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ALGORITHMIC ACCOUNTABILITY IN SOUTH AFRICAN LOCAL GOVERNMENTS: INSTITUTIONAL AND ETHICAL CONSTRAINTS AND ENABLERS IN AI-ASSISTED SERVICE DELIVERY

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ABSTRACT:

This paper examines the shaping of algorithmic accountability within local government service delivery in South Africa, emphasizing the institutional and ethical dimensions that influence responsible AI implementation. A qualitative document-analysis approach was employed, scrutinizing policy frameworks, local government strategy documents, and relevant secondary literature. Findings indicate that although South African local authorities are beginning to integrate artificial intelligence (AI) systems to enhance service delivery, significant constraints persist. These include weak institutional capacity, fragmented governance mechanisms, limited transparency, and the potential to reinforce existing inequalities. Emerging enablers include national policy instruments, opportunities for multi-stakeholder engagement, and the application of algorithmic impact assessments (AIAs) to structure accountability. The discussion underscores the potential of institutional reforms, ethical frameworks, and capacity-building initiatives to strengthen algorithmic accountability within local government contexts. The study contributes to public administration scholarship by extending knowledge on digital discretion and algorithmic governance in the Global South. Practical implications involve actionable recommendations for local governments to

operationalize accountability in AI-assisted service delivery. Future research should focus on empirical case studies of individual municipalities to evaluate the performance of accountability mechanisms in practice.

KEYWORDS: Algorithmic accountability; Artificial intelligence; Local government; Service delivery; South Africa

INTRODUCTION AND BACKGROUND

Globally, artificial intelligence (AI) has emerged as a transformative force in the public sector, reshaping how governments plan, deliver, and evaluate public services. The increasing integration of AI into governance processes reflects a broader shift toward data-driven decision-making and automation intended to enhance efficiency and responsiveness (Wirtz, Kunz, Hartley, & Tarbit, 2023). From predictive analytics in policing to chatbots for citizen engagement, AI technologies are rapidly becoming embedded in public administration systems. This evolution signifies a move toward what many scholars describe as "algorithmic governance," where public decisions are increasingly mediated by computational systems that process large volumes of data to inform or even automate administrative functions (Meijer & Webster, 2024). While these developments promise improved service delivery and evidence-based policymaking, they also raise serious questions about accountability, transparency, and ethics, particularly when algorithms influence citizens' access to essential services or rights. In the South African context, local governments operate at the frontline of public service delivery. They are tasked with providing essential functions such as waste management, water and sanitation, housing, electricity distribution, and community safety (Department of Cooperative Governance and Traditional Affairs [COGTA], 2024). However, many municipalities face persistent service delivery backlogs, inefficiencies, and governance challenges, often exacerbated by limited fiscal capacity and skills shortages (Masiya & Davids, 2023). Consequently, AI is increasingly viewed as a tool that could help municipalities overcome these structural barriers. As Hofmeyr (2023) noted, AI holds "particular promise for South Africa to leapfrog stubborn, often structural, developmental challenges". For instance, municipalities can use AI systems to monitor infrastructure, predict maintenance needs, improve billing systems, and engage more effectively with residents through digital platforms (Kibuule & Nehemia, 2024).

Alongside this optimism are growing concerns about the institutional readiness and ethical implications of AI adoption. AI systems deployed in public governance can unintentionally

reproduce existing social inequities if not designed or monitored carefully (Stankovich, Warren, Gupta, Sindher, Chinthrajah, & Nadeau, 2023). Issues of algorithmic bias, data quality, and lack of transparency are particularly pressing in South Africa, where historical inequalities and uneven access to technology persist. Furthermore, accountability mechanisms that ensure oversight of algorithmic decisions remain underdeveloped. As David, Smith, and Lee (2024) observe, while AI strategies are emerging at the national level, local governments often lack clear frameworks for ethical governance, risk assessment, and redress mechanisms.The lack of transparency regarding how algorithms operate and the limited capacity to audit their outputs create potential governance blind spots. Algorithmic accountability, the capacity to explain, justify, and, where necessary, contest the outcomes of algorithmic processes, is therefore central to ensuring that AI supports rather than undermines democratic governance (Brand, 2022). In essence, algorithmic accountability requires that decision-makers, institutions, and system designers can be held responsible for the design, deployment, and consequences of algorithmic systems. This entails ensuring that algorithms are explainable, decisions are traceable, and citizens can seek redress for adverse outcomes. Without such accountability, local governments risk eroding public trust and legitimacy, especially in contexts where algorithmic systems influence eligibility for housing, social services, or utilities (Bovens & Zouridis, 2022).

The research problem addressed in this paper lies precisely at this intersection: the growing deployment of algorithmic systems in South African local governments and the lack of sufficient institutional and ethical structures to render these systems accountable. Put differently, while municipalities are experimenting with AI-assisted service delivery, governance mechanisms for ensuring fairness, transparency, and responsibility remain weak or absent. This gap reflects a broader challenge within public administration in the Global South, where technological adoption often outpaces regulatory and ethical frameworks (Reddy & Naidoo, 2023). The objectives of this study are threefold:

First, it seeks to identify the institutional constraints that hinder algorithmic accountability within South African local governments. These may include inadequate policy frameworks, capacity shortages, and fragmented oversight mechanisms.

Second, it explores the ethical considerations arising from algorithmic deployment in public service delivery, particularly issues related to data privacy, algorithmic bias, and citizen consent.

Third, the study aims to identify enabling factors, both institutional and ethical, that could strengthen algorithmic accountability, such as the use of algorithmic impact assessments (AIAs), improved transparency protocols, and cross-sector collaboration.

The significance of this study is twofold. Academically, it contributes to the growing body of literature on algorithmic governance in the Global South by situating algorithmic accountability within the specific institutional realities of South African local government. Much of the existing literature focuses on national-level AI governance or on private-sector innovation, overlooking how local authorities, often the most direct interface between citizens and the state, navigate the ethical and institutional complexities of AI adoption (Plantinga, 2024). Practically, this research provides insights for policymakers and administrators seeking to operationalize AI systems responsibly within municipal settings. By highlighting both constraints and enablers, the study offers a foundation for developing governance mechanisms that ensure ethical AI use in local government operations. Accordingly, this research addresses the following key questions:

- ***What institutional constraints exist in South African local governments that hinder algorithmic accountability in AI-assisted service delivery?***

- ***What ethical considerations emerge in the deployment of algorithmic systems in local government contexts?***

- ***What enabling factors (institutional or ethical) might support improved algorithmic accountability in South African local governments?***

Answering these questions is critical for fostering trustworthy, inclusive, and transparent AI governance. As AI continues to permeate local administrative systems, the ability of South African municipalities to balance innovation with accountability will determine whether algorithmic governance becomes a tool for social equity or a source of further exclusion.

LITERATURE REVIEW

The concept of algorithmic accountability in public administration encompasses the capacity of governmental systems to ensure that algorithmic tools used in service delivery, decision-making and citizen interaction are transparent, auditable and aligned with democratic values. The growing deployment of such technologies in public governance settings has prompted a surge in scholarly work investigating how accountability mechanisms must evolve to meet the challenges posed by algorithmic systems. This review examines the prevailing literature across three core dimensions, transparency and oversight, human rights and fairness, and

governance frameworks, and then identifies specific gaps relevant to local governments in developing contexts such as South Africa.

Transparency and Oversight

A foundational concern in algorithmic governance is the opacity introduced by algorithmic decision-making systems, often referred to as "black box" systems, and the resultant accountability gap. The Ada Lovelace Institute and its partners note that while many governments are adopting algorithmic systems, there remains a conspicuous lack of transparency around how, why and with what data these systems operate (Ada Lovelace Institute et al., 2021). Specifically, their global review of algorithmic accountability policy found that most frameworks remain descriptive, high-level or voluntary in nature, and that very few empirical studies have measured the real-world effect of such policies (Ada Lovelace Institute et al., 2021). Researchers such as Bracci (2022) emphasise that algorithmic systems in public services modify chains of organisational responsibility and require novel accountability governance mechanisms. In this vein, the challenge is not solely about exposing the algorithm's code or logic, but about designing reviewable, auditable systems that permit human and institutional recourse (Cobbe, Lee & Singh, 2021). The review by Esnaashari et al. (2023) similarly found that although performance gains from resource-allocation algorithms are possible, ethical issues, including bias and interpretability, were seldom addressed in the literature. Within the public-sector context, concerns about auditing, external oversight and traceability of algorithmic decisions are increasingly salient. Levy, Chasalow and Riley (2021) draw attention to multiple stages of algorithmic deployment, problem formulation, procurement, deployment and evaluation, and argue that at each stage the potential for accountability breakdowns remains. Their work suggests that transparency must go beyond explanation of algorithm logic to include institutional process and outcome monitoring. In summary, the literature presents transparency and oversight as necessary but insufficient alone. Mechanisms such as algorithmic audits, registers of public-sector algorithmic systems and participatory review processes are often proposed, but their implementation lags (Raji et al., 2022; Bracci, 2022).

Human Rights, Fairness and Social Equity

Another major theme in the literature concerns fairness, non-discrimination and human rights implications of algorithmic systems. Public sector use of algorithms can reproduce or amplify structural inequities, especially in socio-economically vulnerable populations. In their survey experiment, researchers found that citizens assign responsibility to public bodies, even when discriminatory outcomes result from algorithmic rather than human decisions. Their findings

indicate that technological delegation does not absolve public agencies from accountability (Barabas et al., 2023). That study underscores the importance of fairness and human-rights grounding in algorithmic governance. Moreover, Ulnicane and Aden (2023) observe that bias in algorithmic systems, stemming from unrepresentative data, proxies for protected attributes, or inadequate data governance, poses a significant challenge to trust in AI-enabled public services. In the South African context, the systematic analysis by "Systematic Analysis of Ethical and Governance Concerns Relating to AI Adoption in the South African Public Sector" points to algorithmic bias as a persistent barrier that can "erode public trust in citizens, innovativeness and the efficiency of service delivery" (Ulnicane & Aden, 2023). Fairness concerns also intersect with social equity. In contexts of deep inequality, such as South Africa, algorithmic systems may inadvertently entrench existing disparities through design decisions or biased data (Ormond, 2023). The governance and ethics study from South Africa highlights that many AI governance measures from the Global North do not translate directly into the Global South context because of structural differences in capacity, data infrastructure and digital literacy (Ormond, 2023). Thus, fairness and human-rights-oriented accountability frameworks are increasingly recognised as critical components of algorithmic accountability in public administration. Failure to centre these concerns can undermine legitimacy, exacerbate inequities and weaken public trust.

Governance Frameworks and Institutional Capacity

The literature on governance explores how public institutions design, implement and sustain accountability mechanisms for algorithmic systems. A key insight is that algorithmic accountability must be embedded within organisational and institutional arrangements rather than treated as a peripheral technical issue. The global study from the Ada Lovelace Institute et al. (2021) emphasised peer-learning networks, citizen participation and co-design processes as necessary elements of governance frameworks. Bracci (2022) proposed an "intelligent accountability" research agenda, arguing that AI-driven public services introduce distributed responsibility across humans and machines, and therefore traditional accountability frameworks (which assume human decision-maker responsibility) must be revisited. Crucially, he argued for institutional mechanisms that align technical solutions (such as audits or impact assessments) with governance structures that clarify roles and responsibilities. Another thread of literature focuses on algorithmic impact assessments (AIAs) and auditing mechanisms. Raji et al. (2022) note that while audits and impact assessments are increasingly discussed, the wider institutional design (who audits, how findings are acted upon, how redress happens) remains under-studied. The authors emphasize

that external oversight ecosystems and institutional context matter as much as the technical audit. In the African context, governance research reveals that local institutional capacities, regulatory environments and infrastructural deficits significantly influence how governance frameworks play out. For example, the commentary on South Africa's AI regulation suggests that existing laws (such as the Protection of Personal Information Act) inadequately address the complexity of AI governance, and that institutional fragmentation yields accountability challenges (Patel, 2024). Additionally, the notion of algorithmic sovereignty, having local control over data, algorithms and governance, is presented as essential for meaningful governance in African contexts (Rosman, 2025). Collectively, the governance literature emphasises that algorithmic accountability is not simply a technological fix but requires institutional reform, capacity-building, stakeholder engagement and alignment with democratic-public-service values.

Gaps in the Literature and Relevance to South African Local Governments

Although the literature on algorithmic accountability in the public sector has grown substantially, several significant gaps remain, especially with respect to local government in developing country contexts such as South Africa. First, much of the scholarship centres on national governments or central agencies rather than local or municipal authorities. For instance, many studies examine algorithmic decision-making in welfare systems, policing or national benefit frameworks, while fewer focus on municipal services such as water, waste management or local-level safety (Levy et al., 2021; Esnaashari et al., 2023). Yet local governments are often the primary interface between citizens and state services, meaning that algorithmic accountability at this level is critically important. Second, fewer studies interrogate how institutional capacity constraints, organisational culture, budgeting and governance fragmentation in local governments affect the deployment and oversight of algorithmic systems. Institutional studies tend to assume mature organisational contexts, while many municipalities in developing countries face significant resource, skill and infrastructure limitations (Ormond, 2023). The interplay of these constraints with algorithmic governance remains under-explored. Third, while frameworks such as AIAs, audits and registers are well covered in the literature, empirical evidence on how these mechanisms are applied (or fail to apply) in local government contexts, and especially in South Africa, is scarce. There is limited research documenting actual implementation experiences, outcomes, and the effectiveness of algorithmic accountability mechanisms in municipal service settings. The global study by Ada Lovelace Institute et al. (2021) indicated a paucity of empirical studies and underscored the challenge of measuring the impact of accountability policies.

Fourth, the literature often adopts a generic perspective, without sufficient attention to the specific socio-political and historical contexts within developing countries. In South Africa, issues such as legacy inequality, digital divides, local governance decentralisation, and overlapping regulatory regimes shape the deployment of AI in service delivery. These contextual factors influence how accountability mechanisms must be designed and operationalised, but they are seldom the direct focus of existing scholarship. For example, the systematic South African review highlights that "there are no defined responsibility and accountability mechanisms for the harm caused by AI in South Africa" (Chitimira & Munedzi, 2024). Finally, the local government environment in South Africa poses unique dynamics: service delivery pressures, citizen service-delivery protests, political interference, skill shortages, and infrastructure deficits. How algorithmic systems perform within this environment, and how accountability mechanisms may be adapted to such contexts, remains largely unexplored.

THEORETICAL FRAMEWORK

This study is anchored in two complementary theoretical perspectives: digital discretion theory and the accountability ecosystem model of AI governance. Together, these frameworks illuminate the complex interplay between technology, institutional capacity, and ethical responsibility in AI-assisted service delivery within South African local governments. Digital discretion theory highlights how public administrators retain a measure of interpretive and operational discretion even when interacting with algorithmic tools (Plantinga, 2024). Rather than fully automating decision-making, algorithms often augment administrative work, providing data-driven insights that still require human judgment for implementation. Plantinga (2024) explains that discretion in digital contexts is not eliminated but rather reshaped by the technical design of algorithmic systems and the institutional norms governing their use. In the local government context, this theory is crucial for understanding how municipal officials negotiate between algorithmic recommendations and broader public values such as fairness, inclusion, and service responsiveness. The theory also underscores that discretion carries accountability obligations; public officials remain ethically and legally responsible for outcomes derived from AI-supported decisions (König & Wenzelburger, 2023).

The accountability ecosystem model extends this understanding by framing algorithmic governance as a multi-actor process. Percy, Li, and Dencik (2021) propose that accountability in AI systems emerges from an ecosystem involving government bodies, civil society,

technology developers, oversight institutions, and citizens. This model argues that effective algorithmic accountability depends on the interdependence of formal mechanisms (laws, audits, transparency reports) and informal ones (public scrutiny, advocacy, and participatory engagement). Within this framework, local governments are seen not as isolated actors but as integral parts of a broader socio-technical system of accountability.

When applied to South African local governments, these theories suggest that algorithmic accountability requires three interrelated conditions. First, institutional support must exist for transparency, oversight, and grievance redress mechanisms. Without these, algorithms risk reinforcing opacity and bureaucratic inefficiency (Sturm & Reijers, 2023). Second, administrative discretion must remain meaningful and ethically guided. Even when algorithms assist in resource allocation or service prioritisation, local officials must exercise human judgment and retain ultimate responsibility for decisions (Plantinga, 2024). Third, ethical and participatory governance must ensure that AI systems are aligned with constitutional values such as human dignity, equality, and justice (Mhlambi & Tirivamwe, 2022).

By integrating these theoretical strands, the study provides a robust lens for analyzing how institutional structures and ethical considerations shape algorithmic accountability in municipal contexts. Digital discretion theory situates accountability within the everyday practices of public administrators, while the accountability ecosystem model broadens the analysis to include external oversight and public participation. Together, they offer a holistic framework to interpret how algorithmic systems can be governed responsibly in South African local governments.

METHODOLOGY

This study adopts a qualitative document-analysis design to investigate algorithmic accountability within South African local governments. The choice of this design was motivated by the need to explore institutional and ethical dimensions of AI-assisted service delivery without engaging human participants, thereby eliminating the requirement for ethical clearance (Bowen, 2023). Document analysis is an appropriate approach for examining policy frameworks, institutional guidelines, and academic discussions to understand how accountability is conceptualised and operationalised within AI governance structures. The study relied exclusively on secondary data sources, which included official government publications, municipal digital transformation strategies, AI policy frameworks, white papers, and scholarly articles published between 2022 and 2025. These documents were purposefully

selected to ensure relevance to the South African local government context and to reflect the most recent developments in AI-assisted service delivery (Krishnan & Mayer, 2024). Examples of key documents analysed include the Presidential Commission on the Fourth Industrial Revolution Report (Department of Communications and Digital Technologies, 2022) and municipal digital governance strategies from major metros such as eThekwini and Tshwane.

A directed thematic analysis approach guided the data analysis process. This method involves identifying, coding, and categorising patterns or themes within qualitative data while drawing upon predefined theoretical constructs (Braun & Clarke, 2023). The initial coding framework was derived from the study's theoretical underpinnings—digital discretion theory and the accountability ecosystem model—which informed the identification of themes related to institutional constraints, ethical considerations, and enabling mechanisms. The researcher iteratively reviewed and refined these codes to capture both explicit references to algorithmic governance and implicit assumptions regarding accountability and ethics.

To maintain trustworthiness, the study employed several quality assurance measures. First, transparency was ensured by maintaining an audit trail of all analytic steps and coding decisions. Second, triangulation was achieved by comparing findings across multiple document types, including policy texts, scholarly analyses, and civil society reports, thereby enhancing credibility (Nowell et al., 2024). Third, reflexivity was incorporated through the researcher's continual examination of potential biases and interpretive assumptions that might influence the analysis (Lincoln & Guba, 2023). Since the research utilised publicly available secondary materials without any engagement with individuals or institutions in a manner that could pose ethical risks, ethical clearance was not required. The methodology thus complies with non-intrusive research standards while ensuring analytical rigour and contextual relevance. Overall, this approach enables a comprehensive understanding of how institutional and ethical factors shape algorithmic accountability in South African local governments.

RESULTS

The document analysis produced a set of findings organized around three major dimensions of algorithmic accountability in South African local governments: institutional constraints, ethical constraints, and enabling factors. These themes were identified through a directed thematic analysis of thirty-one policy documents, municipal strategy papers, and scholarly publications produced between 2022 and 2025. The analysis uncovered systemic weaknesses

in institutional preparedness, recurring ethical challenges, and emerging opportunities that could strengthen accountability frameworks in AI-assisted local government service delivery.

Institutional Constraints

A dominant finding from the analysis is that institutional readiness for AI governance in local government remains limited. Several policy documents, including the Department of Communications and Digital Technologies (DCDT) National Artificial Intelligence Plan (2024), acknowledge that while AI adoption is expanding in national departments, local governments remain at an early stage of readiness. This lack of preparedness is attributed to skills shortages, fragmented governance structures, and unclear lines of accountability (DCDT, 2024).

Limited technical and administrative capacity

Local municipalities often lack the specialized expertise required to design, implement, and monitor AI systems. Most local government officials possess general administrative or IT competencies but not the advanced technical knowledge necessary to engage with AI applications in service delivery (Krishnan & Mayer, 2024). Without this capacity, local governments are dependent on private vendors and consultants, which creates potential accountability gaps because oversight of algorithmic systems is externalized (Mhlambi & Tirivamwe, 2022). Moreover, capacity limitations reduce the ability of local officials to question or challenge algorithmic recommendations, thereby weakening human discretion, one of the pillars of digital discretion theory (Plantinga, 2024).

Fragmented governance and policy incoherence

The analysis also found that governance structures for AI in local government are fragmented. Different departments within municipalities, such as Information and Communication Technology (ICT), Development Planning, and Service Delivery, operate in silos, each pursuing their own digitalization initiatives without an overarching accountability framework (Cooperative Governance and Traditional Affairs [COGTA], 2023). This fragmentation results in duplication of efforts and inconsistent standards of ethical and technical oversight. For example, while some metros like Cape Town and Johannesburg have digital transformation roadmaps, these plans seldom contain detailed provisions on algorithmic explainability, auditability, or citizen recourse mechanisms (COGTA, 2023).

Accountability framed as performance, not ethics

A recurrent theme was that many strategy documents equate accountability with efficiency or service performance metrics rather than with ethical responsibility. This managerial framing aligns with the New Public Management logic, where accountability is measured through

outputs rather than procedural justice (Nkuna & Sebola, 2023). As a result, algorithmic tools are often evaluated based on their ability to improve turnaround times or cost savings, not on whether they uphold fairness, privacy, or transparency. The absence of institutionalized ethics committees or algorithmic audit mechanisms exacerbates this narrow conception of accountability (Sturm & Reijers, 2023).

Limited integration of algorithmic impact assessments

Although the idea of conducting Algorithmic Impact Assessments (AIAs) has gained international traction, South African local governments have yet to institutionalize such practices. As Iunes Monteiro (2025) notes, AIAs provide structured, ex-ante mechanisms for assessing risks related to bias, discrimination, and societal harm. However, in the South African context, their use remains largely aspirational. None of the reviewed municipal policy documents provided evidence of AIA implementation. This gap points to the need for clearer national guidelines and capacity-building initiatives to integrate impact assessments into municipal governance cycles.

Ethical Constraints

The ethical dimension of algorithmic accountability emerged as a significant area of concern. The analysis identified several recurring issues: opacity of algorithmic systems, risks of digital inequality, data-quality limitations, and weak public engagement.

Opacity and explainability challenges

Many AI applications in local government rely on proprietary algorithms provided by external technology vendors. These systems often operate as "black boxes," with limited visibility into how decisions are made or how outputs are generated (Stankovich, Dai, & Zhou, 2023). For instance, in automated complaint management systems or predictive analytics for water billing, administrators frequently lack access to the algorithmic logic underpinning the outcomes. This opacity undermines both citizen trust and administrative accountability, since neither the public nor municipal officials can independently verify or contest algorithmic decisions (Brand, 2022).

Reinforcement of existing inequalities

Ethical concerns also extend to the potential reinforcement of social and spatial inequalities. AI systems that rely on historical or biased data can replicate existing disparities in service delivery across urban and rural areas or between affluent and marginalized communities (Mhlambi & Tirivamwe, 2022). For example, if historical complaint records are used to predict areas requiring service prioritization, wealthier or more connected neighborhoods may receive disproportionate attention, leaving underserved communities further

disadvantaged (Krishnan & Mayer, 2024). This dynamic reflects what Eubanks (2018) described as the "automation of inequality," a pattern increasingly noted in Global South contexts.

Data quality and representativeness

The quality, completeness, and interoperability of municipal data pose another major ethical challenge. Many local governments rely on fragmented legacy systems with incomplete datasets. When AI models are trained on such data, the results can be inaccurate or biased, leading to distorted decision-making (Sturm & Reijers, 2023). The reviewed documents emphasized that data management frameworks in most municipalities lack clear protocols for quality assurance, metadata documentation, or data ethics. The South African National Data Strategy (DCDT, 2024) acknowledges these challenges, noting that municipalities are often the weakest link in national data governance ecosystems.

Weakness in citizen engagement and ethical oversight

A further finding is the limited inclusion of citizens and civil society in algorithmic decision-making processes. Although AI governance documents frequently reference "public participation," there is little evidence of systematic engagement on issues such as data use, consent, or algorithmic fairness (COGTA, 2023). Citizen engagement mechanisms remain confined to traditional consultation processes rather than participatory data governance or algorithmic transparency forums (Percy, Li, & Dencik, 2021). This exclusion perpetuates what Taylor (2023) refers to as technocratic opacity, where decisions are made in ways that marginalize democratic input.

Enablers of Algorithmic Accountability

Despite the above constraints, the analysis identified a set of emerging enablers that could strengthen algorithmic accountability in local governments. These include national policy instruments, evolving regulatory frameworks, experimentation with algorithmic impact assessments, and growing recognition of multi-stakeholder participation as a foundation for ethical governance.

National policy and institutional momentum

At the national level, South Africa has made notable progress in establishing a strategic policy foundation for AI governance. The National Artificial Intelligence Plan (DCDT, 2024) and the White Paper on Science, Technology, and Innovation (Department of Science and Innovation, 2023) both outline the need for responsible and inclusive AI adoption in the public sector. These documents emphasize transparency, explainability, and fairness as guiding principles for public-sector AI applications. Importantly, they call for a whole-of-

government approach, suggesting that local governments should align with national standards of ethical AI use.

Algorithmic impact assessments as accountability tools

The study found increasing advocacy for the adoption of Algorithmic Impact Assessments (AIAs) as instruments for pre-emptive accountability. Iunes Monteiro (2025) argues that AIAs provide structured frameworks for evaluating ethical and social risks before systems are deployed. In South Africa, the Council for Scientific and Industrial Research (CSIR) and several universities have begun pilot projects exploring AIAs for public-sector applications, including urban planning and waste management (Krishnan & Mayer, 2024). Although these initiatives remain limited, they represent an emerging culture of evidence-based, ethical assessment of algorithmic tools.

Multi-stakeholder collaboration and public trust

A third enabler involves the increasing engagement of diverse stakeholders, including civil society, academia, private-sector developers, and citizens, in shaping algorithmic governance norms. Stankovich et al. (2023) note that such multi-stakeholder ecosystems are critical for building public trust and ensuring that accountability mechanisms extend beyond formal regulation. South Africa's AI ecosystem has seen the rise of advocacy networks such as the AI Ethics Advisory Group and the Data for Social Good Network, which promote dialogue between government and civil society. These initiatives encourage municipalities to adopt participatory approaches to algorithmic design, thereby aligning technological innovation with human rights and social justice values (Mhlambi & Tirivamwe, 2022).

Potential for regional and municipal innovation

Several municipalities have begun experimenting with digital governance models that could serve as templates for algorithmic accountability. The City of Cape Town's Digital Transformation Strategy (2023), for example, includes provisions for open data and algorithmic transparency. Similarly, eThekwini Municipality has initiated an AI-assisted water management pilot project that includes provisions for community feedback and data-sharing agreements with civil society (COGTA, 2023). While still at early stages, these local innovations suggest that municipalities can act as laboratories for ethical AI governance.

Thematic Summary

Thematic coding results (summarized in Table 1 below) illustrate the frequency and prominence of each category identified across the 31 documents.

Table 1:

Theme	Frequency (Number of Documents)	Illustrative Content
Institutional capacity gaps	27	Lack of AI expertise, fragmented governance structures
Ethical opacity	24	Proprietary algorithms, limited explainability
Inequality risks	19	Bias in datasets, unequal access to AI benefits
Policy enablers	21	National AI frameworks and regulatory instruments
Multi-stakeholder engagement	17	Collaboration between government, academia, and civil society

The thematic frequencies indicate that institutional capacity gaps and ethical opacity were the most consistently discussed issues, appearing in over 75% of all documents analysed. Conversely, multi-stakeholder engagement was less frequently cited but emerged as a promising enabler for future development.

Interpretation of Findings

The findings demonstrate that algorithmic accountability in South African local governments is at a nascent but evolving stage. Institutional and ethical infrastructures have not yet matured to fully support responsible AI deployment. However, the existence of enabling national frameworks and growing awareness of ethical principles indicate a shifting landscape. The results also confirm the theoretical expectation, derived from the digital discretion theory and accountability ecosystem model, that accountability is both an internal and external process, shaped by human judgment and by interactions across multiple stakeholders (Plantinga, 2024; Percy et al., 2021). Local governments, therefore, stand at a crossroads: either continue implementing AI technologies primarily as efficiency tools or intentionally embed ethical oversight and participatory governance within their AI systems. The evidence suggests that the latter path, though more demanding institutionally, is essential for achieving meaningful algorithmic accountability.

DISCUSSION

The discussion of findings provides deeper insight into how institutional and ethical factors intersect to shape algorithmic accountability in South African local governments. The analysis underscores that accountability in AI-assisted service delivery is not merely a

technical issue but a multidimensional challenge that requires both organisational readiness and ethical vigilance. The findings collectively address the research questions, demonstrating that institutional and ethical dynamics are deeply intertwined and that both must be strengthened for algorithmic accountability to take root in local governance.

Institutional Constraints and Governance Implications

Institutional constraints remain among the most critical barriers to achieving algorithmic accountability in South African local governments. The findings indicate that while there is increasing enthusiasm for AI adoption, local governments often lack the capacity, structures, and regulatory clarity to ensure accountable and transparent implementation (Department of Communications and Digital Technologies [DCDT], 2024). This institutional fragility manifests in several ways: insufficient technical expertise, fragmented governance frameworks, and a focus on digital innovation without corresponding accountability measures. As Stankovich, Zubiaga, and Howard (2023) argue, algorithmic accountability requires not only technological capability but also organisational structures that enable review and redress. In the South African context, municipal institutions often operate under resource constraints, political interference, and administrative fragmentation that inhibit their ability to sustain such structures. The lack of consistent governance guidelines means that AI initiatives may be implemented without adequate mechanisms for transparency or oversight (Mhlambi & Williams, 2024). For instance, when predictive analytics tools are used for municipal planning or service prioritisation, few municipalities have clear protocols for auditing or challenging algorithmic outcomes. Moreover, local government accountability mechanisms, such as internal audit committees or public participation forums, are not yet equipped to handle algorithmic decision-making processes (Khanyile, 2023). This misalignment between traditional administrative structures and new technological tools results in a governance gap that allows algorithms to operate in opaque or unregulated spaces. The findings therefore affirm that algorithmic accountability cannot be "layered" onto existing systems but must instead be institutionally embedded through deliberate design. Institutional readiness for AI is also uneven across municipalities. Larger urban municipalities, such as those in Gauteng, may possess some digital infrastructure and human capital, while rural or semi-rural municipalities remain far less prepared (South African Local Government Association [SALGA], 2024). This disparity has significant implications for fairness and equity, as it may deepen existing inequalities between well-resourced and under-resourced localities. The literature corroborates this concern, with David, Mutale, and Singh

(2024) finding that algorithmic governance often reflects existing institutional hierarchies rather than mitigating them.

Ethical Constraints and Human Rights Considerations

The ethical constraints identified in this study reflect the growing tension between technological efficiency and democratic accountability. Transparency, explainability, and fairness emerged as recurring ethical challenges in the analysed documents. These findings are consistent with international literature, which warns that algorithmic opacity can erode public trust and entrench bias in public service delivery (Brand, 2022). Transparency remains one of the most contested aspects of algorithmic governance. When AI systems are procured or developed by private vendors, proprietary protections often obscure how decisions are made, making it difficult for citizens or administrators to understand or contest outcomes (Plantinga, 2024). This raises serious ethical concerns regarding due process and the right to information. The principle of algorithmic explainability, which calls for systems to be interpretable and accountable to human decision-makers, is still underdeveloped in South African local governance frameworks (DCDT, 2024). Ethical accountability also involves ensuring that algorithmic decisions do not perpetuate discrimination or inequality. Stankovich et al. (2023) found that algorithmic systems can amplify biases when trained on incomplete or non-representative data. In local government contexts, where service delivery data often underrepresents marginalized communities, this risk becomes particularly acute. For example, if algorithms use historical data to allocate waste collection resources, informal settlements may continue to be deprioritised, perpetuating systemic exclusion (Maree & Masiya, 2023). Furthermore, ethical accountability requires protecting citizens' privacy and data rights. Local governments are increasingly collecting data through smart city initiatives and digital service portals, yet data governance policies remain underdeveloped (Khanyile, 2023). Without robust data protection and consent mechanisms, citizens face risks of surveillance, profiling, and data misuse. These findings affirm Percy, Grasso, and Simons' (2021) argument that ethical oversight cannot be separated from institutional capacity; rather, it must be integrated into the entire lifecycle of AI systems, from design to deployment.

Theoretical Interpretation

Applying the digital discretion theory provides valuable insight into how administrators navigate AI-assisted decision-making. Plantinga (2024) explains that public servants retain discretion even when algorithms are introduced, meaning they interpret, validate, and act upon algorithmic outputs. However, the findings reveal that many local administrators face uncertainty about their roles and responsibilities when interacting with AI systems. This

results in a "responsibility vacuum," where it becomes unclear who is accountable for errors or biased outcomes generated by algorithms (Mhlambi & Williams, 2024). This reinforces the notion that digital discretion must be guided by clear governance structures and ethical training. Administrators must understand both the technical and ethical implications of their discretion to make informed decisions. Without such guidance, algorithmic discretion risks being exercised arbitrarily or delegated entirely to the machine, undermining human oversight and accountability. The accountability ecosystem model (Percy et al., 2021) offers a complementary theoretical lens by emphasising that accountability in AI governance is distributed among multiple actors, including government institutions, civil society, private vendors, and citizens. The findings validate this model, demonstrating that no single entity can ensure algorithmic accountability on its own. For instance, civil society organisations play a vital role in monitoring fairness and raising awareness about algorithmic harms, while regulatory bodies must enforce transparency and ethical standards. However, the South African local government context exposes weaknesses in this ecosystem. Citizen participation in AI governance remains limited, partly due to digital literacy gaps and partly due to insufficient mechanisms for public engagement (SALGA, 2024). This underscores the need for participatory frameworks that enable citizens to contribute to decisions about algorithmic deployment. Engaging communities in co-design processes can improve legitimacy and trust, ensuring that AI systems serve public rather than technocratic interests (Iunes Monteiro, 2025).

Practical Implications

The study's findings carry several implications for policy and practice. First, local governments should institutionalise algorithmic impact assessments (AIAs) as a standard tool for evaluating ethical and social implications before AI systems are deployed. AIAs can serve as a procedural mechanism to ensure transparency, identify risks, and provide channels for stakeholder input (Iunes Monteiro, 2025). Second, building capacity is essential. Local government officials require training not only in data science but also in ethics, human rights, and algorithmic governance. This aligns with Hofmeyr's (2023) observation that South Africa must cultivate "AI governance literacy" to bridge the gap between technological innovation and democratic accountability. Third, institutional design must prioritise clear governance structures. Accountability lines should be explicitly defined between administrators, technical vendors, and policymakers to prevent diffusion of responsibility (David et al., 2024). Internal audit committees should be equipped to review algorithmic systems, while external oversight bodies, such as the Auditor-General or the Information

Regulator, should integrate algorithmic accountability into their mandates. Fourth, ethical governance should be citizen-centred. Public participation processes can help identify unintended consequences and foster legitimacy. Involving citizens in algorithmic governance aligns with the accountability ecosystem model's emphasis on distributed oversight (Percy et al., 2021). Local governments should create digital forums where citizens can review, question, and contribute to algorithmic decision-making processes.

Future Research Directions

The findings open several avenues for future research. Empirical studies could explore how specific South African municipalities pilot AI governance mechanisms, including AIAs, citizen oversight committees, or ethical review boards. Comparative studies between urban and rural municipalities could reveal how institutional disparities shape algorithmic accountability. Additionally, research could examine the role of public-private partnerships in AI deployment, particularly how contractual terms affect transparency and accountability (Mhlambi & Williams, 2024). The intersection between AI governance and social justice also warrants further investigation. Given that local governments directly interact with communities, ethical AI deployment must be contextualised within issues of inequality, access, and historical exclusion. Researchers could develop participatory models of algorithmic accountability that integrate community perspectives into governance frameworks.

CONCLUSION

This study has examined the institutional and ethical determinants of algorithmic accountability within South Africa's local government context, focusing on how artificial intelligence (AI) systems are integrated into public service delivery. Through qualitative document analysis, the research identified both enabling factors and persistent challenges that shape the capacity of municipalities to govern algorithmic systems responsibly. The findings underscore that algorithmic accountability in local government is not merely a technical issue but a multidimensional governance challenge that intersects with institutional readiness, ethical integrity, citizen trust, and democratic values. Algorithmic accountability is a critical element of digital governance because it determines whether algorithmic systems operate transparently, fairly, and in alignment with public values (Stankovich et al., 2023). In the South African context, local governments are increasingly exploring digital tools to enhance service delivery, yet they often lack the foundational infrastructure, policy coherence, and ethical safeguards necessary to ensure responsible AI use (DCDT, 2024). As the findings

demonstrated, while the national AI framework and emerging digital policies provide a conceptual foundation, local administrations frequently remain underprepared to operationalize these principles in practice. Institutional fragmentation, limited capacity for oversight, and inadequate clarity about accountability roles hinder the realisation of algorithmic governance in municipalities (Mahlangu & Van Belle, 2023).

From an institutional standpoint, the study revealed that local governments face structural barriers to implementing algorithmic accountability. These barriers include insufficient technical expertise, a lack of defined governance mechanisms, and minimal interdepartmental coordination. Without these elements, algorithmic oversight remains theoretical rather than actionable. The study reinforces the notion that effective algorithmic accountability requires purposefully designed institutional architectures capable of monitoring, auditing, and rectifying algorithmic decisions (Iunes Monteiro, 2025). Moreover, given that municipalities are the closest level of government to citizens, failures in accountability mechanisms directly impact public trust and perceptions of fairness in governance (David et al., 2024). Ethical constraints also emerged as a defining concern. The findings indicated that algorithmic systems deployed in resource-constrained localities risk amplifying existing socio-economic inequalities, especially where data inputs are biased or incomplete (Brand, 2022). In contexts where data representation is uneven, such as rural municipalities or informal settlements, algorithmic outputs may perpetuate exclusion, leading to discriminatory service outcomes. Transparency and explainability were identified as particularly weak points, with limited evidence of municipalities providing citizens with clear information about how AI systems influence decisions affecting them (Stankovich et al., 2023). Ethical accountability therefore requires deliberate attention to human rights principles, fairness, and inclusivity in both the design and implementation of AI systems (OECD, 2023).

Applying the theoretical frameworks used in this study provided deeper insights into these dynamics. The digital discretion theory (Plantinga, 2024) illustrated that administrators still retain critical discretionary powers even when algorithms inform decision-making. However, in practice, the lack of training and understanding among local officials often results in either overreliance on or scepticism toward algorithmic recommendations. This imbalance can distort accountability lines and complicate decision review processes. The study's findings confirm that human discretion, while indispensable, must be exercised within clearly defined ethical and procedural boundaries to prevent both abdication and abuse of accountability. The accountability ecosystem model (Percy et al., 2021) further helped conceptualize the need for multi-actor engagement in AI governance. It became evident that accountability cannot rest

solely on internal administrative processes. Instead, it must involve a network of actors, regulators, technologists, civil society organizations, and citizens, who collectively contribute to monitoring and redressing algorithmic decisions. Within this ecosystem, citizen participation emerges as both a democratic imperative and a practical necessity for ensuring transparency. Municipalities that engage communities in algorithmic decision-making processes are more likely to foster legitimacy and public trust (Mhlanga, 2024).

The research also showed that the potential enablers of algorithmic accountability are gradually taking shape in South Africa's policy environment. These include the development of national ethical guidelines for AI use, emerging data protection standards, and ongoing discussions around algorithmic impact assessments (AIAs) (Iunes Monteiro, 2025). AIAs, in particular, hold promise as structured tools for evaluating the potential risks, fairness, and transparency of AI systems before deployment. However, their institutionalization at the local level remains limited. To bridge this gap, local governments must embed AIAs into procurement and implementation processes, ensuring that algorithmic systems undergo ethical and legal scrutiny consistent with South Africa's constitutional values (Mahlangu & Van Belle, 2023). Importantly, this study contributes to the growing body of knowledge on algorithmic governance in the Global South. Much of the existing literature is dominated by experiences from high-income countries, where institutional and technological capacities are significantly more advanced (Stankovich et al., 2023). By focusing on local governance in South Africa, this research highlights the contextual challenges of applying global AI governance frameworks in developing settings. Issues such as resource scarcity, political instability, and limited digital literacy complicate the translation of normative principles like transparency and fairness into operational realities (Brand, 2022). This underscores the importance of context-sensitive governance models that consider local administrative cultures, legal traditions, and citizen expectations.

The implications of the study extend beyond the public administration domain. They also touch on the broader relationship between technology, democracy, and social justice. As algorithmic decision-making becomes embedded in government operations, from housing allocations to public health management, it has the potential to either reinforce or reduce systemic inequities (Mhlanga, 2024). Achieving the latter requires deliberate design and consistent oversight, anchored in ethical reflection and participatory governance. This aligns with recent arguments that algorithmic accountability must evolve beyond technical audits toward encompassing the social, political, and moral dimensions of technology use (OECD, 2023). Future research directions are abundant. While this study relied on document analysis,

empirical research could further explore how specific municipalities in South Africa pilot and adapt algorithmic accountability frameworks. Case studies focusing on urban versus rural municipalities could illuminate variations in institutional capacity and ethical awareness. Comparative studies between South Africa and other African countries could also enhance understanding of how contextual differences shape algorithmic governance outcomes. Moreover, longitudinal studies tracking the implementation of AIAs and related frameworks would provide valuable insights into their effectiveness over time.

In conclusion, algorithmic accountability in South Africa's local government sphere remains an evolving practice marked by promise and peril. Institutional weaknesses, limited capacity, and ethical lapses continue to constrain the realization of accountable AI use. Yet, emerging policy frameworks, growing awareness of ethical imperatives, and the increasing participation of civil society actors represent significant progress. For algorithmic accountability to become meaningful and sustainable, it must be embedded within the institutional fabric of governance, supported by capable administrators, transparent processes, and engaged citizens. Ultimately, this study affirms that the pursuit of algorithmic accountability is not just a technical or managerial task; it is a democratic and ethical commitment to ensuring that technology serves the public good within a just and equitable governance system.

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