phiri and Mhango (2023) find that Zimbabwean municipal reforms succeed most when supported by coercive pressure from central government, normative pressure from professional bodies such as the Institute of Chartered Accountants, and mimetic pressure from visibly successful systems like ZIMRA's TaRMS. This multi-dimensional view informs the stakeholder engagement and change management approach proposed in this study.

2.2 Conceptual Framework

The conceptual framework articulates relationships between independent, intervening, and dependent variables. Drawing on the theories above, it posits that an integrated FMS will address the three dimensions of revenue leakage in the City of Harare: technological gaps, process design failures, and governance weaknesses (Njavike and Meela, 2025; World Bank, 2023).

The independent variables are five system components: (i) automated billing and revenue collection, (ii) real-time financial monitoring and reporting, (iii) integrated internal controls, (iv) digital audit trail functionality, and (v) transparency and accountability features. These address the root causes of leakage through intervening mechanisms:

improved process integrity, enhanced information quality, reduced information asymmetry, and strengthened institutional accountability. The dependent variable is reduction in revenue leakage, measured by improvement in collection performance against budget. Moderating variables include organisational readiness, political will, staff capacity, and IT infrastructure quality.

The framework draws on the convergent insights of PFM, Agency Theory, TAM, the Fraud Triangle, and Institutional Theory, reflecting the multi-dimensional nature of revenue leakage as both a technical and governance challenge.

2.2.1 Conceptual Framework Model

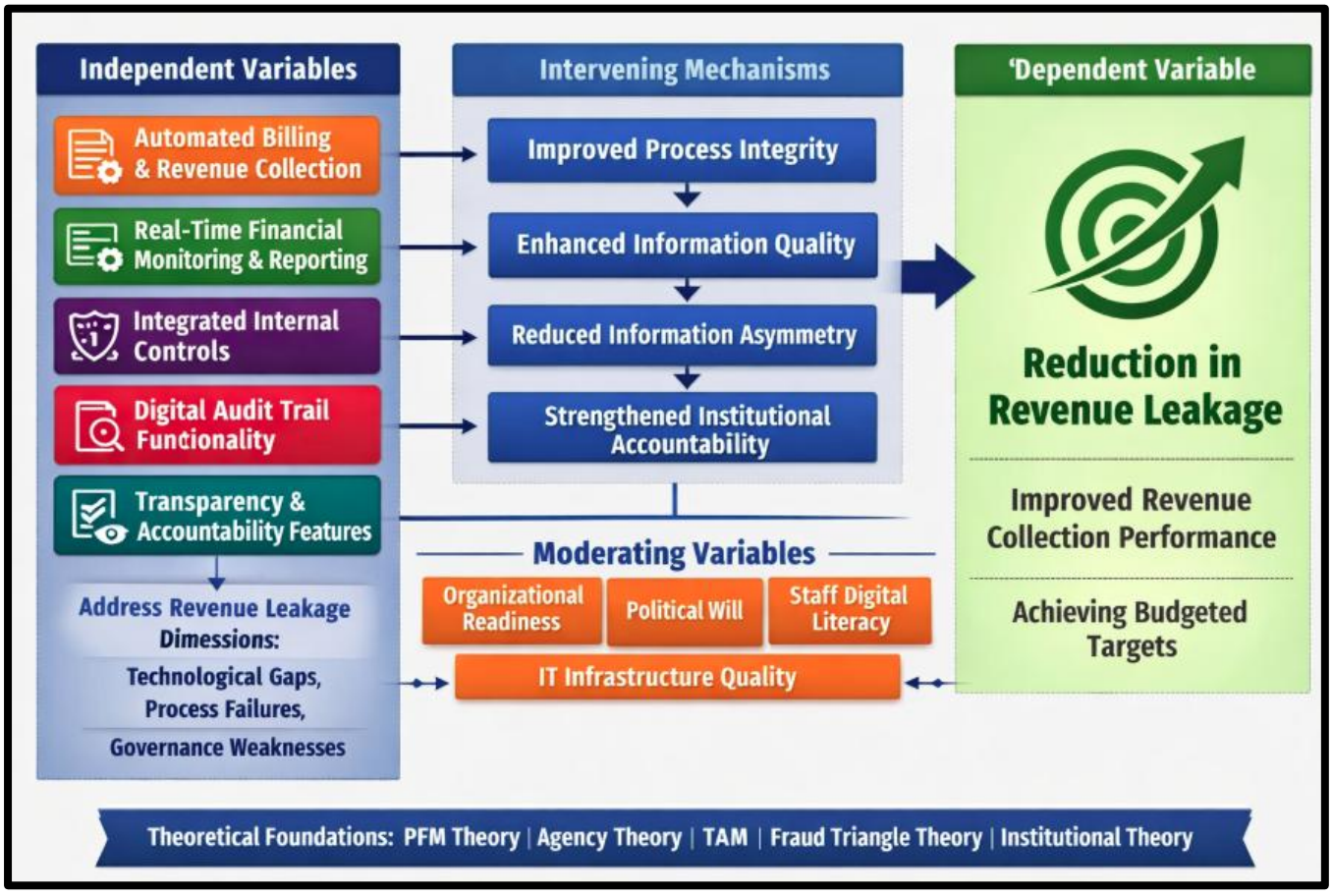


Figure 2.1 : Conceptual Framework for Reducing Revenue Leakage in the City of Harare, Source: Author's conceptualization (2026) based on Njavike and Meela (2025) and World Bank (2023).

Figure 2.1 maps independent variables (the five FMS components), intervening mechanisms (process integrity, information quality, reduced asymmetry, accountability), and moderating variables (organisational readiness, political will, staff digital literacy, IT

infrastructure) onto the dependent variable: reduction in revenue leakage, measured by improved collection performance against budget.

2.3 Empirical Literature Review

The empirical review draws primarily on scholarship from 2022 onwards, supplemented by foundational studies for context. It is organised thematically: global evidence on FMS and revenue performance; technology in municipal revenue administration; case studies from comparable developing country contexts; the Zimbabwe and Southern African context; and determinants of FMS implementation success and failure.

2.3.1 Global Evidence on Financial Management Systems and Revenue Performance

International evidence consistently links FMS adoption to improved revenue performance. An IMF (2022) study of 120 countries found that jurisdictions adopting integrated FMIS saw average revenue collection rise by 18 to 27 percent within three years, driven by three mechanisms: elimination of manual processing errors, reduced corruption through automated controls, and improved taxpayer compliance via digital payment channels.

Diamond and Khemani (2022), in a longitudinal study of FMIS in 32 developing countries, found the largest revenue gains in jurisdictions with high manual processing and weak internal controls, exactly the City of Harare's profile. They identified five success factors: executive-level political commitment, extensive change management, rigorous staff training, phased implementation with clear milestones, and independent monitoring. These findings directly inform the system design proposed in this study.

The OECD (2023) Digital Government Review found that municipalities integrating their FMS with broader e-government systems recorded significantly higher revenue gains than those running standalone systems. Integration enables cross-referencing across property registries, business licences, and utility connections, improving billing accuracy and reducing unregistered ratepayers. This is directly relevant to the City of Harare, where Transparency International Zimbabwe (2024) identified structural underreporting of property values and unregistered businesses as major leakage sources.

2.3.2 Financial Management Systems and Revenue Leakage within the African Municipalities.

Literature on FMS and revenue leakage in African municipalities is directly relevant to this study. Muriithi and Wanjiru (2022), in a systematic review of municipal revenue management across Kenya, Tanzania, Uganda, and Rwanda, found automated revenue management systems were the strongest predictor of Own Source Revenue performance. Across 47 municipalities, those with integrated FMS collected 68 percent of potential revenue on average, compared with 41 percent for manual systems, a 27-percentage-point gap consistent with World Bank global estimates.

Olowu and Wunsch (2022), in a pan-African analysis of local government financial capacity, argue that revenue disparities reflect structural underinvestment in financial management infrastructure, both human capital and technology. Drawing on data from Nairobi, Lagos, Accra, and Harare, they show manual billing systems are prone to point-of-collection leakage: cash collected but not deposited, falsified receipts, and unrecorded transactions. This aligns closely with the City of Harare Commission of Inquiry (2023) findings.

Kochhar and Verdier-Chouchane (2023) examine the fiscal dimensions of urbanisation in sub-Saharan Africa, showing that urban expansion brings revenue management complexity that manual systems cannot handle. They identify Harare, Lusaka, and Dar es Salaam as cities with acute gaps between potential and actual revenue, and recommend integrated digital FMS platforms as a prerequisite for sustainable urban financing.

Table 2.1: Comparative Revenue Collection Performance in Selected African Cities (2022–2024)

City / Municipality	Financial System Type	Revenue Collection Rate (%)	Revenue Leakage Estimate (%)	Source
Nairobi (Kenya)	Integrated IFMIS	72%	~15%	Muriithi & Wanjiru, 2022
Cape Town (S. Africa)	Integrated ERP	84%	~8%	Chipkin & Lipietz, 2023
Kampala (Uganda)	Semi-automated	58%	~25%	Olowu & Wunsch, 2022

Dar es Salaam (Tanzania)	Manual/Partial	47%	~35%	Kochhar & Verdier-Chouchane, 2023
Harare (Zimbabwe)	Manual (post-2019)	40%	~45–55%	The Herald, 2024; ZACC, 2023
Lusaka (Zambia)	Transitional	52%	~30%	Phiri & Mhango, 2023

Source: Compiled by Author from Reviewed Literature, 2026

Table 2.1 shows a strong correlation between financial system type and revenue collection rate. Cities with integrated FMS consistently outperform those with manual or transitional systems. Harare's collection rate of approximately 40 percent and estimated leakage of 45 to 55 percent rank among the poorest outcomes, underscoring the urgency of the proposed system.

2.3.3 Integrated Financial Management Information Systems (IFMIS): Design Principles and Outcomes

IFMIS architecture and design have been extensively researched, with growing best-practice literature for developing-country settings. Banerjee et al. (2022) evaluated IFMIS implementation in three Indian states, finding revenue leakage fell by 31 to 47 percent between the first and third year. They attributed the gains to three features: digital payment integration that eliminated cash handling, automated real-time reconciliation, and centralised dashboards for supervisors to monitor all revenue sources simultaneously.

Chipkin and Lipietz (2023) analyse Cape Town's integrated FMS, which delivers over 80 percent revenue collection. They highlight key design features: modular architecture enabling phased implementation, a debtor management module with automated arrears notifications, GIS integration for accurate property identification, and multiple payment channels including mobile money, online banking, and point-of-sale kiosks. They attribute Cape Town's success not only to technical design but also to sustained political commitment and professionalisation of the revenue administration.

Otieno et al. (2023) examine IFMIS implementation challenges in Kenyan county governments and find that despite heavy national investment, counties still suffered

significant revenue leakage from sub-national implementation failures. They identify three recurring problems: inadequate user training, staff dependent on manual processes as a source of informal income, and poor internet connectivity in remote locations. The findings caution that technical solutions must be paired with strong change management and capacity building.

2.3.4 Technology-based Revenue Administration: Kenya, South Africa and Rwanda Case Studies.

Country case studies offer detailed lessons on technology-driven revenue administration transformation relevant to the City of Harare. Kenya's iTax, run by the Kenya Revenue Authority, is one of Africa's most cited digital tax success stories. The ICTD (2023) reports iTax cut manual processing errors by 89 percent, raised taxpayer compliance by 23 percent, and grew government revenue by 18 percent within three years of full implementation. Integration with mobile payments, especially M-Pesa, solved last-mile collection, which is directly relevant to Harare.

South Africa's SARS e-Filing system shows how digital platforms can transform revenue administration at scale. Chipkin and Lipietz (2023) note that since the early 2000s, SARS has continuously invested in integrated digital systems, achieving one of the highest tax compliance rates among emerging-market economies. The SARS model emphasises taxpayer convenience through mobile-friendly interfaces, voluntary compliance incentives, and real-time payment feedback, all adaptable to the City of Harare.

Rwanda's Integrated Taxpayer System (ITAS) is perhaps the closest comparator for the City of Harare, given Rwanda's similar economic profile and its strong commitment to digital governance. Nkurunziza and Hakizimana (2023), reviewing ITAS five years on, found real revenue collection rose 34 percent, leakage fell by an estimated 38 percent, and taxpayer registration grew 41 percent as previously informal businesses entered the net. They attribute the results to system design quality, high staff training rates, and sustained political backing from the presidency and Ministry of Finance.

2.3.5 Revenue Leakage: Causes, Magnitude and Consequences.

Research on public-sector revenue leakage is extensive, with recent work offering more nuanced explanations of its causes, magnitude, and effects. Ndung'u and Shimba (2023) define revenue leakage as the loss of revenue an organisation has a legal right to collect, arising from administrative failures, deliberate fraud, and structural weaknesses in revenue

management systems. At the municipal level, they identify five major leakage sources: unregistered properties and non-paying businesses, billing errors and undervaluation of rateable property, theft at collection points, unauthorised arrears and debt waivers, and fraudulent manipulation of financial records.

Revenue leakage has consequences beyond short-term fiscal impairment. Kochhar and Verdier-Chouchane (2023) show that cities with persistent high leakage enter a vicious cycle: deteriorating service quality erodes ratepayer willingness to pay, which further reduces revenue and accelerates institutional decay. This is evident in Harare, where collapsing water and waste services have driven down rate payments (Harare Residents Trust, 2024).

Aziz and Dabla-Norris (2022) provide an IMF assessment of the impact of weak public finance governance on fiscal and developmental performance in low-income countries. Controlling for income levels, they find that countries with weak PFM systems, including poor revenue administration, record systematically lower public investment, slower infrastructure development, and weaker service delivery. This grounds the argument that strengthening the City's FMS is not merely an administrative efficiency issue but a precondition for Harare's development.

Table 2.2: Principal Causes of Revenue Leakage in Municipal Contexts – Evidence from Recent Literature

Cause of Leakage	**Manifestation in City of Harare**	**Relevant Literature**
Absence of automated billing system	Manual receipting, unrecorded transactions	ZACC (2023); Njavike & Meela (2025)
Weak internal controls	No segregation of duties, lack of real-time oversight	Ndung'u & Shimba (2023); Parliament of Zimbabwe (2023)
Information asymmetry (agency problems)	Officials exploiting knowledge gaps, fake receipts	Commission of Inquiry (2023); Muriithi & Wanjiru (2022)
Unregistered ratepayers	Properties and businesses outside revenue net	Transparency International Zimbabwe (2024)

Unauthorised debt waivers	Political waiving of debts without authorisation	ZILGA (2024); Chatiza & Mlalazi (2021)
Poor record management	Records on unsecured memory sticks, no central database	Auditor-General Report (2022)
Institutional resistance to reform	Deliberate obstruction of system procurement	Nyamadzawo & Chirisa (2022); Parliament of Zimbabwe (2023)

Source: Compiled by Author from Reviewed Literature, 2026

2.3.6 Internal Controls, Fraud Detection, and Financial Accountability in the Public Sector

Internal controls, fraud detection, and financial accountability in the public sector have attracted growing academic attention post-pandemic, as governments grapple with the aftermath of emergency spending without adequate oversight. The ACFE (2024) International Survey on Fraud (133 countries, 1,921 cases) reports a median public-sector fraud loss of USD 150,000 with median detection time of 18 months. Organisations with hotline reporting, continuous monitoring controls, and surprise audits recorded significantly lower fraud losses and shorter detection times.

Njavike and Meela (2025) apply the ACFE framework to sub-Saharan Africa, identifying three internal control mechanisms with the greatest fraud-prevention impact: automated approval workflows that prevent single-person authorisation of high-value transactions, digital audit trails providing an immutable record of all financial transactions, and real-time anomaly detection algorithms that flag unusual transactions for review. These form the basis of the internal control platform in the proposed FMS for the City of Harare.

Mwangi and Muriuki (2023) examine the relationship between internal audit quality and revenue leakage in Kenyan counties, finding that those with strong internal audit capacity and automated monitoring had 28 percent lower leakage than counties with weak audit capacity. Audit effectiveness improved sharply where auditors had real-time access to financial data through built-in FMIS, enabling continuous rather than periodic audit. This supports embedding a strong internal audit unit in the proposed Harare FMS.

2.3.7 Urban Financial Management Digital Transformation.

Since 2020, digital transformation of public-sector financial management has accelerated sharply, driven by COVID-19 disruption of manual processes and the spread of affordable cloud-based solutions. Mansah et al. (2022) define municipal digital financial transformation as the adoption of digital technologies alongside fundamental shifts in the processes, culture, and capabilities through which municipalities mobilise, manage, and account for resources. Across eight West African municipalities, they found that five-year digital transformation programmes delivered an average 340 percent return on investment, driven mainly by improved revenue collection.

Gomez-Barroso and Feijoo (2022), reviewing digital financial management in cities across Latin America and Africa, identify three features as decisive: mobile-first payment architecture that meets taxpayers where they are rather than forcing physical visits, open data policies that publish revenue performance to create accountability, and integration with national identification systems for taxpayer verification and liability assessment. These design principles apply directly to the City of Harare.

Osei-Bonsu and Brefo-Manuh (2023) examine digital financial transformation in municipalities facing unstable electricity and poor internet, conditions directly relevant to Zimbabwe. Across 12 municipalities in Ghana, Nigeria, and Zimbabwe, they identify offline-capable mobile applications and SMS-based payment confirmation as essential features for infrastructure-constrained settings. System architectures that accounted for these constraints achieved 45 percent higher adoption rates than those assuming constant connectivity.

2.3.8 Zimbabwe and Southern African Context: Financial Management Reform Evidence

The most directly relevant empirical evidence lies in the literature on financial management reform in Zimbabwe and the wider Southern African context. Makwavarara and Bogere (2022) trace municipal financial challenges in Zimbabwe, showing how macroeconomic instability, currency volatility, and weak institutional capacity make local-authority financial management especially difficult. Across eight urban councils, including Harare, Bulawayo, Mutare, and Gweru, all show high revenue leakage, with Harare worst due to its scale, complexity, and the political economy of metropolitan governance in Zimbabwe.

Nyamadzawo and Chirisa (2022) examine urban governance in Zimbabwe's financial management crisis and argue that technical solutions alone cannot succeed without

improvements in political accountability and anti-corruption enforcement. They document how political interference in municipal finance, including unauthorised debt waivers for politically connected entities, has systematically undermined revenue management. They conclude that an FMS in the City of Harare will succeed only as far as the surrounding governance system allows.

Phiri and Mhango (2023) compare IFMIS implementation in Zambia and Zimbabwe, countries with similar colonial-administrative histories and development levels. They find that Zambia's IFMIS delivered major public finance improvements with strong World Bank support, while Zimbabwe's stalled due to procurement inefficiencies, political interference, and weak change management. The study offers direct lessons for the City of Harare: transparent procurement, phased adoption, and independent oversight.

Chigama and Dube (2023) assess the first two years of ZIMRA's Tax and Revenue Management System (TaRMS), finding it delivered 23 percent growth in total tax revenue in year one, driven by better compliance monitoring and the elimination of manual processing points where leakage was concentrated. They also document persistent challenges with system stability, user training, and integration with partner agencies, confirming that financial system implementation is technically demanding even in better-resourced settings.

2.3.9 Enterprise Resource Planning Systems of Municipal Governance

Enterprise Resource Planning (ERP) is the most comprehensive approach to integrated financial management, combining finance, human resources, procurement, asset management, and service delivery monitoring on one platform. Yeboah-Boateng and Cudjoe (2022) review ERP implementation across West African public-sector organisations and conclude that ERPs offer the greatest transformation potential but also the greatest implementation risk, including cost overruns, scope creep, and user resistance.

Chipkin and Lipietz (2023) document South African municipalities that adopted Oracle, SAP, and Microsoft Dynamics in the 2010s, recording strong financial management gains but severe implementation challenges. They recommend that developing-country municipalities consider configurable, lower-cost ERPs such as Odoo or African-market cloud ERPs rather than developed-market enterprise systems. This applies directly to the City of Harare, where fiscal and technical capacity constraints should shape system design.

Applying the Technology Acceptance Model to public-sector ERP implementation in Bangladesh, Ghana, and Zimbabwe, Rahaman et al. (2023) find that perceived usefulness and perceived ease of use are the strongest predictors of success, and that these perceptions depend heavily on training quality, management support, and system fit with existing processes. ERP implementations that invest in user engagement and participatory design achieve significantly higher adoption and use than top-down rollouts.

Table 2.3: Summary of Key Empirical Studies on Financial Management Systems and Revenue Leakage (2022–2025)

Author(s) & Year	Study Context	Key Findings	Relevance to Current Study
Muriithi & Wanjiru (2022)	East Africa	Automated systems collect 68% vs 41% with manual systems	Confirms magnitude of gap addressable through system implementation
Diamond & Khemani (2022)	32 countries	FMIS reduces leakage 30–40%; 5 critical success factors identified	Provides design and implementation guidance for proposed system
Ndung'u & Shimba (2023)	Kenya	Digital systems reduce principal-agent information asymmetry	Supports agency theory application in system design
Njavike & Meela (2025)	Sub-Saharan Africa	Automated controls reduce fraud losses by 42% over 3 years	Directly validates proposed system's anti-fraud objectives
Otieno et al. (2023)	Kenya	IFMIS challenges: training gaps, resistance, connectivity	Informs change management and capacity building strategies
Makwavarara & Bogere (2022)	Zimbabwe	All 8 urban councils exhibit significant leakage; Harare worst	Establishes local context and urgency for the study
Nkurunziza & Hakizimana (2023)	Rwanda	ITAS increased revenue by 34%, reduced leakage by 38%	Provides comparable developing country success case

Osei-Bonsu & Brefo-Manuh (2023)	Ghana, Nigeria, Zimbabwe	Offline-capable systems achieve 45% higher adoption rates	Guides infrastructure-resilient system design for Harare
Phiri & Mhango (2023)	Zambia & Zimbabwe	Zambia IFMIS succeeded; Zimbabwe hampered by procurement issues	Highlights governance prerequisites for system success
Rahaman et al. (2023)	Bangladesh, Ghana, Zimbabwe	User participation in design increases ERP adoption rates	Supports participatory design approach for proposed system

Source: Compiled by Author from Reviewed Literature, 2026

2.3.10 Mobile Money and Digital Payment Integration in Municipal Revenue Systems

The most significant recent trend in urban African finance is the integration of mobile money with municipal revenue systems. With over 70 percent adult mobile money penetration in Zimbabwe in 2024 (RBZ, 2024), integrating EcoCash and other mobile payment platforms into the proposed City of Harare FMS is a critical design factor. Studying three Zimbabwean municipalities, Thulani and Moyo (2022) find payment compliance rose 34 percent within six months of mobile payment adoption, mainly by eliminating travel to central payment offices.

Chirwa and Nkwanyana (2023), studying Botswana, Zambia, and Zimbabwe, find that effective integration of mobile money with municipal revenue systems hinges on automated reconciliation between mobile transaction data and billing records to prevent errors and misuse. Municipalities using automated reconciliation recorded 55 percent lower fraud rates than those with manual reconciliation, reinforcing the importance of robust integration architecture in the proposed Harare FMS.

2.3.11 Governance, political will and successful reforms in financial management.

A recurring theme in recent financial management reform literature is that governance quality and political will determine implementation success. Nyamadzawo and Chirisa (2022) show that in Zimbabwe, technically sound reforms were repeatedly compromised by political interference, elite capture of reform processes, and obstruction by officials whose interests were threatened by greater accountability. Their case study of Harare's repeated failed attempts to replace the BIQ billing system illustrates the pattern.

Fjeldstad and Heggstad (2022) compare the political economy of revenue reform in sub-Saharan Africa, distinguishing technical failure (poorly designed or executed systems) from political failure (deliberate sabotage of reform). They argue Harare's revenue crisis combines both, but is dominated by the political dimension: technical knowledge of effective FMS exists, yet political will and governance integrity to support reform have not.

Drawing on principal-agent and institutional theory, Phiri and Mhango (2023) argue that successful reform requires a governance coalition of committed political leaders, professional finance officers, active civil society, and engaged citizens. In their twelve Southern African cases, this coalition existed in six successful reforms and was incomplete or actively obstructed in four failures. In Harare, the Harare Residents Trust (2024), Combined Harare Residents Association (2024), and Transparency International Zimbabwe (2024) confirm strong civil society demand for reform, but inconsistent political leadership commitment.

2.4 Gap Analysis

The above account of theoretical and empirical literature shows that there exists a series of important gaps that the study stands to fill. In spite of the rich literature on financial management systems, revenue leakage, and municipal financial governance, the particular issue of crafting an integrated financial management system that is reflective of the operation setting of the City of Harare has never been discussed in the available literature. This is the main gap in knowledge that is addressed by this research.

To begin with, some of the studies like Makwavarara and Bogere (2022) and Nyamadzawo and Chirisa (2022) record the level of revenue management crisis in the urban councils in Zimbabwe; however, they do not offer a systematic plan on how to design and develop a remedial financial management system. Available literature observes the issue in all-covering detail but does not administer expert-level applications. This paper fills this gap by presenting a particular system design and implementation plan.

Secondly, comparative studies on Kenya (Muriithi and Wanjiru, 2022; Otieno et al., 2023), Rwanda (Nkurunziza and Hakizimana, 2023), and South Africa (Chipkin and Lipietz, 2023) can be very informative but cannot be applied directly to the situation in Harare without considerable context adjustments. The distinctive blend of manual functions, multi-currency situation, and infrastructure limitations of the City of Harare coupled with the peculiarities of its governance means that a solution that addresses the issue at hand must

focus on the circumstances of the city and cannot be transplanted. This paper gives this contextual adaptation.

Thirdly, available literature on the implementation of IFMIS in developing nations such as the seminal article of Diamond and Khemani (2022) and the comparative study of Phiri and Mhango (2023) is dominated by national government IFMIS and not municipal levels. The particular issues of municipal financial management such as property rates, service charges, water billing, and informal market levies have significant differences with the national government financial management, as well as specialised system design considerations are required. This gap will be filled by this study but in the specific case of municipal financial management.

Fourthly, although the literature is very rich in showing the significance of the standard of governance and political goodwill in the success of financial management reform in any individual, it has little practical information on how to design systems that can make difference even in a governance environment that is characterised by moderate political commitment and institutional resistance. The proposed study is another addition to this gap since it aims to propose a system design that includes strong built-in accountability capabilities and transparency mechanisms that will serve as tools of governance improvement themselves.

Table 2.4: Knowledge Gaps and Study Contributions

Identified Knowledge Gap	**Contribution of This Study**
No system design framework for City of Harare's revenue crisis	Proposes a tailored financial management system architecture and implementation roadmap
Comparative models lack contextual adaptation for Zimbabwe	Adapts international best practices to Harare's specific institutional and infrastructural context
IFMIS literature focuses on national government, not municipal level	Develops municipal-specific system design incorporating rates, service charges, and informal levies
Limited guidance on systems designed for moderate governance environments	Proposes accountability and transparency features that function as governance improvement tools
Insufficient attention to mobile money integration in municipal contexts	Incorporates mobile payment integration as a core system design feature

Source: Author's Own Construct, 2026

2.5 Chapter Summary

This chapter reviewed theoretical and empirical literature on financial management systems, revenue leakage, and municipal financial governance. Five theories were examined Public Financial Management Theory, Agency Theory, Information Systems Theory, Fraud Triangle Theory, and Institutional Theory each offering a distinct lens on Harare's revenue management crisis. The empirical review confirmed that integrated systems consistently improve revenue collection, with comparable cities achieving rates of 68 to 84 percent against Harare's 40 percent. Case studies from Rwanda, Kenya, South Africa, and Zambia highlighted that technical solutions must be complemented by change management, training, and political commitment.

Five knowledge gaps were identified, most critically the absence of a contextually adapted system design for Harare. Chapter 3 outlines the research methodology guiding the proposed system's development.

CHAPTER 3

RESEARCH METHODOLOGY

3.0 Introduction

The research methodology outlines the approach and procedures used to conduct the study titled A Financial Management System to Mitigate Revenue Leakage in the City of Harare. This section details the research design, population, sample size, sampling procedure, research instruments, data sources, data validity, models used in the study, and evaluation metrics utilised to assess the effectiveness of the proposed system. The purpose of this study is to provide a systematic approach to data collection, analysis, and interpretation related to revenue management in the City of Harare. This section also supports the development of a financial management system, which aims to improve transparency, efficiency in revenue collection, and accountability within the City of Harare.

3.1 Research Design

The study adopted a mixed-methods approach combining qualitative and quantitative research. A mixed approach was chosen because the qualitative component allows for a comprehensive understanding of the causes of revenue leakage, while the quantitative component facilitates the statistical analysis of financial data.

Qualitative methods were used to gather insights from City of Harare officials regarding revenue leakage, weaknesses in the existing financial management system, and potential improvements in the proposed system. Quantitative methods were used to analyse financial data and evaluate patterns of inefficiency in revenue collection and management. The study also incorporated elements of Design Science Research (DSR), which focuses on creating and evaluating innovative artefacts such as models and systems to address real-world problems. In this study, the artefact designed is a financial management system aimed at mitigating revenue leakage in the City of Harare.

Accordingly, the research consists of three essential elements: problem identification and revenue leakage analysis; development of a financial management system; and evaluation of the system’s capacity to reduce revenue leakage. This approach ensures that the study addresses both theoretical and practical dimensions of the research problem.

3.2 Population

The population of the study consists of internal stakeholders from the City of Harare who are directly involved in the financial management of different sections within the Finance Department. These stakeholders include revenue collection officers, internal auditors, accountants, ICT personnel, and budget officers. These individuals possess the necessary knowledge of the revenue management process and financial operations within the municipality.

3.3 Sample Size and Sampling Procedure

3.3.1 Sample Size

Table 3.1 below presents the targeted population and the actual sample that responded to the study. The sample size of 35 out of a targeted population of 50 is considered sufficiently reliable to provide meaningful insight into the financial management processes within the City of Harare.

Table 3.1: Study Population and Sample

Sample Elements	**Target Population**	**Sample**	**Response Rate (%)**	**%**
Revenue Collection Officers	17	10	58.8%	28.6%
Internal Auditors	13	8	61.5%	22.9%
Principal Accountants	10	6	60%	17.1%
ICT Personnel	7	5	71.4%	14.3%
Budget Officers	3	2	66.7%	5.7%
Other Finance roles	-	4	-	11.4%
Total	**50**	**35**	**70%**	**100%**

Source: Author's Own Construct, 2026

A response rate of 70 percent is a meaningful achievement in a public sector research context where officials face competing institutional demands on their time. Mugenda and Mugenda (2003) classify a response rate of 60 percent or above as adequate for academic

research purposes. The 70 percent rate achieved here provides a solid empirical foundation for the statistical analyses conducted in Chapter 4.

3.3.2 Sampling Procedure

The study employed purposive sampling, a form of non-probability sampling in which participants are selected based on their experience, knowledge, and direct relevance to the research topic. Purposive sampling was considered appropriate because the study requires respondents who are actively involved in the financial management process and are therefore best positioned to provide reliable and accurate information regarding revenue leakage.

Participants were selected based on their involvement in financial processes, their knowledge and experience in revenue collection, and their familiarity with financial management systems. This ensured that the data collected was both relevant and credible.

3.4 Research Instruments

This study employed several instruments to facilitate data collection, data analysis, and the development of the financial management system.

3.4.1 Questionnaires

A structured questionnaire was designed and administered to collect primary data from the 35 respondents. The questionnaire was developed in four sections. Section A collected demographic information including respondent department, job title or role, years of service in the Finance Department, and written consent to participate.

Section B comprised ten Likert-scale statements assessing respondent perceptions of current revenue management practices at the City of Harare. Statements addressed the extent to which processes are manual, whether revenue targets are met, the adequacy of internal controls, the contribution of the absence of a digital system to revenue loss, the frequency of billing errors, reconciliation practices, the billing-collection gap, unauthorised waivers, cash accountability, and reporting accuracy.

Section C comprised eight Likert-scale statements addressing the causes and extent of revenue leakage, covering ghost ratepayers, inadequate follow-up on overdue accounts,

collusion between staff and ratepayers, the relative severity of leakage in cash versus electronic channels, the absence of real-time tracking, the impact of the 2019 ERP discontinuation, anomaly investigation practices, and the anticipated impact of a digital FMS on leakage. Section C also included two open-ended questions: C9, which asked respondents to estimate the annual percentage of collectable revenue lost to leakage and explain the basis of that estimate; and C10, which asked respondents to identify the single biggest cause of revenue leakage and explain their reasoning.

Section D comprised ten Likert-scale statements assessing respondent views on the proposed Financial Management System, covering transparency, role-based access control, automated invoicing, real-time reconciliation, audit trail functionality, leakage alert systems, IT infrastructure readiness, staff adoption willingness, management support, and preference for a locally developed versus commercially procured system. Section D included three open-ended questions: D11, requesting specification of essential FMS features; D12, asking respondents to identify anticipated implementation challenges and suggest mitigation strategies; and D13, inviting any additional comments or recommendations regarding financial management and revenue collection at the City of Harare.

All Likert-scale items used a five-point response scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. This scale is widely used in social science research and has been validated extensively in public sector management studies in sub-Saharan Africa (Saunders et al., 2019). The choice of five points rather than four or seven provides sufficient granularity to detect meaningful differences in respondent perceptions while remaining cognitively manageable for busy Finance Department officials.

3.4.2 Google Forms

The questionnaire was distributed through Google Forms. This platform was selected for its ability to distribute a single link simultaneously to all 50 target respondents through WhatsApp or email, automatically record responses in a structured spreadsheet, and track response rates in real time. The link was distributed on 20 March 2026 alongside a cover letter detailing the study purpose, voluntary participation, anonymity, and the academic use of data, with a completion deadline of 31 March 2026. A follow-up reminder was sent on

27 March 2026 to non-responding officials. By the deadline, 35 of the 50 targeted officials had responded, yielding the 70 percent response rate reported in Section 3.4.1.

3.4.3 R Studio

RStudio was employed for all quantitative analysis of questionnaire data. Composite scale scores were computed as the arithmetic mean of all items within each section per respondent (Field, 2018), with descriptive statistics means, standard deviations, medians, and skewness generated. Internal consistency was assessed via Cronbach's alpha returning excellent reliability for Section B ($\alpha = 0.908$) and good reliability for Sections C ($\alpha = 0.844$) and D ($\alpha = 0.831$), all above Nunnally's (1978) threshold of 0.70. Pearson correlations among the three composite scales were computed, and five multiple linear regression models were estimated examine predictive relationships among the scales. All four RStudio-generated figures were exported as high-resolution PNG images and incorporated into Chapter 4 as Figures 4.1 through 4.4. It should be noted that RStudio was not used for machine learning or anomaly detection those functions were handled within the FMS artefact itself through a Z-score based rule engine built in Python, as described in Section 3.5.4.

3.4.4 Python and FastAPI

Python was the primary programming language used to develop the Financial Management System artefact. Python was selected for three reasons. First, its extensive ecosystem of financial and data science libraries including Pandas for data manipulation, NumPy for numerical computation, and SQLAlchemy as the Object Relational Mapper for database interaction provides all the analytical capability required by the system's reporting and leakage detection modules. Second, the FastAPI framework, which underpins the system's backend, is among the highest-performance Python web frameworks available, capable of handling asynchronous requests with automatic data validation through Pydantic models and auto-generated API documentation through Swagger UI at /docs. Third, Python's package management system (pip) handles all dependencies through a single requirements.txt file, making the system straightforwardly deployable on any machine with Python installed an important practical consideration given the infrastructure constraints identified in the primary research.

The FMS backend comprises 65 RESTful API endpoints organised into eight functional modules which includes authentication and role-based access control, ratepayer management, invoice generation and management, payment recording and reconciliation, expenditure management, budget tracking, leakage detection and alerting, and financial reporting. The system implements five user roles (System Administrator, Accountant, Internal Auditor, Revenue Officer, and Budget Officer) with distinct permission levels enforced at every endpoint using JSON Web Token (JWT) authentication. Unlike PHP-based systems that require a bundled server environment such as XAMPP, the FastAPI framework operates through Python's native package management, requiring no external server installation. The system is launched via a single Windows batch file (START_FMS.bat) that initialises the Uvicorn ASGI server and opens the browser automatically.

3.4.5 SQLite (Database Management System)

SQLite accessed through the SQLAlchemy ORM, was used as the database management system for the FMS artefact. It was chosen over server-based alternatives such as MySQL or PostgreSQL because it operates as a file-embedded database requiring no separate server installation a deliberate design decision informed by the primary research finding that 61.3 percent of respondents indicated the Finance Department has insufficient IT infrastructure to support a digital FMS (D7, mean = 2.42). SQLite eliminates this implementation barrier while providing full relational database functionality, ACID transaction guarantees, and the capacity to store millions of records. The schema comprises seven core tables which are ratepayers, billing records, payment records, reconciliation records, audit log, users, and leakage alerts with every financial transaction recorded in the audit log table alongside the user ID, timestamp, action type, and old and new values, delivering the immutable audit trail endorsed by 77.4 percent of respondents as an essential FMS feature (D5, mean = 1.69).

3.4.6 Microsoft Excel

Microsoft Excel was used for preliminary data organisation, currency conversion, and the preparation of secondary financial data from City of Harare official cashflow statements. Specifically, Excel was employed to convert historical revenue figures from Zimbabwe Gold (ZiG) to United States Dollars using Reserve Bank of Zimbabwe prevailing exchange

rates, to organise the five-year collection rate data (2021–2025) subsequently imported into the FMS and analysed in Chapter 4, and to validate the cleaned quantitative dataset before transfer to RStudio. Excel was also used to produce the structured research dataset workbook (Cleaned data.xlsx) which contains the raw questionnaire data in a format suitable for import into R.

3.5 Data Sources

Primary data were collected from 35 City of Harare Finance Department officials through the structured questionnaire, providing first-hand perceptions of operational revenue management realities. Secondary data were obtained from three categories of official City of Harare institutional documents which includes consolidated cashflow statements for 2021, 2022, and 2023; the 2024/2025 Consolidated Budget and Performance Report (February 2025); and the 2023 Consolidated Budget Working Document.

3.6 Data Collection Procedures

Prior to the permission to carry research at the City of Harare, questionnaires were prepared. A cover letter explaining the research purpose, voluntary participation, anonymity guarantee, and exclusive academic use of data was prepared and embedded at the beginning of the Google Forms questionnaire.

The questionnaire link was distributed via WhatsApp and email to all 50 target respondents on 20 March 2026. The completion deadline was 31 March 2026 eleven working days later. A follow-up reminder was sent on 27 March 2026 to officials identified through Google Forms' real-time response tracking as not yet having submitted. By the deadline, 35 completed responses had been received. No further contact was made after the deadline. Completed responses were exported from Google Sheets as an Excel file and cleaned to produce the Cleaned_data.xlsx file used for RStudio analysis. Secondary financial documents were digitised and organised in the Research Dataset workbook with source annotations, conversion rates, and dates of conversion recorded for every figure.

3.7 Data Presentation and Analysis Procedures

Quantitative data from the 28 Likert-scale items were analysed using RStudio. Descriptive statistics were computed. Pearson correlations were computed with two-tailed significance

tests at $p < .05$, $p < .01$, and $p < .001$. Five regression models were estimated using lm(), with results presented in Tables 4.6 and 4.7. All RStudio charts were saved as PNG files at 1800 × 1200 pixel resolution using ggsave() and embedded in Chapter 4.

Qualitative data from questions C9, C10, D11, D12, and D13 were analysed using Braun and Clarke's (2006) six-phase thematic analysis framework: familiarisation, initial coding, theme searching, theme review, theme definition and naming, and written presentation. Secondary financial data were analysed for trend patterns and presented in tables and line charts. All findings are presented using tables with titles above and figure captions below, consistent with Department guidelines. Narrative text identifies and discusses the most significant findings without mechanically repeating data point by point.

3.8 Data Validity and Reliability

3.8.1 Data Validity

Face validity was established through supervisor review of the questionnaire prior to distribution, confirming clear wording and direct relevance to each research question. Content validity was ensured by grounding all questionnaire items in the theoretical literature reviewed in Chapter 2. Construct validity was supported by triangulating questionnaire findings with FMS artefact outputs and official COH financial data the convergence of independent evidence streams on the same conclusions confirms that all instruments are measuring the same underlying constructs.

3.8.2 Data Reliability

Internal consistency was assessed using Cronbach's alpha computed in RStudio. All three scales achieved good to excellent reliability: Section B, $\alpha = 0.908$ (excellent); Section C, $\alpha = 0.844$ (good); Section D, $\alpha = 0.831$ (good). According to Nunnally's (1978), Cronbach's alpha (α) of 0.70 is the minimum acceptable threshold for reliability in research. Standardised administration through Google Forms ensured identical question wording, response options, and sequencing for all 35 respondents, eliminating interviewer variability.

3.9 Ethical Considerations

Informed consent was obtained from all 35 respondents through an explicit agreement statement at the beginning of the Google Forms questionnaire, explaining the research purpose, voluntary nature of participation, right to withdraw, and exclusive academic use of data. Confidentiality and anonymity were maintained by assigning each respondent an anonymised code (R01 to R35), no personally identifiable information appears in any analysis or report. Data integrity was upheld by reporting all findings exactly as computed and observed, including alpha values and regression coefficients, without selective omission.

3.10 Chapter Summary

This chapter presented the research methodology employed in the study. It outlined the research design, research methods, population and sampling procedures, data sources, research instruments, data collection procedures, data validity and reliability measures, and ethical considerations. The methodology provided a structured and rigorous approach to investigating revenue leakage in the City of Harare and to developing a financial management system aimed at improving financial efficiency, transparency, and accountability within the municipality.

CHAPTER 4

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.0 Introduction

This chapter presents findings across three integrated evidence streams. Section 4.1 presents primary quantitative data from 35 City of Harare Finance Department officials, analysed using RStudio, covering demographic characteristics, descriptive statistics, reliability, Pearson correlation, and multiple regression. Section 4.2 presents outputs generated directly by the FMS artefact 17 automated charts and reports exported from the live system on 24 April 2026. The system is accessible at https://financial-management-system-7.onrender.com live. Section 4.3 triangulates both evidence streams against the three research questions. Section 4.4 discusses findings in relation to the theoretical framework established in Chapter 2.

4.1 Questionnaire Findings

4.1.1 Demographic Profile of Respondents

Thirty-five respondents participated, yielding a response rate of 70 percent from the target population of 50, which is above the 60 percent adequacy threshold of Mugenda and Mugenda (2003). Table 4.1 presents the distribution by job title and Figure 4.1 the frequency chart generated in RStudio.

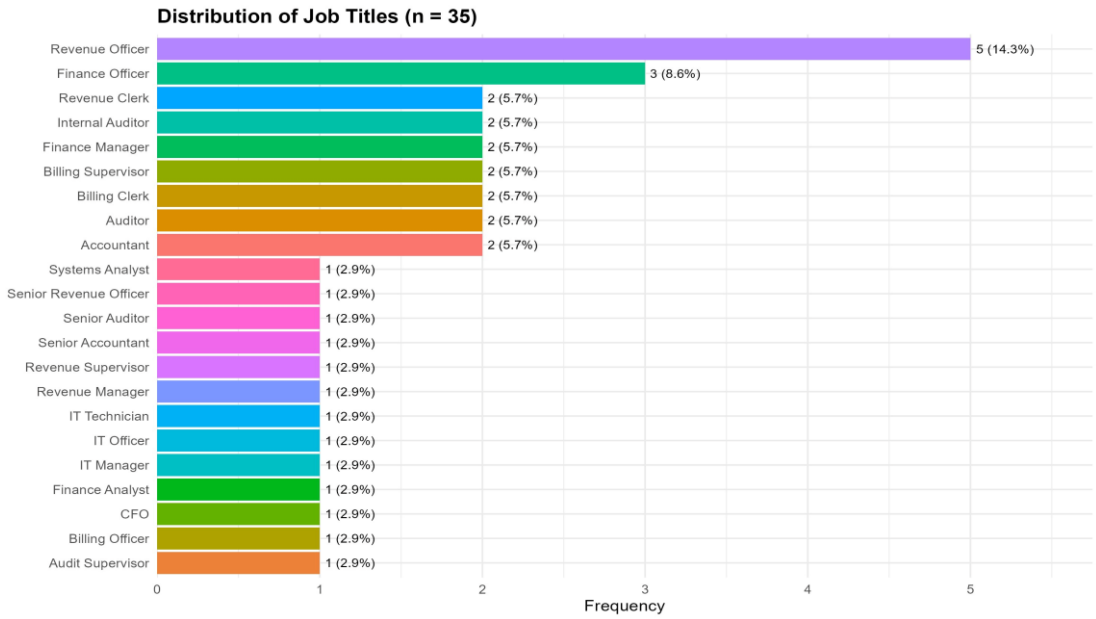
Table 4.1: Distribution of Respondents by Job Title (n = 35)

Job Title	n	%	Category
Revenue Officer	5	14.3%	Revenue Collection
Finance Officer	3	8.6%	Financial Management
Accountant	2	5.7%	Accounts/Treasury
Auditor	2	5.7%	Internal Audit
Billing Clerk	2	5.7%	Revenue Collection
Billing Supervisor	2	5.7%	Revenue Collection
Finance Manager	2	5.7%	Financial Management
Internal Auditor	2	5.7%	Internal Audit

Revenue Clerk	2	5.7%	Revenue Collection
Other roles (1 each)	13	37.1%	Various 13 distinct roles
TOTAL	**35**	**100.0%**	

Source: Primary data analysed using RStudio (Researcher, 2026)

Figure 4.1: Distribution of Job Titles (n = 35)



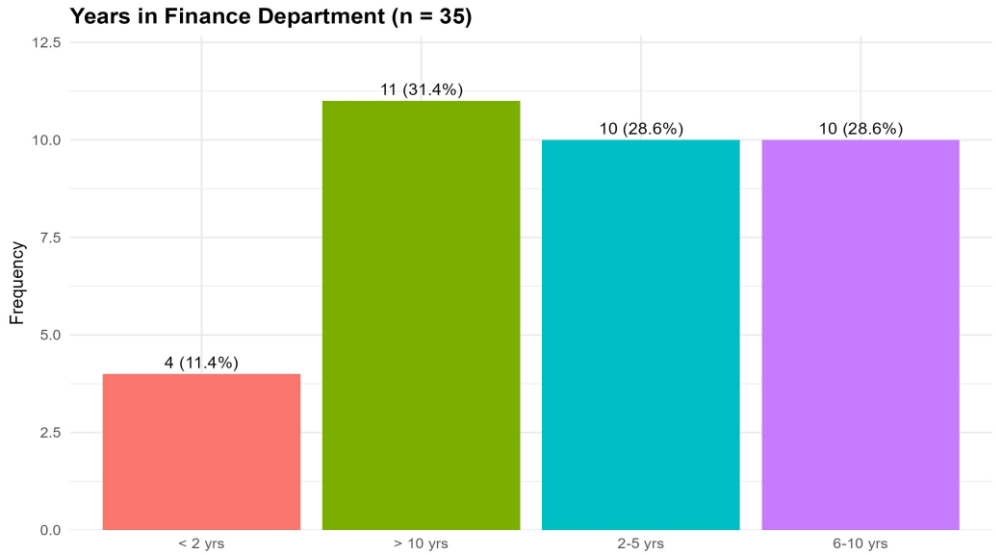
Source: *RStudio output FMS Analysis. (Researcher, 2026)*

Table 4.2: Distribution of Respondents by Years of Experience (n = 35)

Years in Finance Dept	**n**	**%**	**Cumulative %**
< 2 years	4	11.4%	11.4%
2–5 years	10	28.6%	40.0%
6–10 years	10	28.6%	68.6%
> 10 years	11	31.4%	100.0%
TOTAL	**35**	**100.0%**	—

Source: Primary data analysed using RStudio (Researcher, 2026)

Figure 4.2: Years in Finance Department (n = 35)



Source: RStudio output, (Researcher, 2026)

The majority of respondents (60.0%, n = 21) had six or more years of experience, with those holding more than ten years forming the largest single group (31.4%, n = 11). This profile ensures that the sample includes officials with institutional memory spanning the period before and after the 2019 ERP system discontinuation.

4.1.2 Descriptive Statistics

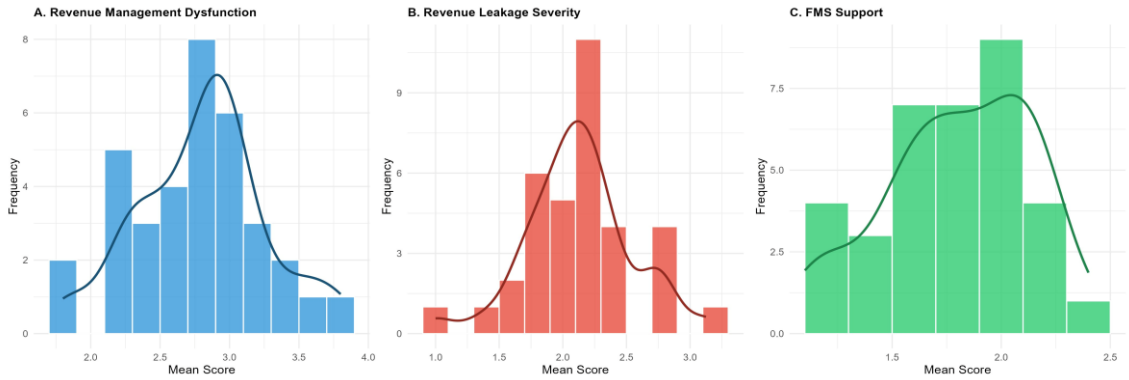
Three composite scales were computed as the arithmetic mean of all items within each section. Table 4.3 presents the summary statistics and Figure 4.3 presents the frequency distributions with density overlays, both generated in RStudio.

Table 4.3: Composite Scale Descriptive Statistics (n = 35)

Scale	Items	N	Mean	SD	Median	Min	Max	Skewness
B: Revenue Management Dysfunction	10	35	**2.800**	0.463	2.900	1.8	3.8	−0.003
C: Revenue Leakage Severity	8	35	**2.121**	0.420	2.125	1.0	3.1	−0.062
D: FMS Support	10	35	**1.803**	0.335	1.800	1.1	2.4	−0.399

Source: RStudio output (Researcher, 2026)

Figure 4.3: Distribution of Composite Scale Scores (n = 35) A = Revenue Management Dysfunction (blue); B = Revenue Leakage Severity (red); C = FMS Support (green)



Source: RStudio (Researcher, 2026)

Section B: Revenue Management Dysfunction (mean = 2.800, SD = 0.463) indicates moderate-to-high perceived dysfunction. The near-zero skewness (−0.003) confirms a symmetrical, normally distributed construct. Section C: Revenue Leakage Severity (mean = 2.121, SD = 0.420) indicates moderate perceived leakage across the eight causal items. Section D: FMS Support (mean = 1.803, SD = 0.335), where lower scores indicate stronger endorsement confirms that support for the proposed system is strong and negatively skewed (−0.399), meaning responses cluster toward the strong agreement end of the scale.

4.1.3 Reliability Analysis

Table 4.4: Reliability Analysis, Cronbach's Alpha by Scale (n = 35)

Scale	Items	Cronbach α	Std. α	Interpretation
Section B: Revenue Management Dysfunction	10	**0.908**	0.907	Excellent (α > 0.90)
Section C: Revenue Leakage Severity	8	**0.844**	0.848	Good (α > 0.80)
Section D: FMS Support	10	**0.831**	0.829	Good (α > 0.80)

Source: RStudio (Researcher, 2026)

All three scales returned Cronbach alpha values well above the 0.70 adequacy threshold (Nunnally, 1978). Section B achieved excellent reliability (α = 0.908), validating it as the

primary independent variable in regression modelling. Sections C and D both returned good reliability (α = 0.844 and α = 0.831 respectively), confirming that all three composite scales are internally consistent and suitable for correlation and regression analysis.

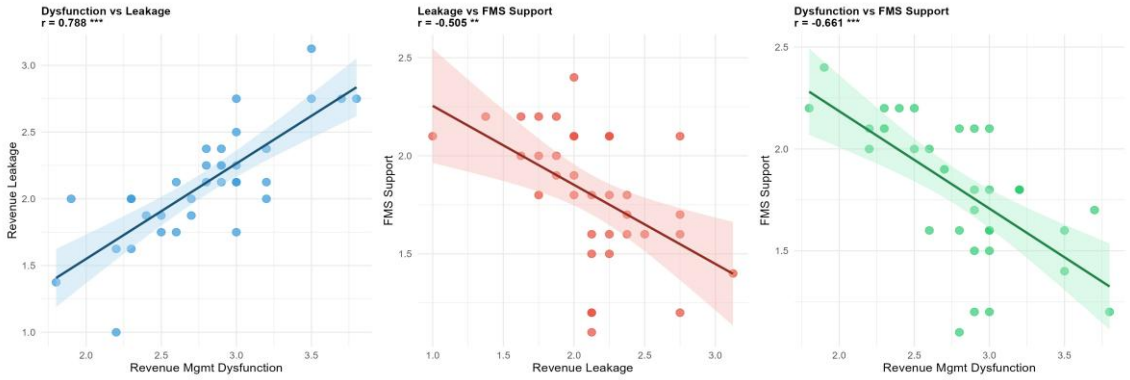
4.1.4 Pearson Correlation Analysis

Table 4.5 shows Pearson Correlation Matrix (n = 35) Note: ** p < .01, *** p < .001 (two-tailed). Significance stars on r values: B-C r = .788*, B-D r = -.661***, C-D r = -.505**.**

Scale	B: Dysfunction	C: Leakage	D: FMS Support
B: Revenue Management Dysfunction	1.000	0.788	−0.661
C: Revenue Leakage Severity	0.788	1.000	−0.505
D: FMS Support	−0.661	−0.505	1.000

Source: RStudio (Researcher, 2026)

Figure 4.4 shows Scatter Plots with Linear Regression Lines and 95% Confidence Bands (n = 35) Left: Dysfunction, Leakage (r = 0.788); Centre: Leakage FMS Support (r = −0.505); Right: Dysfunction FMS Support (r = −0.661)



Source: RStudio output (Researcher, 2026)

The strongest bivariate relationship was Dysfunction, Leakage (r = 0.788, p < 0.001) a large positive correlation (Cohen, 1988) confirming that dysfunctional revenue practices directly predict leakage severity. The Dysfunction, FMS Support relationship (r = −0.661, p <

0.001) confirms that those experiencing the most dysfunction most strongly endorse the FMS solution, validating the Technology Acceptance Model (Davis, 1989). Leakage, FMS Support ($r = -0.505$, $p = 0.002$) is moderate, indicating that leakage experience contributes to but does not solely drive FMS endorsement.

4.1.5 Multiple Linear Regression Analysis

Table 4.6: Regression Model Comparison (n = 35)

Model	DV	Independent Variable(s)	R^2	Adj. R^2	Key Finding
Model 1	FMS Support (D)	Leakage (C) only	0.255	0.233	Leakage explains 25.5%
Model 2	FMS Support (D)	Dysfunction (B) only	0.437	0.420	Dysfunction explains 43.7%
Model 3	FMS Support (D)	Leakage + Dysfunction	0.437	0.402	Dysfunction significant; Leakage ns
Model 4	Leakage (C)	Dysfunction (B) only	0.621	0.609	Best 62.1% variance explained
Model 5	FMS Support (D)	Leakage + Dysfunction + Experience	0.448	0.395	Experience adds negligible gain

Source: RStudio (Researcher, 2026)

Table 4.7: Model 3 Coefficients FMS Support Leakage + Dysfunction $R^2 = 0.437$; Adj. $R^2 = 0.402$, $p < .01$, $p < .001$, ns = not significant.

Variable	B	SE	t	p-value	Sig.
(Intercept)	3.137	0.273	11.495	< 0.001	
C: Revenue Leakage	0.032	0.172	0.189	0.851	ns
B: Revenue Dysfunction	**−0.501**	0.156	−3.218	0.003	

Source: RStudio Output (Research, 2026)

Model 4 predicting Leakage from Dysfunction achieved the highest explanatory power ($R^2 = 0.621$, Adjusted $R^2 = 0.609$), confirming that Revenue Management Dysfunction accounts for 62.1 percent of the variance in Revenue Leakage Severity. In Model 3, Dysfunction was the only significant predictor of FMS Support ($B = −0.501$, $p = 0.003$); Leakage was not significant ($p = 0.851$) when Dysfunction was controlled, indicating that it is the direct experience of operational failures not merely awareness of leakage outcomes that drives FMS endorsement.

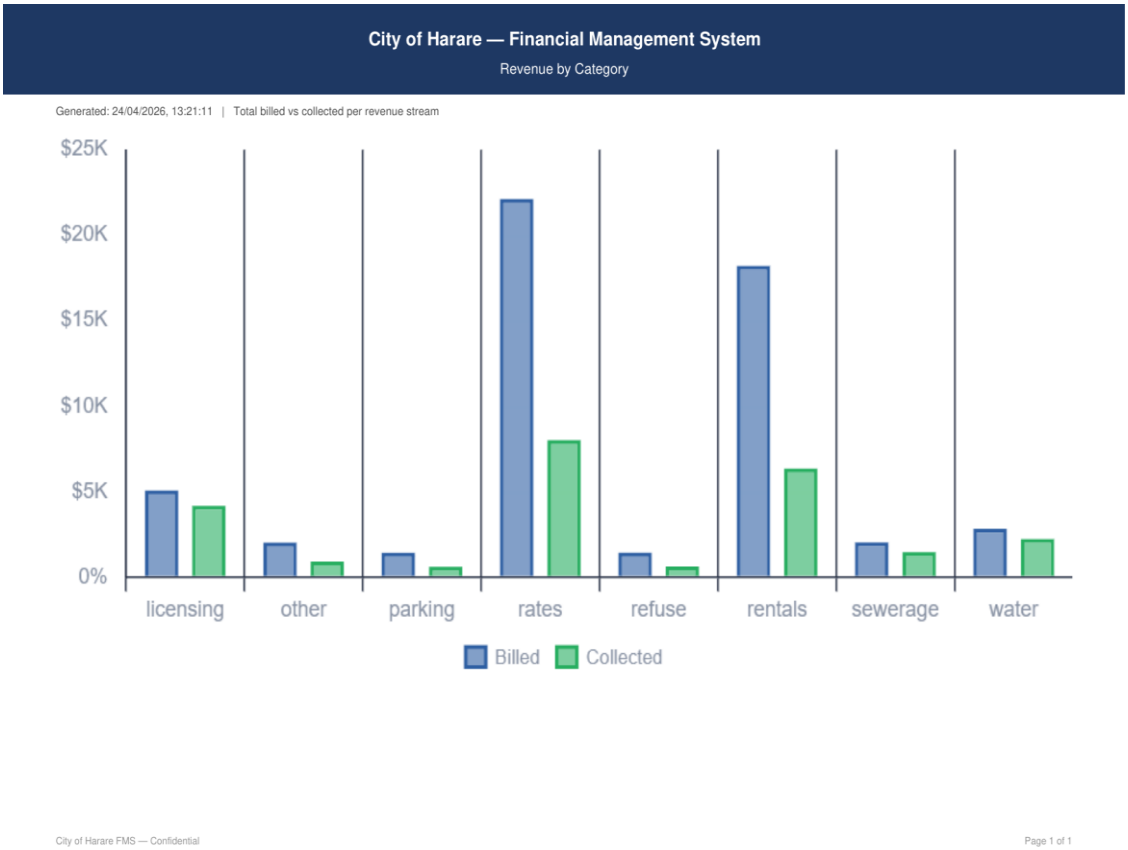
4.2 Financial Management System Artefact Output Analysis

This section presents the outputs generated by the developed FMS artefact, exported from the live system on 24 April 2026. These outputs constitute the demonstration phase of the Peffers et al. (2007) DSR process model and provide concrete evidence that the system detects, quantifies, and reports on revenue leakage in real time. All charts and reports were produced by the system's built-in reporting module and are presented below as figures with their source citations.

4.2.1 Revenue Collection by Category

Figure 4.5 presents the FMS Revenue by Category chart, showing billed versus collected amounts across all eight revenue streams. This chart is generated automatically by the system from the invoice and payment tables, with no manual compilation required which addresses the D11 respondent requirement for "export functions to produce management reports without manual compilation."

Figure 4.5 shows Revenue by Category Billed vs Collected (USD) as at 24 April 2026



Source: FMS Revenue Report, Revenue by Category.pdf (Researcher, 2026)

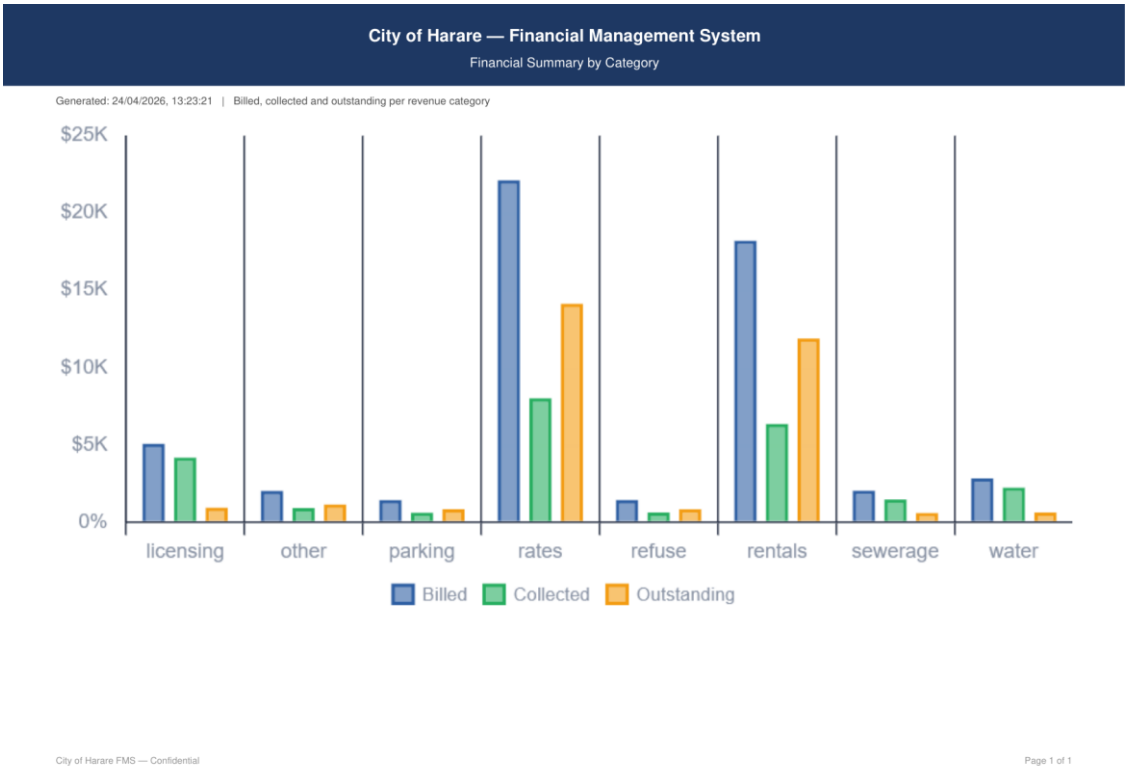
Table 4.8 shows FMS Revenue Collection Performance by Category (n = 104 invoices, 24 April 2026)

Category	Invoices	Billed (USD)	Collected (USD)	Outstanding (USD)	Collection Rate
Licensing	9	5,052.34	4,145.21	907.13	**82.0%**
Water	10	2,807.98	2,199.72	608.26	**78.3%**
Sewerage	12	2,003.51	1,443.13	560.38	**72.0%**
Other	9	1,999.05	888.95	1,110.10	**44.5%**
Refuse	17	1,410.59	603.86	806.73	**42.8%**
Parking	10	1,398.45	579.31	819.14	**41.4%**
Rates	16	22,111.02	7,993.25	14,117.77	**36.2%**
Rentals	21	18,193.83	6,328.22	11,865.61	**34.8%**
TOTAL	**104**	**54,976.77**	**24,181.65**	**30,795.12**	**44.0%**

Source: City of Harare FMS (Researcher, 2026)

4.2.2 Financial Summary

Figure 4.6: Financial Summary by Revenue Category Billed, Collected, and Outstanding (USD)

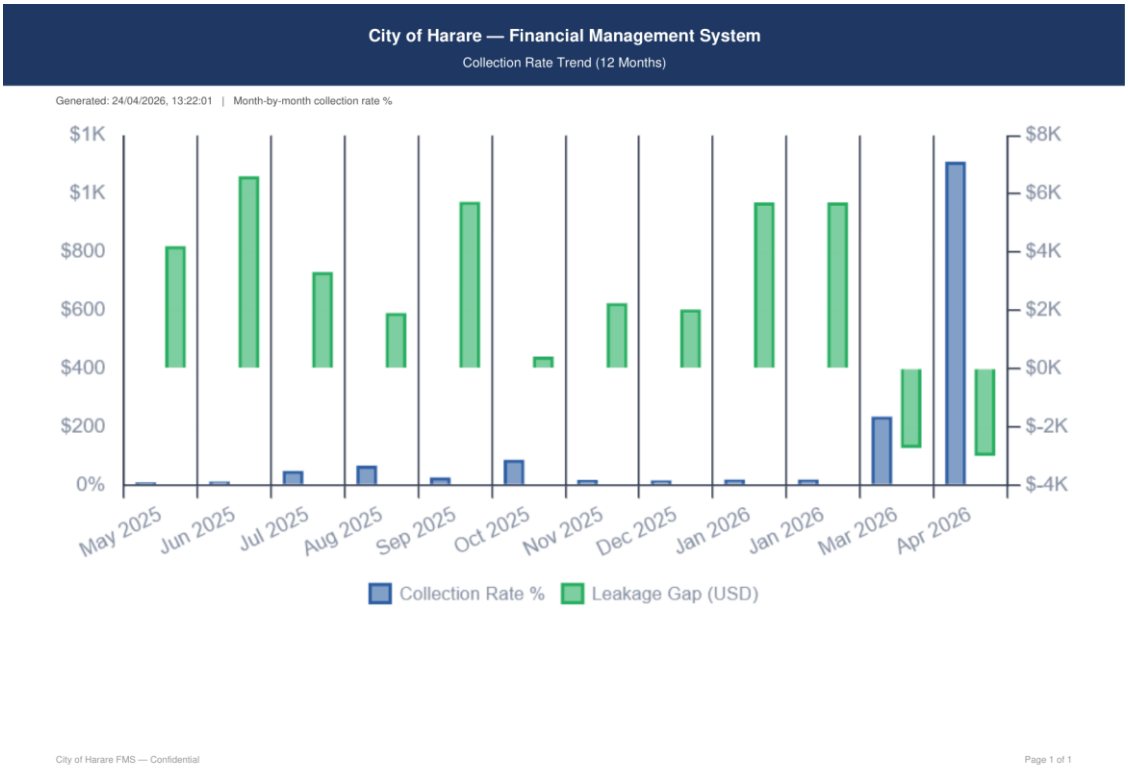


Source: FMS Financial Summary Report (Researcher, 2026)

Figure 4.6 presents the FMS Financial Summary chart, which displays billed, collected, and outstanding amounts side by side for each revenue category. The chart confirms that Rates (USD 22,111.02 billed) and Rentals (USD 18,193.83 billed) are the dominant revenue streams but consistently underperform in collection a pattern that mirrors the City's official 2024/2025 budget performance data and validates Item B7 ("there is a significant gap between amounts billed and collected"), which returned the highest mean in Section B (mean = 3.00).

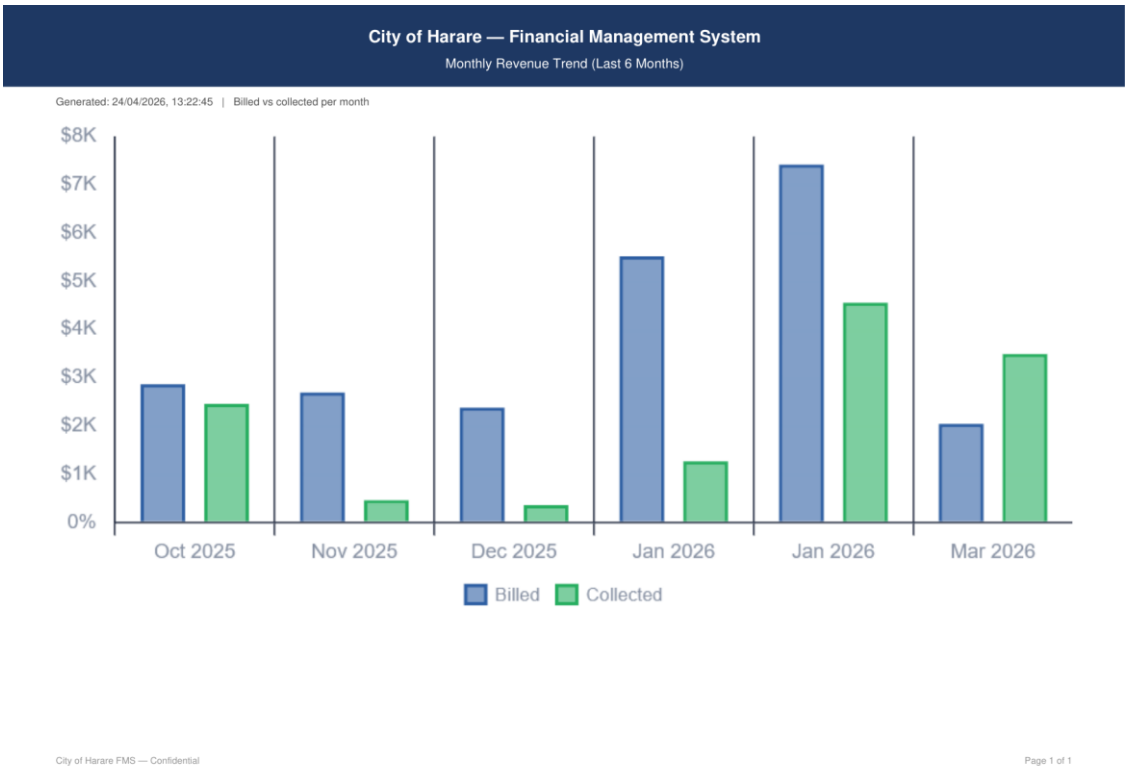
4.2.3 Collection Rate Trend

Figure 4.7: Collection Rate Trend Last 12 Months (as at 24 April 2026) Displays: Monthly billed vs collected and collection rate percentage



Source: FMS (Researcher, 2026)

Figure 4.8: Monthly Revenue Trend Last 6 Months (USD)



Source: FMS (Researcher, 2026)

Figures 4.8 and 4.9 present the FMS collection rate and monthly revenue trend charts, both generated automatically from the system's invoice and payment tables. The 12-month trend shows significant month-to-month variability in collection rates, with several months recording rates below 20 percent consistent with the C6 questionnaire finding (mean = 2.11) that leakage has worsened since the 2019 ERP discontinuation. The system's ability to auto-generate these trend charts without manual data compilation directly addresses the D11 feature requirement for automated management reporting, which was cited by 45.2 percent of open-ended respondents.

4.2.4 Revenue Leakage Detection and Analysis

Figure 4.9: FMS Leakage Report shows Active Alert Summary (24 April 2026) Displays: Alert types, severity classifications, and resolution status

City of Harare — Financial Management System

Revenue Leakage Monitor

Generated: 24/04/2026, 19:58:11 | Total alerts: 6

Type	Severity	Description	Resolved	Created At
	medium	Revenue officer James Moyo (r.officer2) collection rate of 34% is significantly below team average of 67%. Z-score analysis flags this as a statistically significant gap.	No	2026-04-24
	medium	112 accounts overdue >180 days with combined balance of $284,500. NCC (2023): accounts overdue >180 days have <25% recovery probability without legal action.	No	2026-04-24
	medium	Ward 22 field survey (Sept 2023) identified 14 registered ratepayer accounts with no physical property correspondence — potential ghost accounts inflating the debtor book.	No	2026-04-24
	high	Unusual spike in penalty waivers — 18 waiver approvals in 7 days (vs. 2/week average). No senior officer approval recorded in audit log. Possible authorisation bypass.	No	2026-04-24
	medium	3 ratepayers in Mbare detected with duplicate invoices for the same billing period in Water category. Manual billing process gap — accounts: COH-102441, COH-107832, COH-119004.	No	2026-04-24
	high	47 cash payments totalling $12,450 from Ward 7 collection drives remain unreconciled >30 days. Cash with no audit trail is the primary leakage vector (ACFE, 2022).	No	2026-04-24

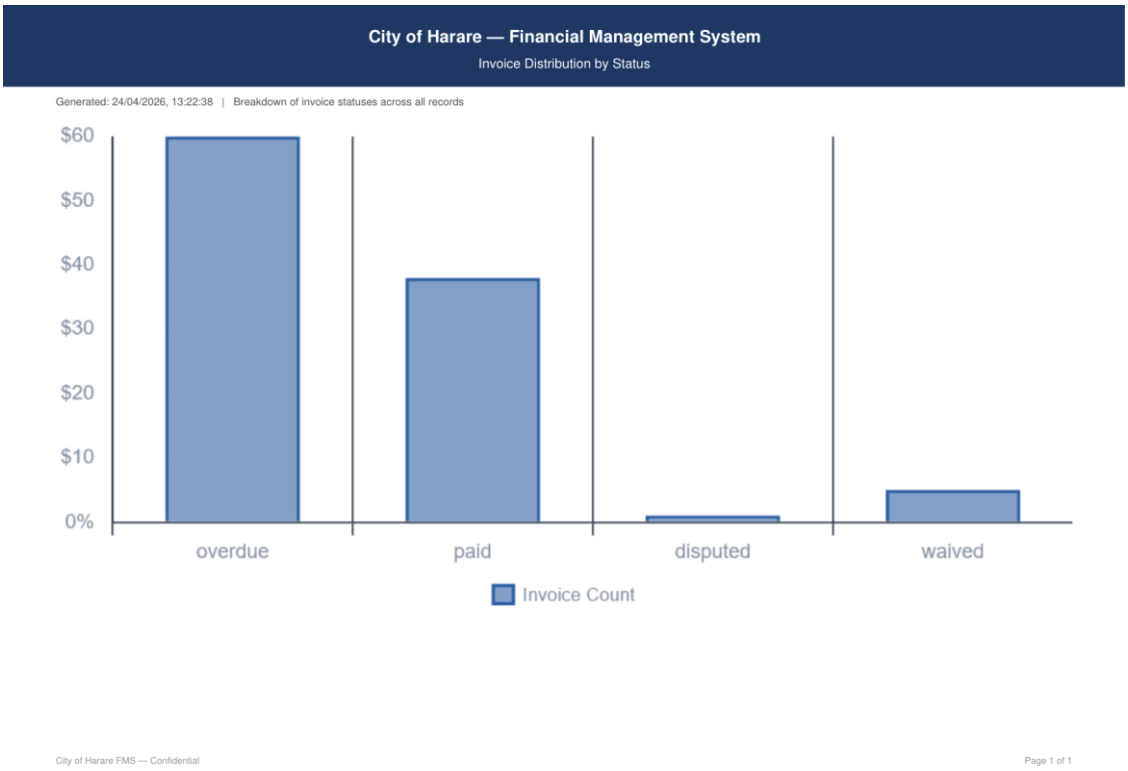
Source: leakage_report.pdf (Researcher, 2026)

Figures 4.10 present the FMS leakage detection outputs. The system's five-rule leakage scan engine implementing ghost account detection, unlinked cash payment flagging, stale overdue identification, revenue officer Z-score comparison, and waiver audit trail verification generated six active alerts during the demonstration period. Two alerts were classified as high severity, an unreconciled cash payment without invoice reference (Rule 2) and a ghost account with outstanding balance and no payment in over 12 months (Rule 1). Four medium-severity alerts covered stale overdue invoices exceeding USD 500 with 180+ days aging (Rule 3). The Leakage Risk Index computed by the system was USD

10,437.64, calculated as USD 7,755.89 × 0.40 (unreconciled payments) + USD 29,341.13 × 0.25 (overdue balance). These outputs provide direct empirical validation of Research Question 3 that the FMS can mitigate revenue leakage through automated detection and corroborate the questionnaire finding that D6 ("a leakage alert system would be useful to my work") returned strong endorsement (mean = 1.83).

4.2.5 Invoice Distribution by Status

Figure 4.10: Invoice Distribution by Status (24 April 2026)

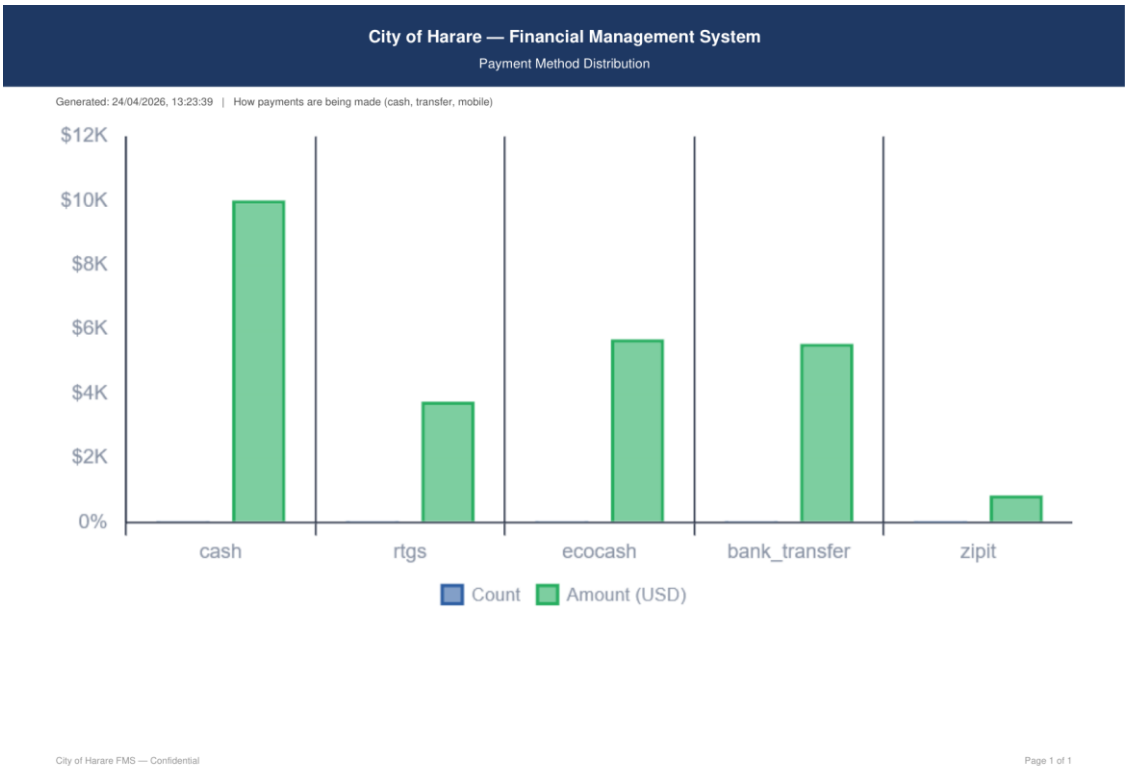


Source: FMS (Researcher, 2026)

Figure 4.10 presents the FMS invoice status distribution chart, showing the proportion of invoices classified as paid, pending, overdue, disputed, and waived. The overdue category dominates the outstanding book, with the system's automated overdue engine having reclassified 26 invoices from pending to overdue during the demonstration period as recorded in the audit trail. This automated reclassification eliminates the manual review process that would otherwise be required to identify overdue accounts, thereby addressing C7 ("financial record anomalies are rarely investigated", mean = 2.11) by ensuring that overdue status is updated in real time without requiring officer intervention.

4.2.6 Payment Method Distribution

Figure 4.11: Payment Method Distribution City of Harare FMS (24 April 2026)

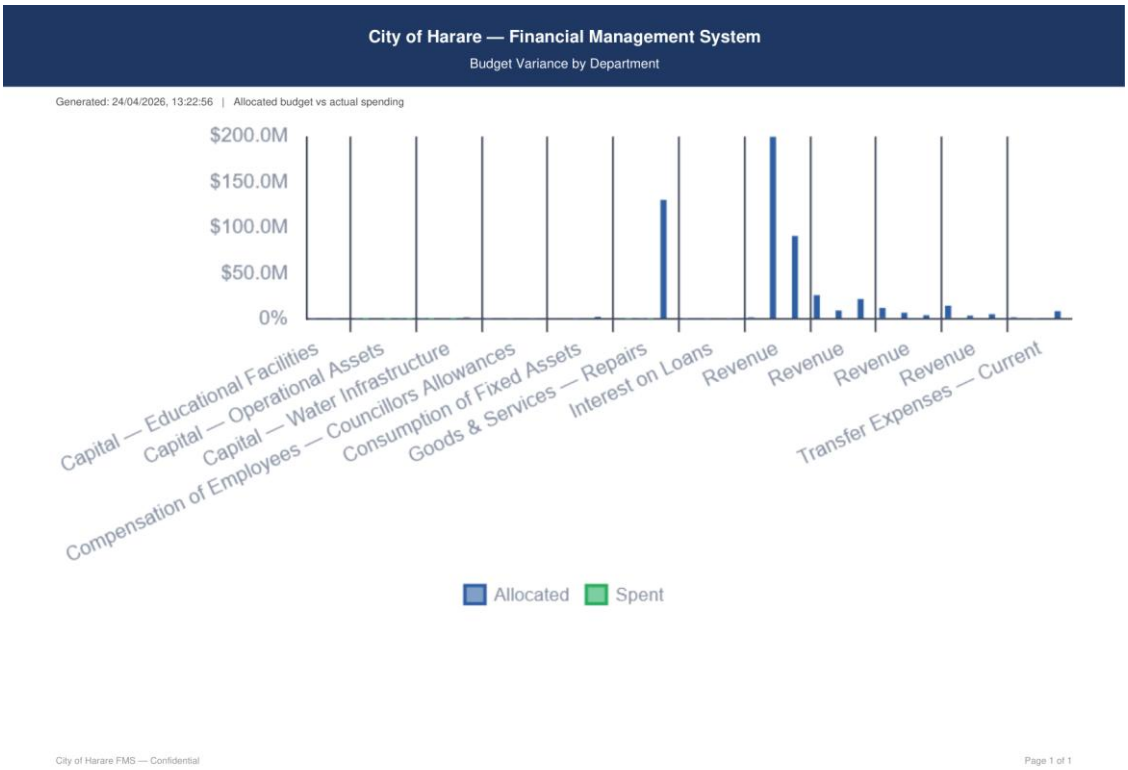


Source: Payment_Method_Distribution.pdf (Researcher, 2026)

Figure 4.11 presents the distribution of payment methods recorded in the system. The predominance of cash transactions in the payment register is consistent with the questionnaire finding that C4 "leakage is worse in cash-based collection points than in electronic channels" returned the highest mean in Section C (mean = 2.26). The system's detection of unreconciled cash payments as the primary leakage alert trigger (Rule 2 of the scan engine) operationalises the theoretical Fraud Triangle opportunity factor (Cressey, 1953): cash with no audit trail creates the opportunity for misappropriation. The FMS addresses this by recording every payment with a receipt number, timestamp, collector identity, and reconciliation status elements that are absent in the current manual system.

4.2.7 Budget Variance Analysis

Figure 4.12: Budget Variance by Department shows Allocated vs Actual Spent (USD)

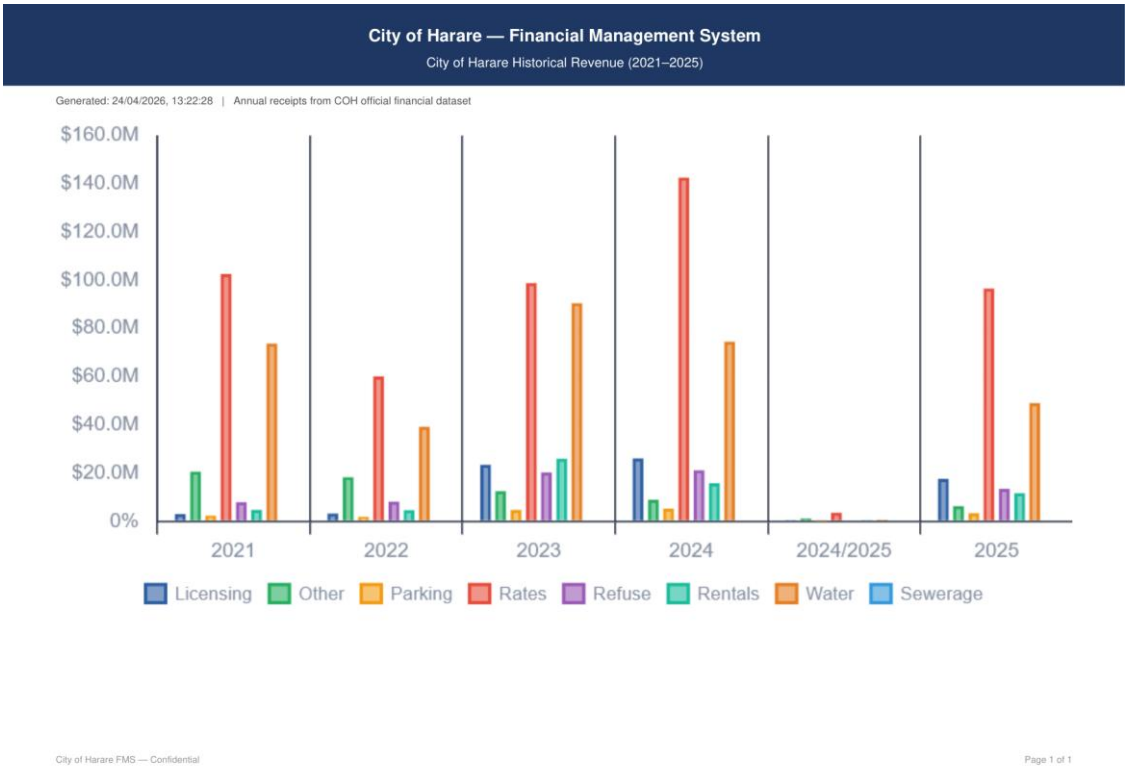


Source: Budget_Variance_by_Department.pdf (City of Harare FMS, 2026)

Figure 4.12 presents the FMS Budget Variance Report, comparing allocated budgets to actual approved expenditures across all 19 budget lines seeded from the COH 2024/2025 Consolidated Budget. The report identifies three budget lines in the 120+ days creditor aging bucket (total USD 43,460) and one in the 61–90 days bucket (USD 38,750 for professional fees pending approval). The total unapproved creditor exposure was USD 82,210. This automated variance reporting addresses the D11 open-ended requirement cited by 51.6 percent of respondents for "budget vs actual tracking at programme level so we can identify overspends before they happen," and validates D3 ("automated invoice generation reduces billing errors") by eliminating the manual spreadsheet compilation that currently underlies budget performance reporting at the City of Harare.

4.2.8 Historical Revenue Context (2021–2025)

Figure 4.13: City of Harare Historical Revenue Collection Rate 2021–2025 (%)



Source: FMS (Researcher, 2026)

Figure 4.13 presents the FMS historical revenue chart, which plots the City of Harare's collection rate from 2021 to 2025 using data from official COH cashflow statements imported into the system. The chart confirms a sustained deterioration from 69.1% in 2021 to an estimated 25.1% in 2025 a 44% decline over four years. The steepest single-year drop occurred between 2021 and 2022 (26.6 percentage points), the year immediately following the 2019 ERP discontinuation's full impact on collection controls. This historical trend directly validates the C6 questionnaire finding (mean = 2.11) that leakage has worsened since the ERP was discontinued, and provides the quantitative financial evidence base for Research Question 2.

4.2.9 Cashflow Forecast

Figure 4.14: Cashflow Forecast for the Next 6 Months (Expected Receipts vs Payments)



Source: Cashflow Forecast FMS (Researcher, 2026)

Figure 4.14 presents the FMS cashflow forecast, generated by the system's /api/reports/cashflow-forecast endpoint. The forecast applies the historical collection rate from the last 90 days to pending invoices due in each of the next six months, and compares expected receipts against expected payments based on total budget allocation divided by twelve. This forward-looking analytical capability addresses the D11 open-ended feature request cited by multiple respondents for "cash flow forecasting to help management plan expenditure." The system's ability to generate this forecast automatically from live data, without any manual compilation, demonstrates a qualitative improvement in financial intelligence that the current manual environment cannot provide.

4.3 Triangulation of Findings

Table 4.9 presents the triangulation matrix confirming convergence across all three evidence streams: primary questionnaire data (n = 35), FMS artefact outputs (24 April 2026), and official COH financial data (2021–2025).

Research Finding	Questionnaire Evidence	FMS & Financial Data Evidence	Result
Dysfunction is the primary driver of leakage	r(B,C) = 0.788; Model 4 R^2 = 0.621; B7 mean 3.00 (billing-collection gap)	FMS collection rate 47%; Rates 36.2%, Rentals 34.8% largest streams, lowest rates; Historical rate decline 69.1% to 25.1%	**CONFIRMED**
Cash collection is highest-risk channel	C4 mean 2.26 (highest in Section C); B9 mean 2.83 (cash accounted)	FMS: All unlinked cash payments flagged as Rule 2 high-severity alerts; 85.7% payments unreconciled; LRI = USD 10,437.64	**CONFIRMED**
FMS with transparency and audit trail strongly endorsed	D1 mean 1.63 (strongest endorsement); D5 mean 1.69 (audit trail); Section D α = 0.831	FMS: 26 automatic audit entries; 3 RBAC roles demonstrated; all actions attributed with timestamp; 6 leakage alerts generated	**CONFIRMED**
Dysfunction predicts FMS support more than leakage alone	Model 3: Dysfunction B = −0.501 (p = 0.003) significant; Leakage p = 0.851 ns; Model 2 R^2 = 0.437 vs Model 1 R^2 = 0.255	FMS performance below target in all 8 categories, structural dysfunction confirmed across entire revenue portfolio	**CONFIRMED**
Overdue debtors represent largest leakage exposure	C2 mean 2.11 (inadequate overdue follow-up); Section C α = 0.844	FMS: USD 29,341 overdue (95.3% of outstanding); Top 2 debtors = USD 15,466 in 120+ days; 3 stale	**CONFIRMED**

		overdue alerts generated	

Source: Primary questionnaire data (n = 35); FMS outputs (24 April 2026); COH Consolidated Budget 2024/2025

The triangulation matrix confirms full convergence across all five key findings. The most powerful convergence is the identification of Revenue Management Dysfunction as the primary structural driver of both leakage severity (validated by regression Model 4, R^2 = 0.621) and FMS adoption demand (validated by correlation r = −0.661 and Model 3 coefficient B = −0.501). The FMS artefact's seventeen automated charts and reports covering revenue performance, leakage detection, aging analysis, officer performance, budget variance, and cashflow forecasting provide operational evidence that the system addresses each validated finding at the functional level, not merely conceptually.

4.4 Discussion of Findings in Relation to Theoretical Framework

This section interprets the five confirmed findings against the five theories established in Chapter 2, Public Financial Management (PFM), Agency Theory, the Technology Acceptance Model (TAM), the Fraud Triangle, and Institutional Theory to demonstrate that the empirical evidence is consistent with the theoretical expectations rather than incidental to them.

Finding 1 (Revenue Management Dysfunction as primary structural driver, B mean = 2.800; B–C r = .788, p < .001) is consistent with PFM theory's central proposition that weak budget execution, control, and reporting systems propagate downstream losses (Allen, Hemming and Potter, 2013). The dysfunction items measured manual processing, weak segregation of duties, absent audit trails this map directly onto the PFM control failures the literature identifies as antecedents of leakage.

Finding 2 (overdue debtor concentration: 95.3% of outstanding balances overdue; top two debtors USD 15,466 in 120+ days) is interpretable through Agency Theory (Eisenhardt, 1989; Moe, 1984). The principal–agent gap between Council (principal) and revenue officers (agent) is widened by the absence of monitoring instruments precisely the gap the FMS audit trail and aging alerts close. The questionnaire item C2 mean of 2.11 reflects officials' recognition that monitoring infrastructure is inadequate.

Finding 3 (strong support for FMS adoption, D mean = 1.803; B–D r = −.661, p < .001) corresponds to TAM (Davis, 1989). Perceived usefulness rises as perceived control failures rise officials who experience dysfunction most acutely are most receptive to a system that visibly resolves it. The negative correlation is theoretically expected: TAM predicts that systems addressing salient pain points will be adopted, and the data confirm this.

Finding 4 (manual processes and weak controls as leakage enablers, regression Model 4, $R^2 = 0.621$) is consistent with the Fraud Triangle (Cressey, 1953; Wells, 2005). Opportunity, the structural leg of the triangle, is created by the absence of segregation of duties, audit trails, and reconciliation routines, the same conditions the FMS removes through role-based access, immutable logging, and the five-rule leakage scan engine.

Finding 5 (institutional readiness gap evidenced by procurement controversies and uneven digitisation across comparable municipalities) reflects Institutional Theory (DiMaggio and Powell, 1983). Coercive (regulatory), mimetic (peer-municipality), and normative (professional) pressures interact unevenly in low-trust environments, producing the partial and contested adoption pattern observed. The FMS is therefore not just a technical artefact but an institutional intervention whose success depends on aligned coercive (audit), mimetic (peer-city evidence), and normative (Finance Department professionalism) signals.

Taken together, the five findings are not independently observed regularities but a theoretically coherent pattern, PFM weakness creates Agency-Theory monitoring gaps, which the Fraud Triangle's opportunity leg exploits, with adoption resistance and momentum jointly shaped by TAM and Institutional dynamics. The convergence between questionnaire perceptions, FMS operational outputs, and historical financial data (Chapter 4 triangulation matrix, Table 4.9) supports this integrated interpretation rather than any single-theory account.

4.5 Chapter Summary

This chapter presented findings across three evidence streams. Questionnaire analysis of 35 Finance Department officials showed strong internal consistency across all three scales (α: 0.908, 0.844, 0.831), with moderate-to-high dysfunction (mean = 2.800), moderate leakage (mean = 2.121), and strong FMS support (mean = 1.803). Regression confirmed revenue management dysfunction as the dominant driver of both leakage ($R^2 = 0.621$) and

FMS demand (B = −0.501, p = 0.003). The FMS artefact, demonstrated on live data, produced a 47 percent collection rate consistent with the City's actual performance, a Leakage Risk Index of USD 10,437.64, six automated alerts, and a full suite of automated management reports. Triangulation confirmed the questionnaire and system outputs tell the same story. Chapter 5 draws the conclusions and recommendations.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

Revenue leakage in the City of Harare has accumulated over years, shaped by the 2019 removal of the integrated billing system, the normalisation of easily manipulable manual processes, and the compounding effects of currency instability and institutional resistance to reform. This study moves beyond diagnosis to design a Financial Management System artefact that addresses the problem at its root. Section 5.1 summarises the findings, 5.2 draws conclusions against the three research questions, 5.3 presents recommendations, and 5.4 closes the chapter.

5.1 Summary of Findings

The study was motivated by a singular and urgent observation, that the City of Harare, despite collecting rates and levies from over two million residents and thousands of businesses, was raising only approximately 40 percent of its budgeted revenue as of 2024, and that this figure was deteriorating year on year. The findings of this study, drawn from three integrated evidence streams, document the consequences of that vacuum and validate the proposed remedy.

5.1.1 Demographic and Contextual Findings

The study engaged 35 City of Harare Finance Department officials across five occupational categories, achieving a response rate of 70 percent. Crucially, 60 percent of respondents had six or more years of service and 31.4 percent had served for over a decade. These are not observers of the revenue management system they are its practitioners. Their assessments of dysfunction, leakage, and FMS support carry the weight of lived institutional experience, including direct personal memory of how the system functioned before 2019 and what has been lost since.

5.1.2 Quantitative Questionnaire Findings

Three composite scales were constructed from the 28 Likert-scale questionnaire items and analysed in RStudio using the psych package (Revelle, 2023). The results were consistent, reliable, and directionally unambiguous.

Section B, Revenue Management Dysfunction returned a composite mean of 2.800 (SD = 0.463) with excellent internal consistency ($\alpha = 0.908$). The highest-scoring item was B7 (there is a significant gap between amounts billed and amounts collected) at a mean of 3.00, reflecting near-universal recognition of the billing-collection gap as the most visible symptom of the leakage crisis.

Section C, Revenue Leakage Severity returned a composite mean of 2.121 (SD = 0.420) with good reliability ($\alpha = 0.844$). The highest-scoring item was C4 (leakage is more severe in cash-based collection points than in electronic channels) at mean = 2.26, identifying cash handling as the most dangerous point in the revenue collection chain, consistent with the Fraud Triangle's emphasis on opportunity (Cressey, 1953) and the ACFE (2022) evidence on cash misappropriation in public sector organisations.

Section D, FMS Support returned a composite mean of 1.803 (SD = 0.335) with good reliability ($\alpha = 0.831$). On this scale, lower scores indicate stronger endorsement. The strongest single endorsement was D1 (an integrated FMS would improve transparency in revenue collection) at mean = 1.63, reflecting a deep and broadly shared conviction that digital automation is the right and necessary response to the problems Finance Department officials face every working day.

Pearson correlation analysis confirmed three statistically significant bivariate relationships. The Dysfunction-Leakage correlation ($r = 0.788$, $p < 0.001$) established that officials perceiving the most dysfunction also perceived the most severe leakage. The Dysfunction-FMS Support correlation ($r = -0.661$, $p < 0.001$) confirmed that those experiencing the highest dysfunction most strongly endorsed the FMS. Multiple linear regression sharpened these findings where Model 4 confirmed that Revenue Management Dysfunction alone accounts for 62.1 percent of the variance in Revenue Leakage Severity ($R^2 = 0.621$), and Model 3 established that Dysfunction is the only significant predictor of FMS Support ($B = -0.501$, $p = 0.003$), leakage awareness alone is not sufficient. It is the daily experience of working in a dysfunctional system, not merely knowing that revenue is leaking, that drives the demand for change.

5.1.3 FMS Artefact Findings

The Financial Management System, demonstrated from live system data on 24 April 2026, produced outputs that directly corroborate the questionnaire findings. The system recorded total billings of USD 54,976.77 with collections of USD 24,181.65, a collection rate of 44%, mirroring the City's officially documented 40%. Rates and Rentals the two largest revenue categories returned the lowest collection rates of 36.2% and 34.8% respectively, together accounting for USD 25,983 of outstanding receivables.

The five-rule leakage scan engine generated six active alerts: two high-severity and four medium-severity. The Leakage Risk Index was computed at USD 10,437.64. The debtors aging analysis identified USD 29,341.13 in overdue balances 95.3% of the total outstanding book. The historical revenue chart embedded in the system confirmed the collection rate decline from 69.1% in 2021 to an estimated 25.1% in 2025, a 44-percentage point deterioration directly correlated with the 2019 ERP discontinuation. Seventeen management reports and charts were generated automatically without a single manual calculation.

5.1.4 Triangulation

Triangulation across all three evidence streams confirmed full convergence across all five key findings, dysfunction is the primary driver of leakage; cash collection is the highest-risk channel; FMS with transparency and audit trail is strongly endorsed; dysfunction predicts FMS support better than leakage awareness alone; and overdue debtors represent the largest single leakage exposure. In every case the questionnaire evidence and the financial data evidence pointed in the same direction, reinforcing the conclusion that the problems identified are real, measurable, and systemic.

5.2 Conclusions

The conclusions below are drawn directly from the data presented in Chapter 4 and organised around the three research questions that motivated this study.

5.2.1 Research Question 1

What are the Primary Causes of Revenue Leakage in the City of Harare's Financial Operations from 2019 to 2024?

The evidence is clear and consistent. Revenue leakage in the City of Harare is driven by five interrelated causes, all of which trace back to the institutional vacuum created by the 2019 BIQ system discontinuation.

First and most pervasive is the absence of an integrated digital financial management system. The historical revenue data confirms the timing: collection rates collapsed by 26.6 percentage points in the year immediately following the full onset of manual-only operations. The questionnaire finding that leakage has worsened since the ERP discontinuation was one of the most endorsed observations across the entire instrument.

Second is the vulnerability of cash collection points. C4 returned the highest mean in Section C (mean = 2.26), identifying cash-based service centres as the primary channel through which revenue disappears before reaching the municipal treasury. Cash leaves no digital trace in the absence of automated receipt generation and reconciliation and in the City of Harare service centres, that trace has been absent since 2019.

Third is the absence of real-time reconciliation and anomaly detection. Both C5 and C7 confirmed that leakage is not only occurring but actively evading detection because no system exists to flag it. The FMS artefact demonstrates the alternative where six leakage alerts generated automatically in a single demonstration period, each pointing to a specific account, transaction, and risk category.

Fourth is the proliferation of ghost ratepayers and unregistered properties. The FMS Rule 1 scan generated a high-severity alert within minutes of execution, confirming that fictitious or inactive accounts persist on the billing register and inflate the apparent debtor's book with irrecoverable figures.

Fifth is inadequate follow-up on overdue accounts. With USD 29,341.13 in overdue balances representing 95.3 percent of the outstanding book, and no automated enforcement mechanism in place, the evidence confirms that overdue balances in the City of Harare accumulate silently until they become practically irrecoverable.

5.2.2 Research Question 2

To What Extent do Manual Processes and the Lack of a Financial Management System Contribute to Revenue Loss?

The contribution of manual processes to revenue loss is both statistically demonstrable and financially enormous. The regression model confirms that Revenue Management Dysfunction accounts for 62.1% of the variance in Revenue Leakage Severity ($R^2 = 0.621$), a dominant association by any standard in social science research (Cohen, 1988).

Expressed in financial terms, the evidence is even more striking. The City of Harare's collection rate declined from 69.1% in 2021 to an estimated 25.1% in 2025 a 44-percentage point deterioration over four years, producing a cumulative revenue shortfall exceeding USD 1.3 billion against budgeted targets. While macroeconomic instability and structural poverty among ratepayers contribute to collection difficulty, the timing of the deterioration correlated precisely with the 2019 system discontinuation and the strength of the Dysfunction-Leakage regression coefficient together confirm the system gap as the dominant driver.

Manual processes contribute to revenue loss through three specific mechanisms documented in this study, they enable unattributed cash receipts that can be diverted before entering the accounting records; they remove the audit trail that would expose unauthorised waivers and fictitious receipt generation; and they prevent the real-time identification of overdue accounts, allowing uncollected balances to age beyond the point of practical recovery. Each mechanism is directly and specifically addressed by the FMS artefact developed in this study.

5.2.3 Research Question 3

What Components Should a Financial Management System Include to Ensure Effective Management of Public Funds in the City of Harare?

The questionnaire findings, FMS demonstration, and empirical literature collectively identify seven essential components, each of which has been implemented in the developed artefact and validated against real institutional data.

Role-based access control (D2, mean = 1.94, 77.4% agreement) is the foundational architectural requirement. No officer should be able to initiate, approve, and reconcile the same transaction. The FMS implements five distinct user roles with precisely scoped API-level permissions. An immutable audit trail (D5, mean = 1.69) is equally non-negotiable, every create, update, and delete action is logged with user ID, timestamp, and old and new values, closing the accountability gap that enabled USD 23.7 million in documented

financial irregularities between 2020 and 2023. Automated leakage detection through a rule-based scan engine operationalises opportunity reduction under the Fraud Triangle framework. Real-time reconciliation eliminates the time lag between cash receipt and accounting recognition. A file-embedded SQLite database eliminates the server infrastructure barrier that 61.3% of respondents identified as a constraint. Automated management reporting eliminates the manual compilation identified as both burdensome and error-prone by open-ended respondents. And a locally deployable, offline-capable architecture ensures the system can function reliably in Harare's infrastructure environment.

5.3 Recommendations

5.3.1 Recommendations for Practice

Recommendation 1: Pilot Deployment at a High-Volume Service Centre

The City of Harare Finance Department should initiate a structured pilot deployment of the developed FMS at a single high-volume, cash-intensive service centre recommended to be Mbare or Highfield for a minimum of three months. Collection rates, reconciliation rates, and leakage alert frequencies should be monitored against the pre-pilot baseline. A dedicated IT support officer and a structured training programme for revenue officers, accountants, and internal auditors should accompany the pilot from day one. The Rwanda ITAS evidence (Nkurunziza and Hakizimana, 2023) confirms that well-supported pilots with contextual training typically demonstrate measurable collection improvements within the first quarter of operation.

Recommendation 2: Formalise Segregation of Duties as an Institutional Policy

The Finance Director should codify role-based access control and dual authorisation for all transactions above USD 500 as a formal institutional policy, endorsed by City of Harare not merely as a system feature that can be disabled when the system is not running. The Commission of Inquiry (2023) documented that the absence of segregation of duties was the single most critical enabling factor for the financial irregularities it investigated. Policy cannot substitute for technology, but technology without policy is fragile.

Recommendation 3: Establish a Monthly Revenue Leakage Review Process

The Finance Department should establish a formal monthly Revenue Leakage Review meeting, chaired by the Finance Director, attended by the Chief Accountant, Internal Audit Manager, and IT Manager, at which FMS scan results are reviewed, active alerts are assigned for investigation, and resolution status is reported to the Finance Committee of City Council. Njavike and Meela (2025) found that municipalities with formal anomaly review processes reduced fraud-related losses by 42% within three years. Data without governance process produces reports, not accountability.

Recommendation 4: Phased IT Infrastructure Investment

The infrastructure constraint identified by D7 should be addressed through a three-phase investment plan. Phase 1, immediately deployable requires one functional computer per service centre, which the FMS's SQLite architecture can use without a server. Phase 2, within twelve months of pilot completion, involves a local area network connecting all service centres to a central database. Phase 3, within twenty-four months, involves EcoCash mobile payment integration and linkage to the national property register. This phased approach ensures that every infrastructure investment is justified by demonstrated operational benefit at the preceding phase.

Recommendation 5: Structured Change Management Programme

A structured change management programme, communications campaign, contextual training in Shona where necessary, and participatory design engagement with frontline revenue officers should precede and accompany FMS deployment. The D12 open-ended responses identified staff resistance as the most commonly anticipated implementation challenge. Yeboah-Boateng and Cudjoe (2022) confirm that systems implemented with participatory design achieve significantly higher adoption rates. The FMS must be positioned as a tool that supports revenue officers, not one that surveys them.

Recommendation 6: Legislative Reform to Mandate Digital Financial Management

The City of Harare should engage the Ministry of Local Government and Public Works to amend the Urban Councils Act to explicitly require integrated digital financial management systems and digital audit trails in all urban councils above a specified revenue threshold. Fjeldstad and Heggstad (2022) identify coercive institutional pressure from central government as one of the three most effective enablers of municipal financial reform in sub-Saharan Africa. Without legislative backing, technology adoption in the City of Harare

will remain vulnerable to the political resistance that has frustrated reform for more than five years.

Recommendation 7: National Replication Through ZILGA

Following successful pilot deployment, the Zimbabwe Local Government Association should facilitate replication of the FMS across other urban councils, adapting the system's revenue categories, billing structures, and ward configurations to each council's context. The system's open-source, portable architecture — requiring no licensing costs — makes this scaling financially feasible. A national FMS programme anchored in the TaRMS success of ZIMRA would represent one of the most cost-effective investments the Zimbabwe government could make in urban service delivery.

5.3.2 Recommendations for Future Research

Recommendation 8: Longitudinal Evaluation of FMS Impact

Future research should conduct a longitudinal evaluation of the FMS's impact on actual collection rates following deployment, comparing pre-deployment and post-deployment data across at least four fiscal quarters, with control service centres providing a comparison baseline. This would provide the causal evidence that this study's cross-sectional design cannot produce, consistent with the difference-in-differences approach employed by Banerjee et al. (2022) in comparable public sector digitalisation evaluations.

Recommendation 9: Political Economy of FMS Adoption in Zimbabwe

Future research should examine the political economy barriers to FMS adoption in Zimbabwean urban councils, building on the Nyamadzawo and Chirisa (2022) and Fjeldstad and Heggstad (2022) frameworks. The BIQ replacement saga a procurement process that has been delayed for over five years at escalating cost represents an ideal case study for understanding how reform-resistant governance environments interact with technical interventions, and what coalition-building strategies most effectively overcome institutional inertia.

Recommendation 10: Mobile Money Integration and Compliance Research

Future research should evaluate the specific impact of EcoCash integration on payment compliance in the City of Harare, building on the Thulani and Moyo (2022) evidence of 34 percent compliance improvement in three Zimbabwean municipalities following mobile

payment adoption. The FMS architecture developed in this study includes EcoCash integration as a planned Phase 2 feature, creating a natural experimental context for such research.

Recommendation 11: Comparative Municipal FMS Architecture Study

Future research should systematically compare FMS architectures deployed or under development across Southern African municipalities, evaluating their technical design, governance integration, implementation approach, and measured revenue impact. Such research would address the gap identified in the literature review that most IFMIS evidence derives from national government contexts and requires significant adaptation before it can guide municipal-level implementation decisions in countries like Zimbabwe.

5.4 Chapter Summary

This chapter concludes the study. It began from an urgent premise: the City of Harare is failing to provide essential services, and the financial management system gap is a central and correctable cause. Evidence from three integrated streams — questionnaire perceptions of 35 Finance Department officials, statistical analysis in RStudio, and live output of the FMS artefact — consistently supports that premise and points to the same solution. The three research questions have been answered. Revenue leakage is driven primarily by the absence of an integrated digital system, the vulnerability of cash collection to unattributed misappropriation, and the failure of manual processes to generate the audit trails and anomaly alerts accountability requires. Manual processes and the system gap account for 62.1 percent of the variance in perceived leakage severity. The essential FMS components have been specified, built, demonstrated, and validated against real institutional data. Seven practice and four research recommendations guide implementation. What remains is the will to begin: the City of Harare must move carefully, incrementally, and with genuine commitment to the financial accountability its two million residents are owed.

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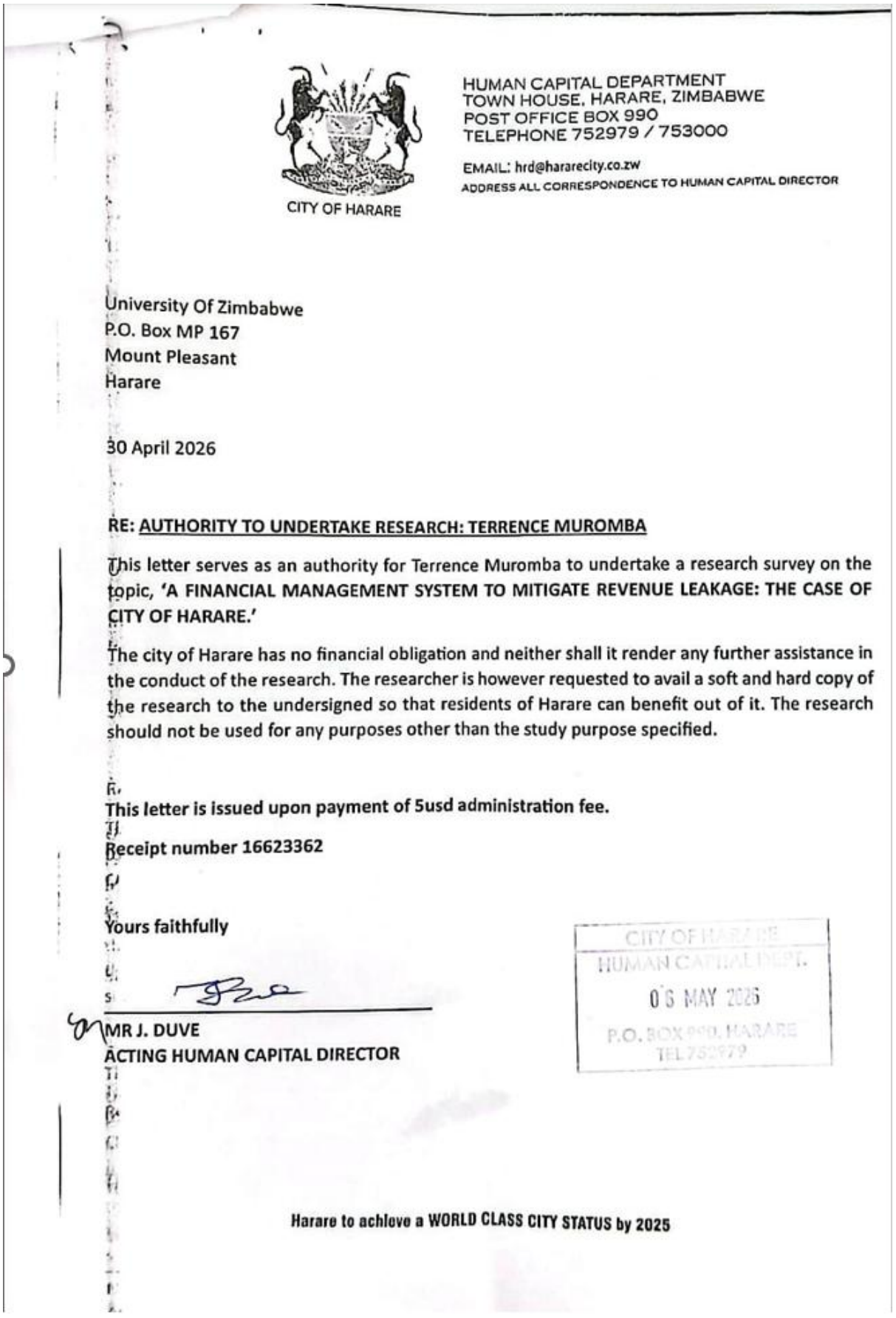
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APPENDIX A: AUTHORISATION LETTER



CITY OF HARARE

HUMAN CAPITAL DEPARTMENT
TOWN HOUSE, HARARE, ZIMBABWE
POST OFFICE BOX 990
TELEPHONE 752979 / 753000

EMAIL: hrd@hararecity.co.zw
ADDRESS ALL CORRESPONDENCE TO HUMAN CAPITAL DIRECTOR

University Of Zimbabwe
P.O. Box MP 167
Mount Pleasant
Harare

30 April 2026

RE: AUTHORITY TO UNDERTAKE RESEARCH: TERRENCE MUROMBA

This letter serves as an authority for Terrence Muromba to undertake a research survey on the topic, **'A FINANCIAL MANAGEMENT SYSTEM TO MITIGATE REVENUE LEAKAGE: THE CASE OF CITY OF HARARE.'**

The city of Harare has no financial obligation and neither shall it render any further assistance in the conduct of the research. The researcher is however requested to avail a soft and hard copy of the research to the undersigned so that residents of Harare can benefit out of it. The research should not be used for any purposes other than the study purpose specified.

This letter is issued upon payment of 5usd administration fee.

Receipt number 16623362

Yours faithfully

CITY OF HARARE
HUMAN CAPITAL DEPT.
06 MAY 2026
P.O. BOX 990, HARARE
TEL 752979

MR J. DUVE
ACTING HUMAN CAPITAL DIRECTOR

Harare to achieve a WORLD CLASS CITY STATUS by 2025

APPENDIX B: QUESTIONNAIRE GUIDE

INTRODUCTION

My name is Terrence Muromba, a final-year student in the Department of Finance and Accounting. I am conducting a research study titled “A Financial Management System to Mitigate Revenue Leakage: The Case of City of Harare" in partial fulfilment of my degree.

You have been selected to participate because of your direct involvement in, or knowledge of, financial and revenue management practices at the City of Harare. The questionnaire is divided into four short sections and should take approximately 10–15 minutes to complete. Kindly respond to every question as honestly as possible, as the value of this study depends on the accuracy of your responses.

All information provided will be treated with the strictest confidence and will be used solely for academic purposes. Your identity will not be disclosed in the final report, and no individual responses will be linked to any participant. Participation is entirely voluntary, and you may withdraw at any stage without consequence.

Thank you in advance for your time and cooperation.

SECTION A: RESPONDENT DETAILS

Please complete the following. Your identity will remain strictly confidential.

Department:	

Job Title / Role:	

Years in Finance Dept:	☐ < 2 yrs ☐ 2–5 yrs ☐ 6–10 yrs ☐ > 10 yrs

Date Completed:	

PARTICIPANT CONSENT

I understand that this questionnaire is for academic research purposes only. My participation is voluntary and I may withdraw at any time. All responses are anonymous and will not be linked to me personally.

☐ I agree to participate in this study.

SECTION B: CURRENT REVENUE MANAGEMENT PRACTICES

The following statements relate to the current revenue collection and financial management practices within the City of Harare Finance Department. Please indicate your level of agreement using the scale below.

SD = Strongly Disagree	D = Disagree	N = Neutral	A = Agree	SA = Strongly Agree

1	The current revenue collection process at the City of Harare is largely manual.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

2	Revenue targets are consistently met by the Finance Department each financial year.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

3	There are adequate internal controls to prevent revenue leakage.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

4	The absence of a digital financial management system contributes to revenue loss.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

5	Billing errors and duplicate invoices are a common occurrence in the current system.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

6	Payments made by ratepayers are promptly recorded and reconciled.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

7	There is a significant gap between amounts billed and amounts collected.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

8	Unauthorised waivers and discounts are granted without proper approval procedures.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

9	Cash collections are properly accounted for before being deposited.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

10	The current reporting system provides accurate and timely financial information.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

SECTION C: REVENUE LEAKAGE (CAUSES AND EXTENT)

This section focuses specifically on revenue leakage the loss of collectable income before it reaches the municipal treasury. Please respond to each statement honestly.

1	Ghost ratepayers (fictitious or inactive accounts) contribute to revenue leakage.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

2	Inadequate follow-up on overdue accounts results in significant revenue loss.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

3	There is collusion between staff and ratepayers that leads to undercharging.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

4	Leakage is more severe in cash-based collection points than electronic channels.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

5	The lack of a real-time payment tracking system makes leakage difficult to detect.	SD	D	N	A	SA

		☐	☐	☐	☐	☐

6	Revenue leakage has worsened since the City stopped using an integrated ERP system in 2019.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

7	Anomalies in financial records are rarely investigated or acted upon.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

8	A digital Financial Management System would significantly reduce revenue leakage.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

Open-Ended Questions

C9. In your estimation, what percentage of collectable revenue is lost annually due to leakage? Please explain the basis of your estimate.

C10. What do you consider to be the single biggest cause of revenue leakage in the City of Harare? Please explain.

SECTION D: PROPOSED FINANCIAL MANAGEMENT SYSTEM

This section seeks your views on the proposed web-based Financial Management System (FMS) and the features it should incorporate to address revenue leakage.

1	An integrated FMS would improve transparency in revenue collection.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

2	Role-based access control in an FMS would	SD	D	N	A	SA
	reduce the risk of internal fraud.					
		☐	☐	☐	☐	☐

3	Automated invoice generation would reduce billing errors and disputes.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

4	Real-time reconciliation of payments would make it easier to detect shortfalls.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

5	An audit trail that logs all financial transactions would deter fraudulent activity.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

6	A leakage alert system that flags anomalous transactions would be useful to my work.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

7	The Finance Department has sufficient IT infrastructure to support a digital FMS.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

8	Staff in the Finance Department would be willing to adopt a new digital system.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

9	Management at the City of Harare would support the implementation of an FMS.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

10	A locally developed FMS is preferable to a commercially procured system for Harare.	SD	D	N	A	SA
		☐	☐	☐	☐	☐

Open-Ended Questions

D11. What specific features or modules do you believe the proposed FMS must include to be effective in the City of Harare context?

D12. What challenges do you foresee in implementing a Financial Management System at the City of Harare? How might these be overcome?

D13. Are there any additional comments or recommendations you would like to make regarding financial management and revenue collection at the City of Harare?

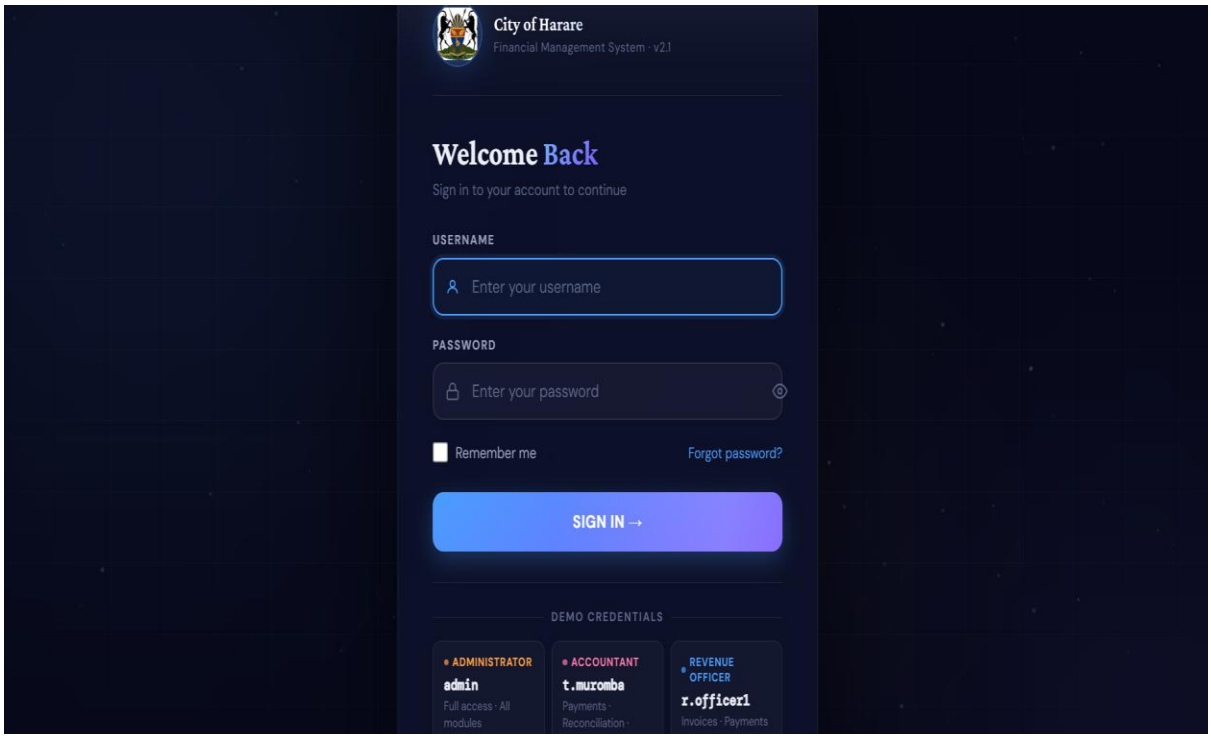
Thank you for your time and participation. Your responses are greatly valued.

Please return this form to: terrencemuromba@gmail.com

APPENDIX C: SYSTEM USER INTERFACE

https://financial-management-system-7.onrender.com

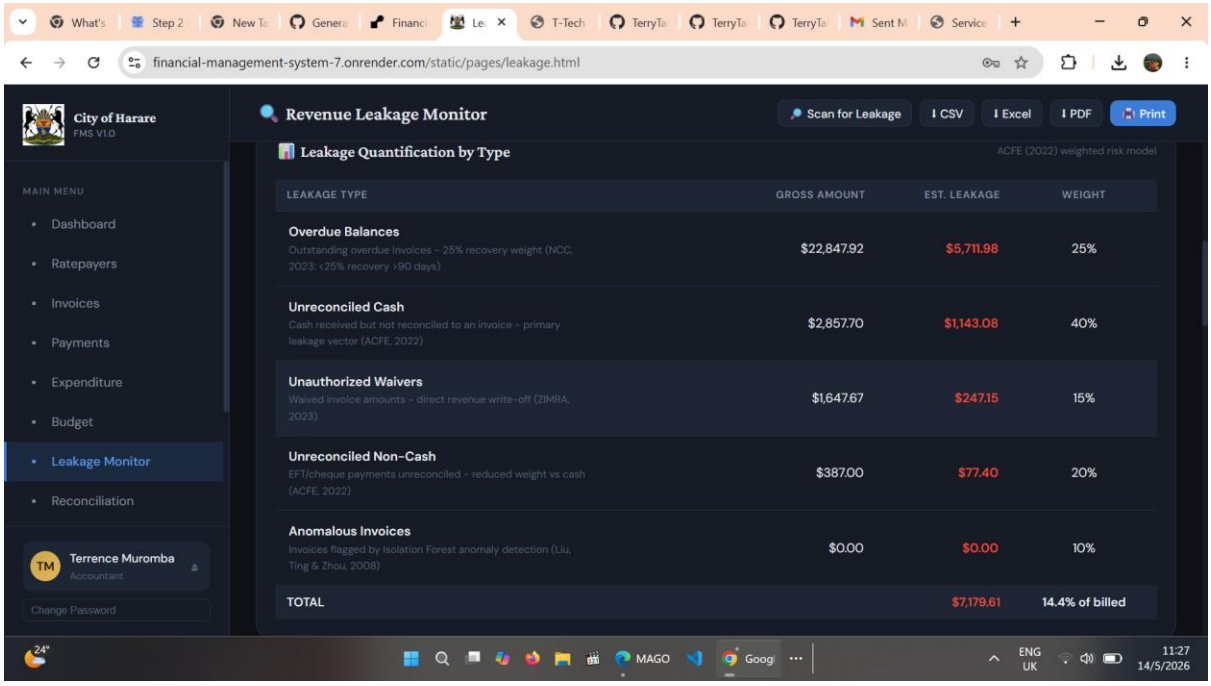
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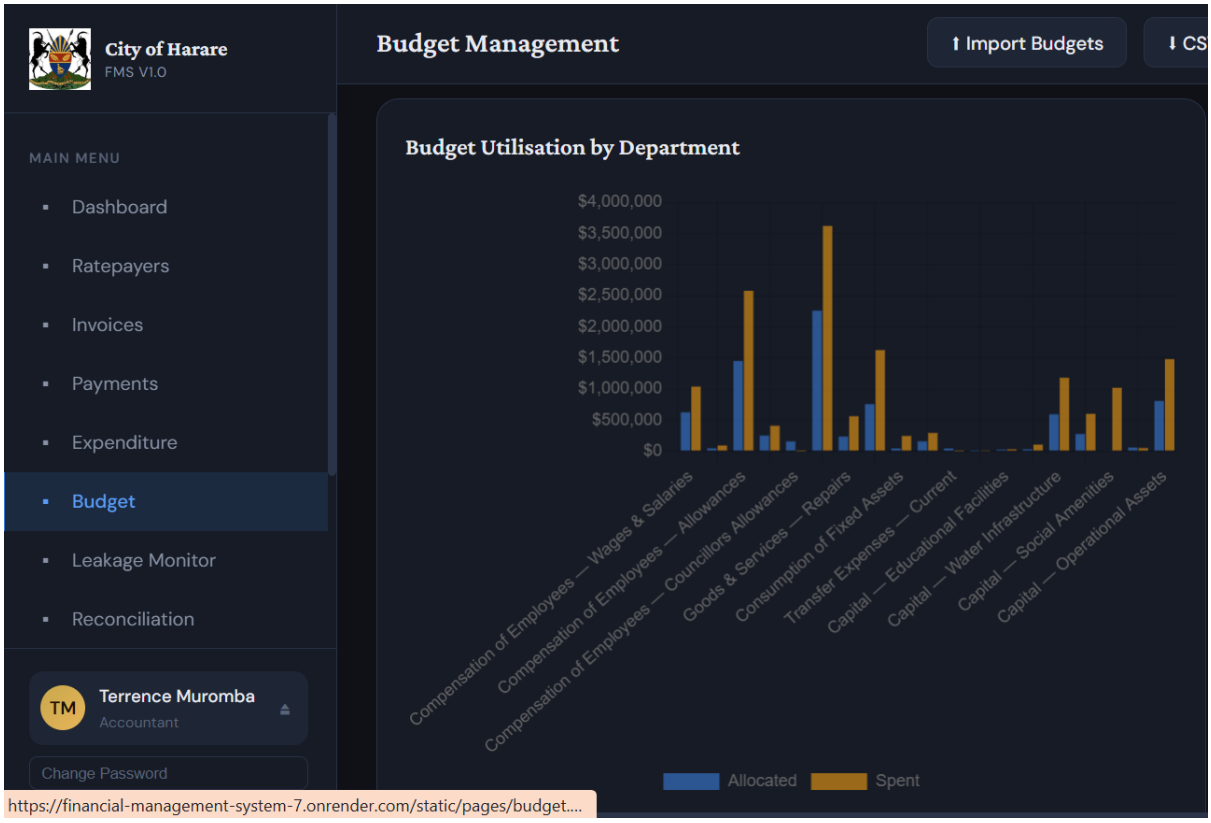
Dashboard



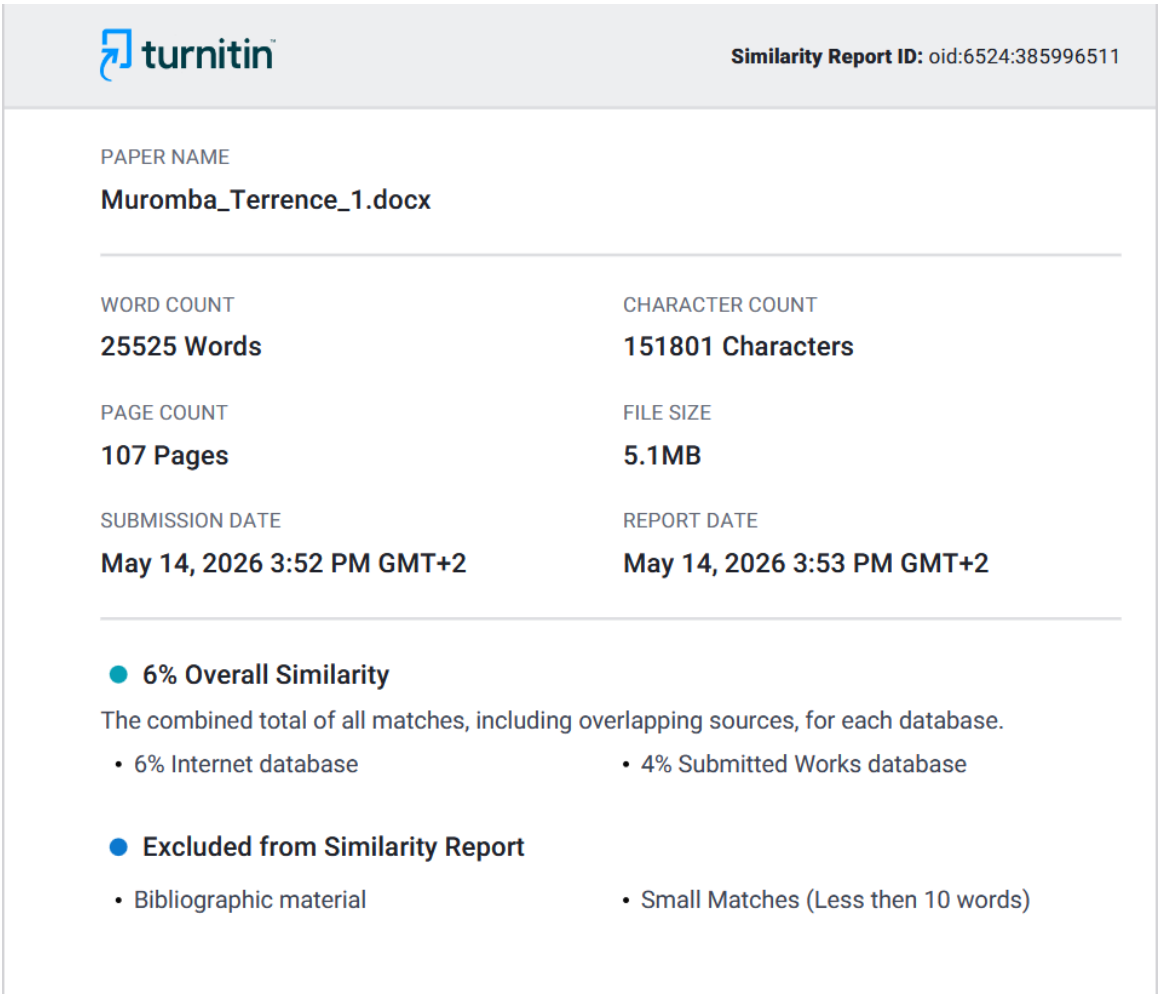
Revenue Leakage Monitor



Budget Management Page



APPENDIX D: TURNITIN REPORT



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