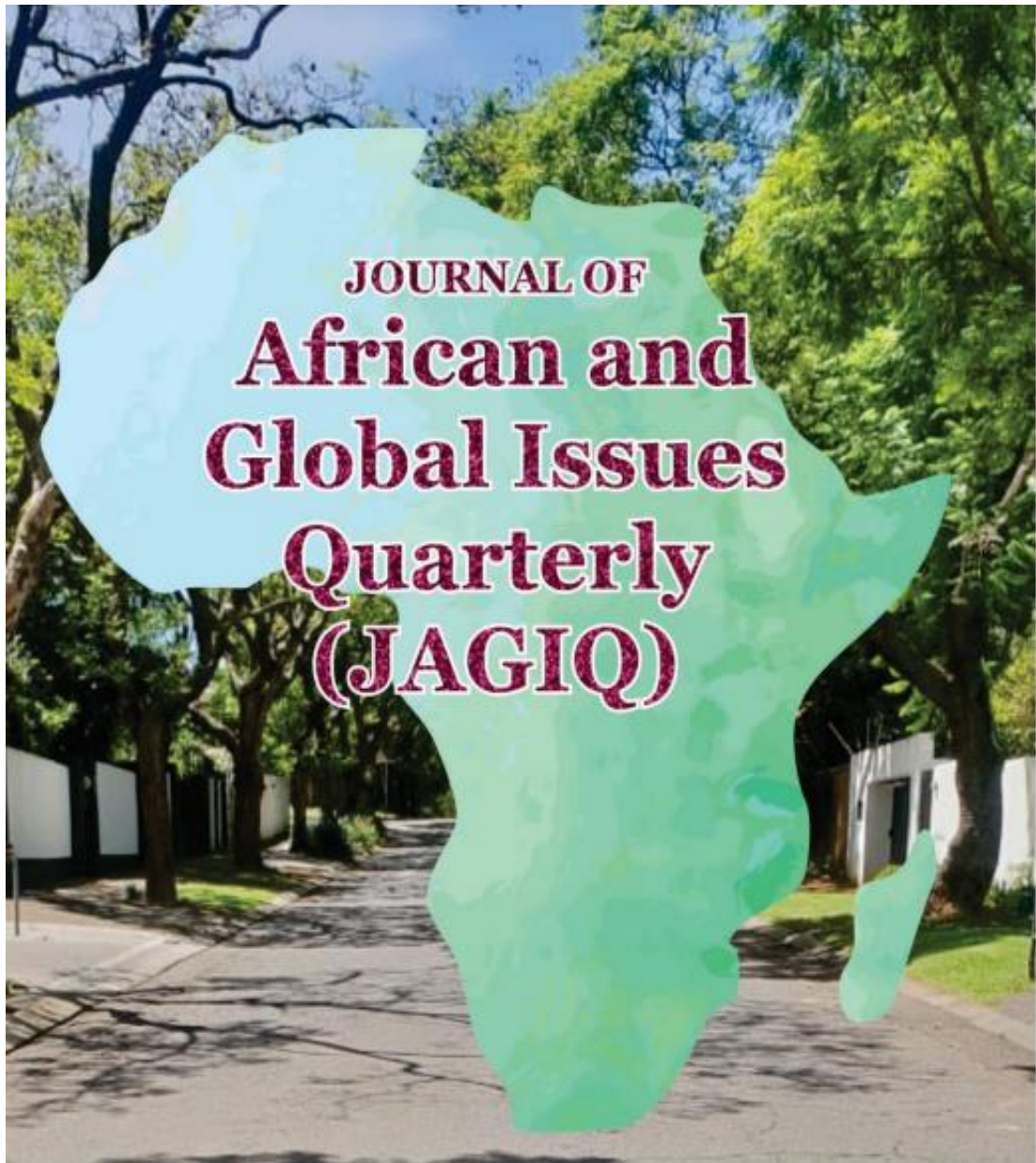




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EDITORIAL NOTE

This volume represents concerted calls within and outside Africa on the need for multidisciplinary collaboration and research output. Specifically, papers were drawn from all disciplines and research focuses, which has further increased the quality of research and collegial engagement. Hence, topics covered in this volume cut across the areas of economics, politics, security, ICT, indigenous knowledge, development studies, finance, trade, youth engagement, agriculture, democratization, and nation-building, among others.

For instance, Thizwilondi Josephine Mudau in *African Youths and the Promotion of Sustainable Development through the Lens of Indigenous Knowledge (IKS) in the 21st Century* employed qualitative desktop research methodology in synthesizing existing literature to argue that IKS represents a dynamic body of wisdom encompassing sustainable agriculture, natural resource management, and community resilience and offers proven, contextually grounded solutions to modern challenges like climate change and food insecurity. The analysis highlights youth-led initiatives across the continent that are revitalizing indigenous crops, integrating traditional ecological knowledge with climate adaptation strategies, and using digital platforms for cultural preservation. Mudau concluded that for Africa to achieve authentic and sustainable development, a concerted effort is needed to empower youth through inclusive education, supportive policy frameworks, and intergenerational dialogue, thereby transforming indigenous knowledge from a cultural heritage into a living toolkit for a resilient future.

Masila Joshua Masipa in *Beneficiaries of Corruption? An analysis of the function of South African banks in handling and making money from crime proceeds* adopted institutional theory and the political economy of corruption and a qualitative research design that combines semi-structured interviews with compliance officers, financial regulators, and civil society actors with document analysis of Zondo Commission and Financial Intelligence Centre (FIC) reports, legal statutes, and policy papers in examining how, in spite of strict anti-money-laundering (AML) and anti-corruption laws, South African banks may profit from, handle, or ineffectively stop the flow of monies associated with corruption. Specifically, with an emphasis on whether banks directly or indirectly benefit from the proceeds of crime, Masipa investigated the relationship between financial institutions and illegal financial flows within the following objectives: (1) assess the regulatory framework that oversees AML compliance; (2) examine high-profile cases of corruption in which banks are implicated; (3) evaluate due diligence and institutional accountability; and (4) suggest changes to improve ethical banking governance.

Then Sipho Patrick Bhengu-Mancosa & Andrisha Beharry-Ramraj in *Advancing Small, Medium, and Micro Enterprise Growth through Digitalized Enterprise and Supplier Development in South Africa* examined the current state of Enterprise and Supplier Development (ESD) in South Africa, investigated the role of digitalization in enhancing ESD, identified the challenges and opportunities in digitalizing ESD, and provided recommendations for policymakers, corporates, and Small, Medium, and Micro Enterprises (SMMEs). A qualitative secondary data approach was employed, drawing on thematic analysis of existing literature, reports, and industry initiatives. For key findings, Bhengu-Mancosa & Beharry-Ramraj indicated that ESD adoption remains limited; digitalization (Mancosa) significantly enhances market access and supplier diversity; infrastructure and skills gaps persist; and strategic digital integration can unlock growth opportunities for SMMEs.

Lere Amusan & Ebenezer O. Oni, in their study, *Disinvestment of Multinational Corporations (MNCs) in Developing Areas: An Assessment of Shoprite Disengagement in*

Nigeria, started by reflecting on why, at the global level, many MNCs have started to disengage from their host states. In a bid to respond to the possible reasons, Amusan & Oni pushed further into examining possible reasons that could explain why Shoprite, a large South African retailing company, disinvested from Nigeria after operating in the country for about 15 years, using secondary sources supported by primary data and personal observations. For them, the reasons range from political, economic, marketing, and legal to civil society attitudes towards their business. Employing the twin theories of neoliberalism and oligopoly that facilitate globalization, Amusan & Oni concluded that, aside from losing litigation to its erstwhile Nigerian business partners, competition from domestic and foreign retail companies contributed in no small measure to why Shoprite exited the Nigerian market.

In A sober teacher is a problem”: Unpacking Political Ideology and Emancipatory Struggles Within teacher unionism, Zwane Theminkosi Trevor & Matsepe David adopted the grounded postcolonial theory in examining how teacher unions embody and deploy political stances and ideologies to promote the emancipation and freedom of education, as well as the broader communities they aim to serve. Clearly, Trevor and Matsepe employed a qualitative interpretivist approach to analyze data from narrative interviews with unionized educators, along with further examination of public union discussions. Key findings of their research indicated four interrelated themes: (1) political consciousness as both a threat to order and a driver of democratic emancipation; (2) teacher unions functioning as a counter-hegemonic force challenging neoliberal geopolitics and political norms; (3) the ideological repositioning of teacher unions as intellectual activists rather than compliant officials; and (4) tensions between political agency and professional identity.

Douglas Nyath in Rural Youth and the Future of Farming in Sub-Saharan Africa: Revisiting the Abandonment Debate explored whether rural youth are truly abandoning agriculture or are instead redefining their involvement through diversified livelihood strategies. It examines the socio-economic, institutional, and cultural factors influencing youth decisions and analyzes how emerging hybrid forms of engagement—such as agriprenuership and part-time farming—are reshaping rural economies. A systematic desktop synthesis of peer-reviewed literature (2000–2025) was conducted using databases like Google Scholar, Scopus, and Web of Science. Nyaath observed that youth disengagement from agriculture is not uniform but context-specific, and the key determinants to such disengagement include land scarcity, education, labor market structures, gender norms, and limited access to finance and technology.

Then, in ***Equal Ideals, Unequal Realities: Gender Dynamics in the Workplace of an International Religious Non-governmental Organisation in Eswatini***, Thembumenzi Jomo Ntshalintshali & Innocent Simphiwe Nojiyeza examined attitudes, experiences, and organizational practices regarding gender roles, power dynamics, and inclusivity by drawing on in-depth interviews and focus groups with 20 employees from a range of departments and hierarchical levels. The results of their findings show that male participants, who were primarily ideologically devoted to gender equality, showed conflicted feelings about shifting power dynamics. Unconscious bias, policy implementation gaps, and organizational culture were equally identified as the primary obstacles to change. The results emphasize that in order to guarantee changes in gender equality, context-specific solutions are required that go beyond the adoption of policies.

In Indigenous Knowledge Systems and Environmental Conservation Ngugi’s Petals of Blood, Thabo Prince Zondo started by reflecting on members of the impoverished and socio-economically disadvantaged community who are distressed by incessant drought and who consult

a seer and offer sacrifices to seek solutions. Using this as a point of departure, Zondo explored how text gestures and Indigenous Knowledge Systems (IKS) address the real dilemmas faced by Africans following the extensive and cross-generational crises that accompany coloniality. In this, Zondo provided an ecocritical reading of the text, drawing on relevant postcolonial/decolonial ideas to illustrate the ways in which indigenous African epistemologies can indeed boost efforts at environmental conservation and poverty alleviation in rural communities today.

Also, **Rendani Tshifhumul** in *Exploring the Role of African Indigenous Knowledge Systems in Healing Practices and Resilience During the COVID-19 pandemic in Thohoyandou*, presented a narrative inquiry into the experiences of individuals who survived COVID-19 without requiring hospitalization, based on in-depth interviews with three respondents. For Tshifhumul, among the identified practices were the inhalation of steam treated with stones and salt, as well as the application of various herbal concoctions, including *Tshiumbeumbe*, *Musese*, *Mufula Musudzungwane*, *Miora*, and *Mubomo*, guava leaves, and lemon grass tea, including a mixture that comprises onion, ginger, lemon, honey, and garlic. Therefore, Tshifhumul concludes that these findings not only shed light on the adaptive strategies employed by individuals in response to the pandemic but also underscore the significance of traditional healing practices in the context of contemporary health crises. Khulisile Judith Nkuna & Sikhumbuzo Sibuso Khoza, in their work, *Capturing Cultural Heritage: Exploring the Poetic Elements of Domesticated Animal Praise*, carried out an analytical analysis of the lyrical components found in the praises of Siswati domestic animals. Nkuna & Khoza observed that expressing gratitude to animals for their contributions to human life remains a significant goal of animal praise. Reflecting on case studies, they noted that the Nguni people view domestic animals as very close environmental companions, particularly for those who live in rural areas. Praise poetry's primary goal is to commemorate great men's accomplishments. However, the reverse is the case for the Swati people, who have a tradition of honoring non-human animals in their poetry, including the wild animals they encounter in their environs as well as the domestic livestock they raise.

Intaher M. Ambe, Ellsworth C. Jonathan, Phathutshedzo D. Lavhelani,* and David H. Selby, in their study, *Exploring the landscape of demand management practices in the public health sector in the Gauteng Province, South Africa: An Empirical Analysis*, employed secondary sources in determining what demand management practices are employed within Gauteng, South Africa, and public health sector institutions. Findings in their study revealed substantial obstacles in organizational structure, demand management techniques, budget, and alignment between demand planning and strategic goals, as well as supply chain management (SCM) rules, regulations, and specifications. They conclude that the paucity of demand management implementation in public sector organizations reveals a misalignment between strategic goals, demand management, and demand planning, resulting in a loss of value for public sector organizations.

Aderinsola E. Kayode, Shalini Sing, & Patricia P. Badenhorst's research, *ICT for Indigenous Knowledge Dissemination and Education in Africa: A Systematic Review*, conducted a systematic review of literature published between 2015 and 2025 to examine how ICT tools and platforms have been deployed to support indigenous knowledge dissemination and education in African contexts. The findings of their research indicated that ICT can enhance indigenous knowledge preservation, improve youth engagement, facilitate intergenerational learning, and broaden global visibility of African knowledge systems when implemented with community participation. However, challenges remain regarding digital access, cultural sensitivity, intellectual property rights, and the sustainability of technology-driven initiatives.

In ***Donald Trump-Twitter Diplomatic Disruptions And Impact On The Post-World War II International Order.***, Ndivhoniswani Aaron Tshidzumba & Puseletso Nthate examine how President Donald Trump's unprecedented use of Twitter as a direct channel for foreign policy communication disrupted established diplomatic norms inherited from the post-World War II international order. Through content analysis of Trump's social media communications, examination of foreign policy outcomes, and comparative analysis with traditional diplomatic practices, Tshidzumba & Nthate demonstrated that Trump's social media presidency constituted a significant departure from institutional diplomacy and contributed to broader challenges facing the established international order. Further findings reveal that digital direct engagement by heads of state bypasses institutional constraints, undermines multilateral consensus-building, and creates new vulnerabilities in international relations.

Furthermore, in ***Determinants And Effect Of Small-Scale Livestock Production On Household Income In Malawi: Evidence From Fifth Integrated Household Survey***, Gladson Andrew Chipala, Christopher Chombo & Hannah Dunga examined the determinants and effects of small-scale livestock production on household income among farmers in Malawi, using cross-sectional data from the Fifth Integrated Household Survey (IHS5) with a sample of 8,795 households. Their key findings indicate that household size, access to credit, access to extension services, landholding size, distance to the market, and location in the Northern region significantly increase the likelihood of participation in livestock production. Notably, households engaged in livestock production earned, on average, an additional MWK 36,405.76 compared to non-producing households, demonstrating its important role in improving economic welfare.

In ***Navigating Artificial Intelligence Personalization and Consumer Privacy in Digital Marketing across South Africa and Global Contexts***, Suraksha Moothura and Andrishia Beharry-Ramraj critically examined how AI-driven hyper-personalization in digital marketing influences consumer privacy, with a specific focus on its ethical implications and regulatory challenges in South Africa in comparison to global standards using desktop literature review methodology. Moothura & Beharry—Ramraj observed that ethical concerns such as manipulation, algorithmic bias, and reduced consumer autonomy were found to be inadequately addressed in South Africa, where legal instruments like POPIA lack the specificity and enforcement capacity evident in global standards like the GDPR. Taleat, Bisiriyu Abiodun & Lukamba, Muhlya Tshombe's article, ***Energy Sustainability and Sustainable Development Agenda: The Role of Public-Private Partnership in South Africa***, investigated the role and effectiveness of Public-Private Partnerships (PPPs) in South Africa's energy development towards sustainability using a qualitative desk research methodology to analyze secondary data from policy documents, scholarly literature, and government publications. For Abiodun & Tshombe, key findings demonstrate that PPPs have attracted a substantial amount of private investment and benefited the economy through job creation and community development. However, institutional and systemic barriers, e.g., Eskom monopoly, regulatory uncertainty, grid integration constraints, and institutionalized dependency on coal, impede the full implementation of PPPs in accelerating the energy transformation. Hence, they recommend policy stability, energy regulation reform, enhancing financial methods, and ensuring that social equity consideration is factored into PPP structures.

For Olukayode Idris Lasisi in ***The Governance–Development Nexus in Nigeria: A Conceptual Synthesis of Good Governance and Policy Discourse Theories***, a qualitative, conceptual, and desk-based review approach was employed, relying on the literature, policy documents, and theoretical frameworks in reevaluating the governance development interface in Nigeria in terms of the role of institutional weaknesses, the inconsistency of policies, and discursive framing in the

determination of sustainable development outcomes. Findings revealed that weak institutions, corruption, bureaucratic inefficiencies, low accountability, and marginalization in policymaking processes bedeviled Nigeria's sustainable development, thereby distorting policy implementation and weakening effective service delivery. Lasisi concludes by calling for the need to strengthen institutions, improve transparency, guarantee policy sustainability, encourage civic participation, and apply digital governance solutions, which is essential to attaining sustainable development.

Eyitayo Francis Adanlawo & Mpho Chaka in *The Effect of Ethnicity And Politics on the Democratization of African Nations* examined the theoretical challenge that ethnicity poses to the African state and the challenges it poses for democratization on the continent. To guide the discourse, critical questions are raised: What kind of connection exists in Africa between politics and ethnicity? Under what conditions may ethnicity either support or undermine democracy? Can citizenship rights be reconciled with ethnicity? . Furthermore, Adanlawo & Chaka explored the evolution of ethnicity from the viewpoints of development communication and provided it with a psycho-social meaning. In their conclusion, Adalanwo & Chaka posited that, if ethnicity has an informative component, we should anticipate that voters' reliance on ethnic cues will decrease when certain forms of higher-quality information become available.

Lindokuhle Senamile Ntuli & Innocent Simphiwe Nojiyeza in *Does Resource Scarcity Constrain Rural Women's Entrepreneurial Performance in KwaZulu-Natal, South Africa?*, examined whether resource scarcity significantly constrains the entrepreneurial performance of rural women in KwaZulu-Natal (KZN), South Africa. Anchored in the Resource-Based View (RBV), the study adopts a quantitative research design using survey data collected from 273 rural women entrepreneurs across uMhlabuyalingana, Big5Hlabisa, and eJozini municipalities. **Ntuli & Nojiyeza** revealed statistically significant relationships between entrepreneurial performance and seven resource-based constraints: leadership skills, financial institutional barriers, entrepreneurial experience, regulatory constraints, access to financial resources, technological limitations, and limited training opportunities. Lastly, in *Transformative Governance Frontiers: Relational Public Administration for Smart City Inclusivity*, Melvin Diedericks examined the conceptualization of informal systems in the context of South African smart city initiatives. By repositioning informal systems as co-creators in urban governance, this study advocates for a paradigm shift from technocratic optimization to relational inclusion. This reframing aligns with South Africa's constitutional and developmental goals, enabling transformative governance and the effective localization of SDGs in sustainable cities.

It is expected that these works compiled in this volume will further enrich the discourse and provide policy options to individuals, governments, and countries, particularly in Africa.

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TRANSFORMATIVE GOVERNANCE FRONTIERS: RELATIONAL PUBLIC ADMINISTRATION FOR SMART CITY INCLUSIVITY

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Abstract

Smart city development initiatives aim to transform urban governance and service delivery by leveraging digital technologies to enhance efficiency and effectiveness. Extensive literature portrays these technologies as instruments for efficiency, control, and streamlined urban management. This instrumental logic often frames informal systems as deficiencies to be optimised, ignoring their relational, cultural and psychosocial value. The reductionist approach excludes informal systems from governance, yet in South Africa, where inequality and digital exclusion are prominent, these systems remain central to urban functioning. Consequently, the systematic literature review examined the conceptualisation of informal systems in the context of South African smart city initiatives. By repositioning informal systems as co-creators in urban governance, this study advocates for a paradigm shift from technocratic optimisation to relational inclusion. This reframing aligns with South Africa's constitutional and developmental goals, enabling transformative governance and the effective localisation of SDG 11 in sustainable cities.

Keywords: *enframing, Heidegger, informal systems, relational governance, SDG 11.*

Introduction

Smart city developments represent a strategic global shift aimed at transforming urban governance, enhancing service delivery, and fostering economic growth (Musakwa & Mokoena, 2017, pp. 4-17; Balkan, 2019; Abbas et al., 2024). At its core, the discourse reflects a growing reliance on digital technologies and ICT systems to create responsive and data-driven cities (Musakwa & Mokoena, 2017, pp. 4-17). Cities like Los Angeles, Amsterdam, Chicago, London, Cape Town and Kigali illustrate this trend by embedding smart

technologies within their public service systems to boost global competitiveness while promoting citizen-centric solutions (Meijer & Bolivar, 2016, p. 394; Musakwa & Mokoena, 2017, pp. 4-17; Balkan, 2019; Das, 2020; Toit & Stimie, 2023; Clement, Ruyschaert & Crutzen, 2023, p.7). These technologies drive innovation, inclusion, and sustainability, yet they also reflect technocratic logics that prioritise control and efficiency over social embeddedness (Toit & Stimie, 2023).

Some existential and Marxist philosophical critiques caution against

treating technology as an instrument or a neutral tool for problem-solving. For instance, Herbert Marcuse, Jacques Ellul, and Martin Heidegger have provided foundational critiques of technological rationality (Kaplan, 2009, p. 1). Marcuse (1964:157-159) and Kaplan (2009:1) argue that technological rationality can reduce governance to efficiency and control, thereby obscuring how technology shapes societal values and relations. Ellul (1964:567) warns that although people perceive technology as serving human goals, such as efficiency, democracy, and progress, it ultimately reduces human freedom by shaping choices according to its internal technical logic (Ellul, 1964, p. 568). Among these seminal thinkers, Heidegger is the most influential in offering a critical inquiry into technology. In his seminal essay, *The Question Concerning Technology*, Heidegger is instructive. He contends that technology is not merely instrumental but a mode of revealing ordering beings in specific ways (Heidegger, 1977).

Applying this knowledge to smart city systems implies that digital technologies can reduce complex social realities to data points ready for exploitation, while concealing lived experiences and marginalised voices. Heidegger's implied stance on the *mode of revealing* consequently discloses informal systems, including settlements, governance structures, mobility, and economies in the smart city discourse as standing reserves, while concealing their relational and lived dimensions. According to Heidegger, all "*beings*" and "*entities*" become on-call, waiting to be optimised for further purposes (Heidegger,

1977:17, 18; Dreyfus, 1995, p. 28). In this regard, informal systems are allegedly devoid of intrinsic value or purpose and serve only as outputs of economic, environmental, or governance transformations. Informal systems become resources to be measured, optimised, or absorbed into formal smart governance, economy, environment, mobility, people and housing dimensions propounded by Giffinger et al. (2007:12). Smart city discourse marginalises informal systems by treating them as inefficiencies to be optimised, eliminated, or absorbed, rather than as valued contributors capable of shaping urban futures.

Extensive literature explores the exclusionary tendencies of smart city development across policy and structural levels (Burch, 2021; Rajput, 2024), reporting fragmented, insufficient, or biased policy frameworks that fail to address inclusivity and structural inequities adequately (Paharaj, 2021; Rahbarianyazd, 2024). Including how sensor deserts, data invisibility, and surveillance exacerbate structural exclusion and limit the visibility of marginalised populations (Wang, 2018), a dynamic that is particularly evident in the South African context, where technological initiatives underscore a persistent digital divide deeply embedded in structural inequalities in provinces, cities, and communities (Mubangizi, 2021). Explicitly, informal settlements and rural provinces, such as the North West, Limpopo, and Northern Cape, experience pronounced disparities, as limited access to digital technologies deepens inequalities in education, healthcare, and infrastructure

development (Human Science Research Council, 2024). These conditions reflect material exclusions and broader governance challenges (Musakwa & Mokoena, 2017).

Despite the growing scholarship on smart city development, this extensive literature remains focused on policy, structural, or managerial critiques, often highlighting fragmented frameworks, insufficient inclusivity, and persistent digital divides. A few studies adopt a systematic approach that explores the ontological *mode of technological* revealing, in particular, how digital systems frame informal settlements, economies, mobility, governance, and housing practices as inefficiencies and data points to be optimised or absorbed. This reductionist logic conceals the relational, lived and adaptive value of informal systems, thereby reinforcing exclusion in already unequal contexts in South Africa. Heidegger's seminal essay, "Question Concerning Technology" (1977), reveals how enframing conceals deeper *modes of being*, a gap that smart city discourse rarely acknowledges. This study addresses the gap by using a systematic literature review guided by three interrelated questions, revealing how scholars frame informal systems as inefficiencies and marginalise them, while also uncovering the potential for alternative governance rooted in pluralism and indigenous knowledge. The questions expose the dual movement of exclusion and possibility, converging on the ontological conflict between strong ontologies, anchored in calculability and optimisation, and weak ontologies, grounded in adaptability and relational governance. This conflict ultimately shows that

public administration theory must move beyond rigid paradigms and reconfigure itself through integrative governance principles that bridge the ontological divide.

Theoretical Lens: Relational Ontology and Heidegger's Diagnosis

The smart cities discourse, as outlined in Giffinger et al. (2007:10-11), features a six-dimensional model that has become a dominant framework for assessing urban performance. While this model is useful for benchmarking, it emphasises a technocratic view of optimisation and efficiency (Godzinski, 2005; Toit & Stimie, 2023). Accordingly, such frameworks risk perpetuating a logic that treats informal systems, including backyard rentals, informal utilities, waste reclaimers, and survival economies, as inefficiencies waiting to be formalised or eradicated. Heidegger (1977:13) and Kaplan (2009) argue that technology is not neutral nor merely instrumental but a *mode of revealing* that shapes how reality presents itself. This revealing takes the form of *enframing* (Gestell), which orders beings as *standing reserve* resources to be calculated, managed, and exploited. This logic risks viewing informal systems only as inefficiencies to be rectified, data to be harvested, or markets to be formalised. Heidegger warns that this mode of revealing is correct and applicable to governance issues but not entirely accurate, as it conceals other possibilities, while reducing human experience to calculability and control (Kaplan, 2009; Dreyfus, 1995). In the South African context, informal systems are not peripheral but central to urban functioning. From a relational process ontology perspective, smart cities must

embody adaptive and assembled processes (Stout & Love, 2015, p. 464), where formal and informal elements co-construct their discourse. In this sense, digital technologies cease to be mere tools of production and instead become relational mediators, revealing smart cities as a process of becoming through various modes that value plurality, inclusivity, and co-creation.

Systematic Literature Review: Methodological Orientation

The study employs a systematic literature review to synthesise fragmented debates on smart city governance, showing how digital technologies function not merely as tools of production but as relational mediators. Sources were systematically retrieved from Scopus, Google Scholar, JSTOR and Web of Science, then screened in Covidence using inclusion and exclusion criteria guided by the PICOS framework. Three guiding questions structured the review:

- *Q1: Does smart city scholarship frame technology as instrumental-technical rationality or as ontological revealing (Heidegger's enframing), and which critique is most dominant across the discourse and literature?*

- *Q2: How do informal systems intersect with the concept of smart cities in South Africa, and how is technology framed in this context?*
- *Q3: How do indigenous knowledge systems in South Africa influence or interact with the governance and technological frameworks of smart cities?*

These questions explore how smart city discourse conceptualises technology, how formal and informal systems are positioned within South Africa's sub-national contexts, and how indigenous knowledge, understood as a weak ontology in Stout and Love's terms (2021), introduces plural and relational ways of reshaping governance and technological frameworks amid the rigid and conflicting values that separate formal from informal systems.

Inclusion and exclusion criteria

Eligible studies underwent title and abstract screening, as well as full-text analysis, to trace definitions of technology, ontological positions, and the role of informal systems and indigenous knowledge in smart city discourse, as further illustrated in the following diagram.

Figure 1: Inclusion and exclusion criteria

Question 1: Instrumentality vs Enframing

- **Inclusion:** Studies on smart cities, digital governance, urban governance, and/or public administration that view technology as either instrumental (efficiency, control) or ontological (world-disclosure). Eligible studies included philosophical analyses (not limited to Kaplan, Ellul, Marcuse, Heidegger, etc.), conceptual papers, critical reviews, interpretive research, urban theory, qualitative case studies, and/or empirical studies. Studies were limited to peer-reviewed journal articles and book chapters in English. The study's focus included but was not limited to South Africa/Global South.
- **Exclusion:** Studies not related to urban governance, smart cities, or digital governance; as well as studies mentioning technology descriptively only, without conceptual framing or critique; or that focus on clinical, military, or corporate IT without an urban or smart city governance link. Studies that measure metrics or performance, such as adoption rates or software efficiency, without analysis were also excluded, and designs that can't address philosophical framing, such as RCTs, atheoretical surveys, or pure econometric models. Also, non-peer-reviewed sources, opinion pieces lacking depth, and non-English publications were excluded.

Question 2: Informality in South African Smart Cities

- **Inclusion:** South Africa (especially Gauteng and Cape Town); urban populations; urban communities; residents of informal settlements; informal economic actors; municipal/provincial governance stakeholders; smart city initiatives; ICT-enabled governance; digital transformation; smart infrastructure policy; urban innovation programmes affecting informal systems. Formal vs informal comparisons; comparisons across SA urban provinces; before–after studies of smart city initiatives. Outcomes on inclusivity, service delivery, informal sector integration, participation, digital inclusion/exclusion, equity, and regulatory effects. Empirical (qual/quant/mixed), reviews, case studies (2020–2025), peer-reviewed journal articles. Explicit SA link between informal systems and smart cities; SA-focused policy analysis integrating informality and smart governance.
- **Exclusion:** Populations outside South Africa; rural-only contexts without urban/smart city link; private-sector-only technological users without governance/informality context. Generic technology adoption is not linked to smart city frameworks, non-digital infrastructure, or industrial/agricultural technology. International comparisons, unless South Africa is central and contexts are unrelated to smart cities or informality. Technical performance-only outcomes (e.g., software efficiency) or unrelated economic metrics. Abstract-only conference items; non-English; opinion-pieces; dissertations/theses. Purely theoretical without SA application; formal planning/private tech roll-out with no informal-systems link

Question 3: Indigenous Governance in Smart Cities

- **Inclusion:** Communities practising Ubuntu or other indigenous knowledge systems; South African populations and/or communities in Southern Africa; Studies on indigenous knowledge/informal systems in survival strategies (e.g., communal decision-making, resource-sharing); Contextual comparisons studies: for instance, formal vs informal, urban vs rural, informal settlements vs formal governance. Studies examining outcomes related to community resilience, social capital, survival strategies, governance, and sustainability in informal settlements. Full-text empirical studies (qualitative/quantitative): case studies, ethnography, field studies. Peer-reviewed journal studies with clear methods and relevance to Ubuntu/survival strategies
- **Exclusion:** Populations outside South Africa or not relevant to Ubuntu; populations not practising indigenous knowledge systems or survival strategies. Formal governance interventions without indigenous knowledge/survival strategies; technology-based or non-indigenous systems. No comparison/contextual analysis of indigenous knowledge/survival strategies; no specific geographic or cultural context. Unrelated outcomes (e.g., health/economic performance) without connection to indigenous knowledge systems. Dissertations; theoretical papers; studies without primary empirical data/fieldwork. Non-peer-reviewed studies; grey literature; not directly related to indigenous knowledge systems and survival strategies.

The final set of studies was exported from Covidence into Excel, where detailed coding and thematic analysis followed. The structured synthesis illustrated how technology is defined and endorsed in smart city governance within the public administration discourse.

Quality Assessment

Table 1: Quality Assessment

	Strengths	Weaknesses
Q 1:	Clear aims (90% rated high), strong design coherence, robust integration of frameworks and figures, and high philosophical reflexivity.	Methodological transparency is uneven (20% weak sampling/data), ethics are inconsistently reported (65% high), and bias is rarely addressed, as most studies were theoretical.
Q 2	High clarity of objectives (97.6% high), firm cultural grounding (90.6% high), survival strategies well-defined (88.2% high). The predominance of low bias in results (72.9%) indicates strength in minimising distortion in the findings.	The relevance of indigenous knowledge is uneven (23.5% low), while transferability is moderate (77% high).
Q3	The integration of formal/informal perspectives is high (75%), reflexivity is approximately 70% high, and overt bias is low (70%).	Approximately 20–25% of studies underreported recruitment/data handling, around 25% lacked reflexive engagement with positionality, and ethics were only 65% strong.

The quality assessment indicates that the *Q1-Q3* sources selected for this review are conceptually and contextually relevant, providing clear aims, cultural grounding, and a well-integrated perspective across the three questions. At the same time, the uneven reporting of methodological details, reflexivity, and ethics reveals a gap in the evidence base for further research and underscores the need for careful interpretation. These strengths and

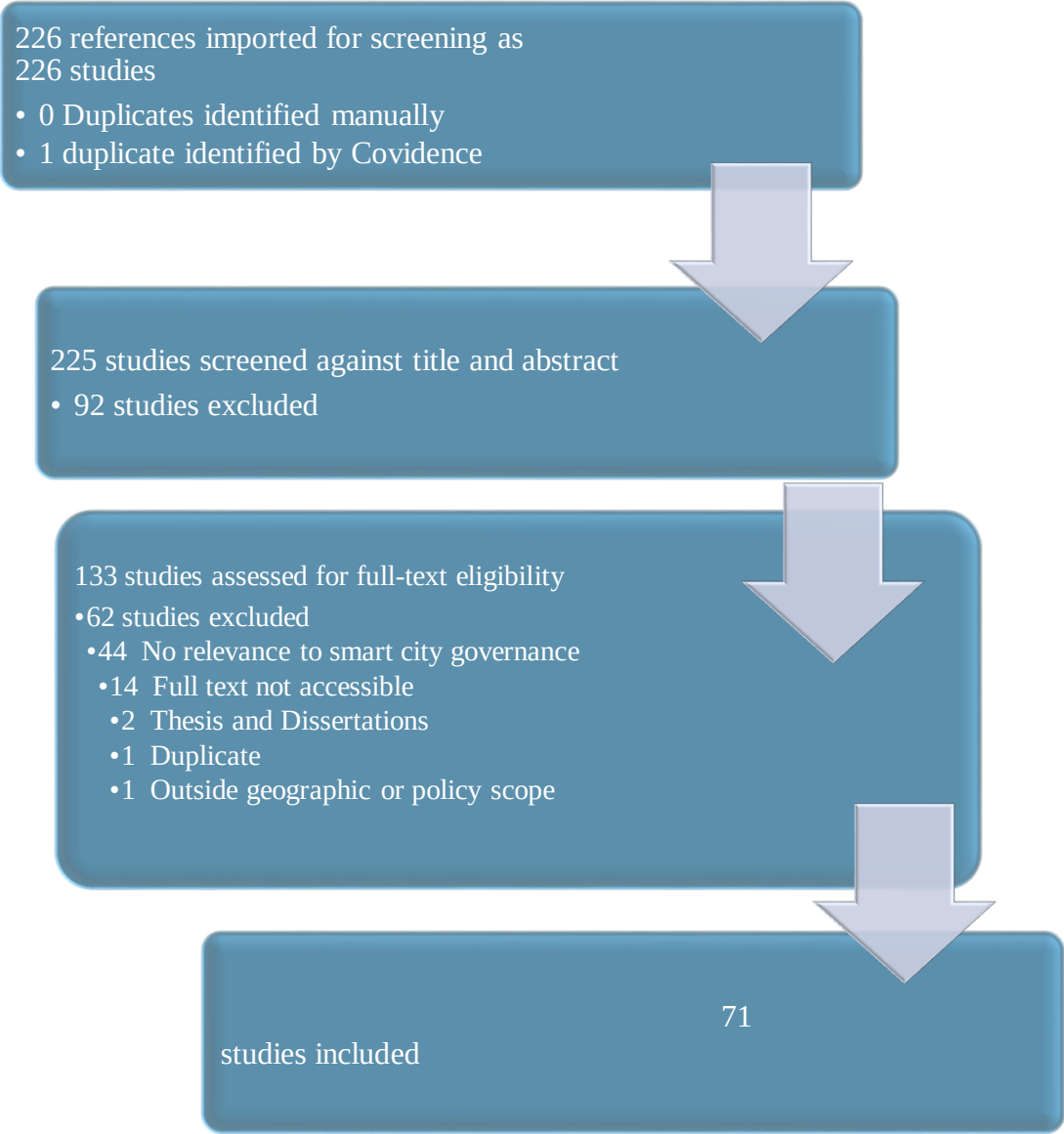
The quality assessment applied standard criteria for conceptual and empirical research, including clarity of aims, design coherence, coverage, reflexivity, ethics, cultural grounding, and transferability. Each criterion was rated across (*Q1-Q3*) to evaluate the conceptual robustness, methodological transparency, and reflexive engagement of studies.

weaknesses confirm both the value and the gaps in existing scholarship.

Technology as an Instrument or Mode of Revealing

Guided by the philosophical grounding, this paper (*Q1*) asks whether smart city technology is conceived as an instrumental tool for efficiency and a *mode of revealing* and shaping governance realities.

Figure 2: PRISMA Question 1



Exported from Covidence software

Figure 2 presents the PRISMA flow diagram outlining the selection process. Ultimately, 71 studies met the inclusion criteria, and data extraction focused on how technology discloses or orders

realities in smart cities, particularly through philosophical critiques. The literature reviewed reflects a broad philosophical spectrum, ranging from Phenomenology and Existentialism to

Social Constructivism and and cognitive lenses, as tabulated below.
Posthumanism, each framing smart city governance through distinct normative

Table 2: Philosophy and Normative

Context	Covidence #	Philosophical Underpinnings
Phenomenology & Existentialism	193, 148, 117, 116, 115, 108, 104	Husserl, Merleau-Ponty, Don Ihde, Gadamer, Wittgenstein, and Dreyfus
Technological Ethics & Critical Theory	131, 62, 17, 22	John Gray's scepticism, Herbert Marcuse's critical theory, Hans Jonas's ethics, Luciano Floridi's information ethics, and Ellul's analysis of technological control.
Heidegger & Related Ontologies	212, 188, 176, 174, 170, 176, 105, 104	Heidegger, Bachelard, Teilhard de Chardin, McLuhan, Simondon, Sloterdijk, Marcuse
Social Constructivism & Actor-Network Theory	212, 36, 41, 33	Bruno Latour's actor-network theory, socio-technical imaginaries, Foucault's power techniques, and institutional logics shaping technology and governance.
Posthumanism/ Transhumanism	197, 89, 76, 9	Transhumanist philosophies, post-anthropocentric theories, Indigenous data sovereignty, and critical realism in examining the role of technology in transcending human limits.
Resilience, Ethics, & Sustainability	51, 49, 42	Resilience thinking, cultural resilience, urban commons theory, and socio-ecological systems theory for sustainable, rights-based smart city development.
Cultural & Social Philosophy	148, 131, 75, 47	Aristotle, Arendt, Ricoeur, MacIntyre, and Habermas are among the key thinkers discussed for their insights on technology, ethics, social theory, and governance within urban contexts.
Critical Urbanism & Governance	85, 74, 35, 33, 30	Critical urbanism, open governance, resilience-thinking, and urban informatics
Applied Systems Analysis & Decision Science	87, 73, 72, 70	Systems analysis, decision science, engineering, modelling, and multi-criteria decision-making methods

According to Table 1, the reviewed literature (*see reference in figure 2*) distinguishes between instrumental accounts of technology and ontological modes of revealing. The Applied Systems Analysis & Decision Science (87, 73, 72, 70) treat technology as a calculative tool to optimise governance outcomes. Whereas

Critical Urbanism & Governance (85, 74, 35, 33, 30) adopts technology as an enabler of governance, performance, and service delivery. Phenomenology & Existentialism (193, 148, 117, 116, 115, 108, 104) demonstrate the instrumentality of technology by treating technology as embodied mediation, an equipment-in-use,

and a bridge between instrumentality and revelation (Riemer & Johnston, 2014). Marcuse, Ellul, Jonas, and Floridi critique the instrumentality of technology, arguing that technology operates as a means or a rationality system (Ellul, 1964, p. 567; Marcuse, 1964, pp. 157-159; Kaplan, 2009, p. 1). Explicitly, the table illustrates that the instrumental logic dominates the smart city literature, especially in governance frameworks, applied systems and ethical critiques. On a side note, Heidegger and

related ontologies in the literature (212, 188, 176, 174, 170, 105, 104), view technology as a mode of revealing that both discloses and conceals reality. Additionally, Simondon, Latour, Foucault, and post-humanist theorists reinforce the idea that technology actively structures what becomes visible and valuable in smart city discourse. The predominance of the instrumentality logic further probed the exploration of modes of technology presented in Figure 3 below.

Figure 3: Mode of Technology

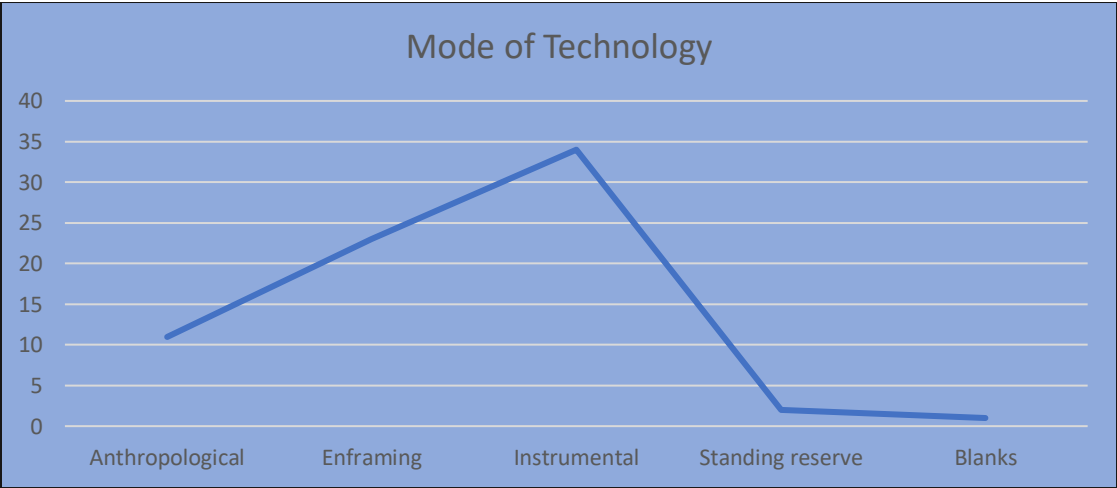


Figure 3 illustrates that the instrumental framing dominates (50%), indicating that technology is comprehended as a tool for problem-solving rather than as a force that shapes human beings. Smart city discourse technology is a neutral, efficiency-driven tool to solve problems. ICT dashboards and AI decision tools are justified in terms of efficiency, optimisation and competitiveness, and this is considered a mainstream framing in the literature. A few studies imply that technology reveals everything, including informal life, as raw materials for exploitation, insinuating the standing reserve notion. Technology is

understood through Heidegger's Gestell as ordering, regulating and reducing phenomena into calculable forms. Standing reserve reduces entities to resources awaiting deployment. These include data to be harvested or inputs into optimisation algorithms. A strong enframing strand (40%) implies a critical awareness that technology orders and formalises informality into calculable systems. The smaller category of anthropological 16% emphasises citizens' needs, social acceptance and technology as an extension of human capabilities. For instance, ICT platforms are designed to make life easier.

Technology and Instrumentality

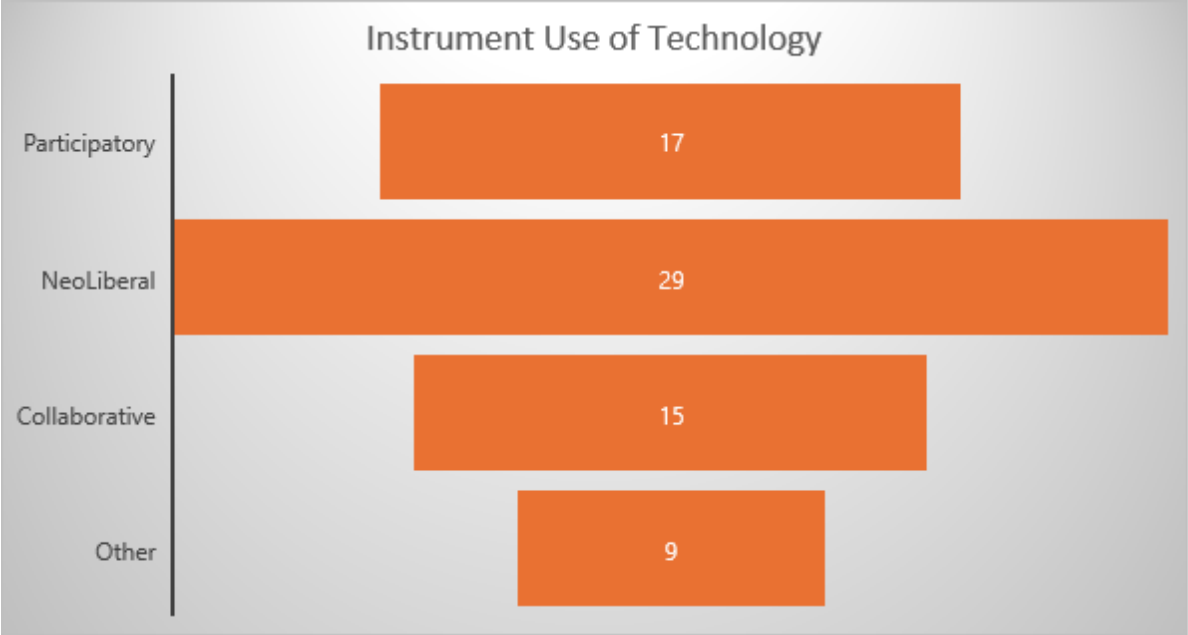
The instrumental logic frames technology in smart city discourse as a neutral tool

directed toward predefined goals, such as efficiency, control, and rational planning. Within this logic, technology is both a means-to- an-end and a human activity that

reflects both instrumental and anthropological definitions (Kaplan, 2009, p. 9; Blitz, 2014). The essence of technology is reduced to purpose and utility, where artefacts are valued for their function within a causal chain that links them directly to the outcomes they are designed to achieve (Heidegger, 1977, p. 10; Kaplan, 2009, p. 9). Dreyfus (1995:25) and Kaplan (2009:9) both argue that this instrumental perspective frames technology as a problem-solving mechanism, where every situation is analysable, manageable, and controllable through technical intervention. In parallel, the anthropological definition considers

technology as something created by and for human beings. This perspective asserts that technology is an extension of human intention, formed through rational processes and oriented toward mastery over nature (Heidegger, 1977, p. 5; Blitz, 2014, p. 64). It assumes human agency to be the driving force behind technological development and treats nature as a passive object awaiting transformation. This assertion further supports the literature findings that follow.

Figure 4: Instrumental Use of Technology



As shown in Figure 4, the literature highlights that, under neoliberalism, smart city technology primarily functions as a market-driven instrument of optimisation. Whereby, technology to enhance efficiency, competitiveness, and economic growth (Bandaiko & Arku, 2023). Smart meters, automated traffic management, and data-driven urban planning exemplify this orientation. Drawing on Giffinger et al.'s (2007) six dimensions, neoliberal smart cities prioritise ICT infrastructure, global connectivity, innovation, and performance measurement as key vehicles for competitiveness (Cerny, Menz, &

Soederberg, 2005). In this sense, technology is less a medium for inclusion than a mechanism for economic control and privatisation (Davis, 2017). This reflects what Heidegger (1977) described as calculative thinking, in which efficiency imperatives order urban life, and citizens are reduced to standing reserves—resources to be optimised and managed (Blitz, 2014; Dreyfus & Spinoza, 2003).

Smart city technology fosters interconnectedness, transparency, and social trust by enabling collaborative decision-making, consensus-building, and

inclusive governance processes (Graham, Plumptre & Amos, 2003; Pomeranz & Stedman, 2020). Digital feedback platforms and health initiatives, in Johannesburg, Cape Town, and Nairobi, exemplify efforts to embed the values of accountability, equity, and sustainability (Musakwa & Mokoena, 2016; Toit & Stimie, 2023). This lens resonates with Heidegger's critique of instrumentality by emphasising technology's role in structuring relationships rather than merely solving problems. Nevertheless, even these governance-oriented initiatives are not free from the logic of enframing, since participation is still mediated by predefined technological parameters (Kaplan, 2009). Thus, collaborative governance resists being haunted by the risk of reducing inclusion to calculable categories. Further, extensive literature within the participatory framework positions technology as a tool of empowerment, a means to deepen citizen engagement and collective problem-solving in urban systems. Open data portals, crowdsourcing applications, and participatory governance platforms embody this orientation (Musakwa & Mokoena, 2016; Toit & Stimie, 2023). Technology is reduced to instrumentality—a neutral tool that extends human agency to achieve democratic goals (Kaplan, 2009; Blitz, 2014). This echoes Kaplan's "instrumental" and "anthropological" definitions of technology, which conceive of technology either as a means to an end or as a human creation (Kaplan, 2009). While these perspectives correctly describe how technologies function, they risk narrowing engagement to calculative problem-solving logics (Dreyfus, 1995). At the same time, it reinforces the instrumentalist view by presenting smart cities and their inhabitants as entities to be optimised, calculated, and used for functional utility.

Technology as a Mode of Revealing

Martin Heidegger argues that technology's true essence does not lie in tools, machines, or ICT devices but in a mode of revealing—a process that unconceals truth (Heidegger, 1977, p. 13; Kaplan, 2009). Heidegger shifts attention away from the functional use of devices and instead considers how technology shapes our understanding of reality (Heidegger, 1977, p. 13; Dreyfus, 1995, p. 26; Blitz, 2014, p. 69). This orientation places technology within the realm of being, not merely as something we use, but as something that configures the way we experience and interpret the world (Dreyfus, 1995).

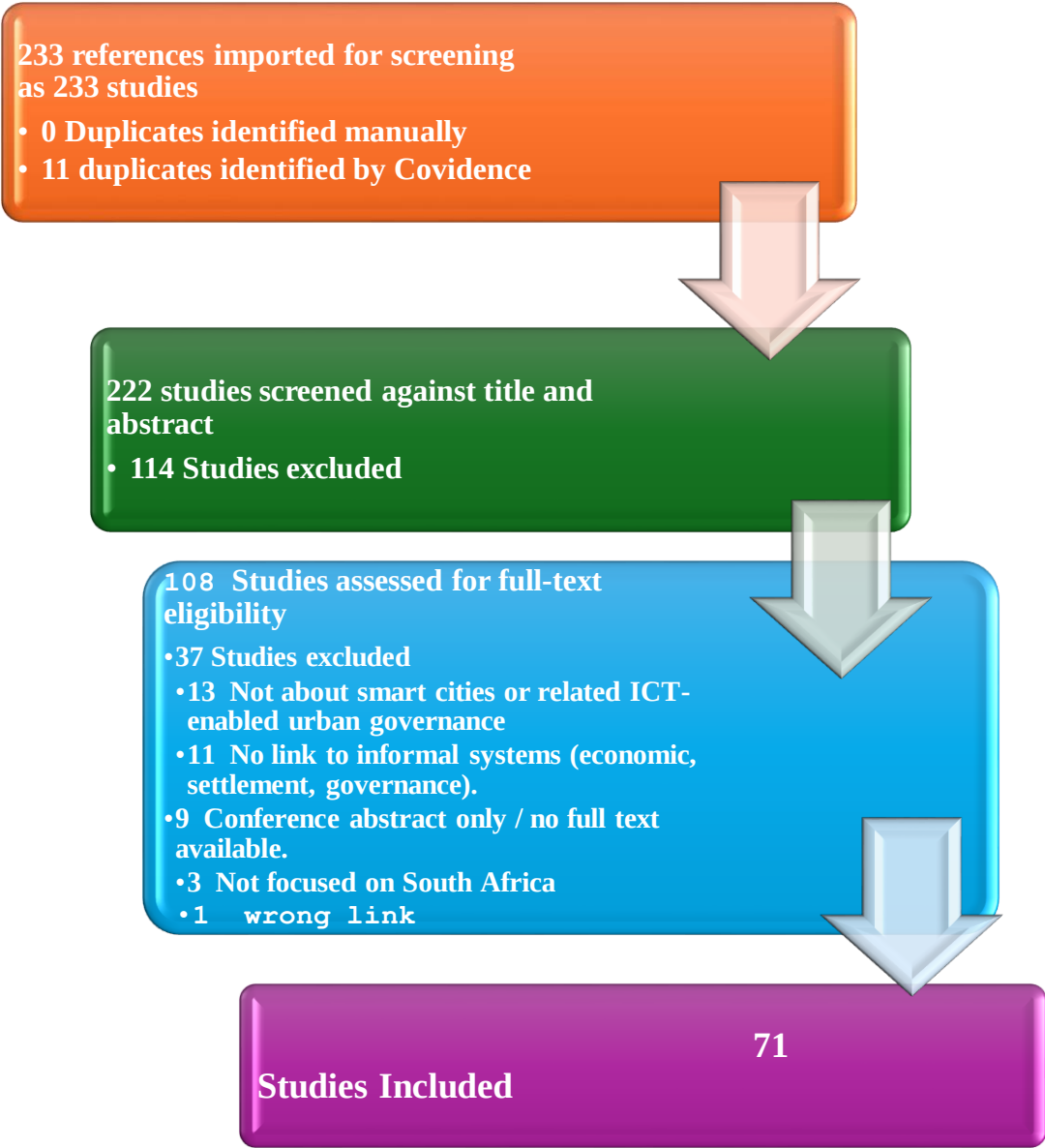
Contemporary philosophical discourse, grounded in Heideggerian thought, explores how modern technology reveals itself through a process called *challenging forth* (Blitz, 2014:68, 71). Before using something technologically, it must already appear to us as a resource, whereby revelation occurs before technical application (Blitz, 2014, p. 71). In this challenging context, nature is ordered, stored, and transformed for endless use (Dreyfus & Spinoza, 2003, p. 342). Everything in this mode of revelation becomes a *standing reserve*, whereby the environment, humans, and systems appear only in terms of their utility or availability (Dreyfus & Spinoza, 2003, p. 342). In this regard, challenging forth leads to *enframing* (Kaplan, 2009, p. 16). Enframing turns everything, including humans, into a standing reserve, with all beings and entities waiting to be used for some further purpose (Heidegger, 1977:17–18; Dreyfus, 1995, p. 28). Unlike traditional technology, which disclosed beings in harmony with nature, modern technology imposes a calculative order that renders everything as resources held in readiness for future use (Blitz, 2014, p. 71; Dreyfus & Spinoza, 2003, p. 342). In this mode of revealing, the human being becomes an object of optimisation, measurable and controllable like any other resource (Heidegger, 1977:17–18; Blitz, 2014, p. 67). Blitz, Dreyfus, and Spinoza

collectively argue that this technological revealing limits the range of human experience and narrows the conditions under which beings can appear meaningfully (Dreyfus & Spinoza, 2003, p. 342; Blitz, 2014, p. 71). Harman (2010:17–22) further suggests that this is not a temporary or lamentable outcome, but an inescapable facet of modern being.

The reviewed literature shows that most studies adopt instrumentalist views, while philosophical critiques reveal how technology actively shapes urban life. Heidegger's perspective shifts smart city thinking from treating technology as a mere function or artefact to recognising its role in structuring lived reality. This critical gap explains the continued exclusion of informal systems and is examined further in the next section.

Informal Systems in South African Smart Cities

Figure 5: PRISMA FOR QUESTION 2



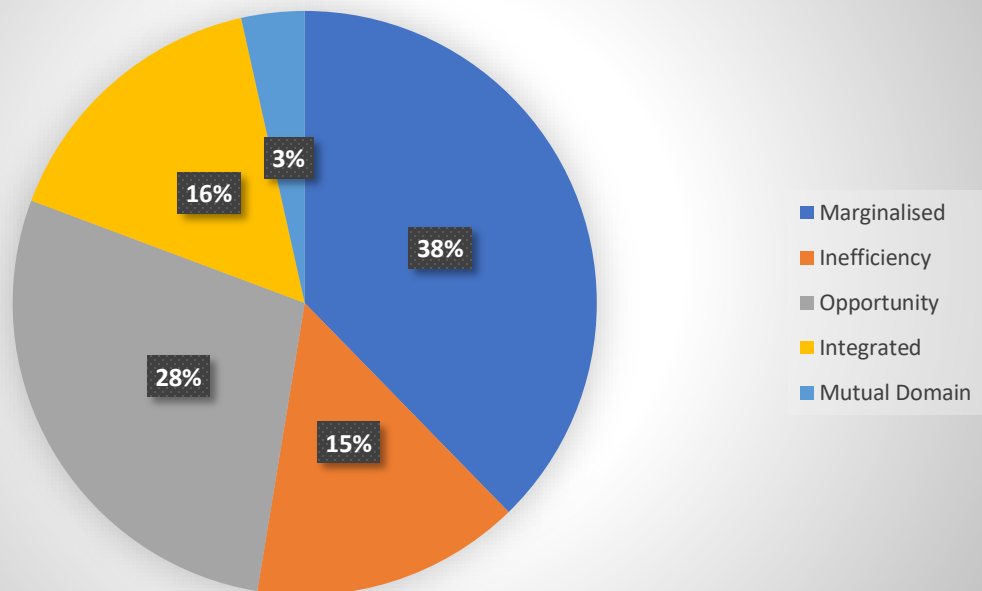
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Figure 5 presents the PRISMA flow diagram outlining the selection process. Ultimately, 71 studies met the inclusion criteria and were analysed. Regarding informal systems, a question was raised about how the literature has framed this

population group in the context of smart city development.

Figure 6: Enframing Informal Systems

Enframing Informal Systems



The literature reviewed in Figure 5 showed that informal systems in South African smart city discourse are predominantly marginalised (38%) and regarded as inefficient (15%). At the same time, they are portrayed as burdens to be disciplined, corrected, or eliminated. This aligns with Heidegger's notion of enframing, where technology orders reality by rendering informal systems as standing reserve—in other words, inefficiencies to be optimised, data to be harvested, or markets to be exploited. As Heidegger (1977:18) and Kaplan (2009:16) describe, enframing challenges beings into availability, reducing them to mere utilities ordered for technical purposes. This logic becomes especially apparent in smart city plans that seek to formalise, digitise, or regulate informal realities. In South Africa, city planners treat informal settlements as irregular-density zones to be rezoned and restructured into smart living spaces. Musakwa and Mokoena (2017:15) argue that these settlements represent poor living conditions requiring formalisation and integration. Similarly, officials interpret informal economies, such as street vending

and stokvels, as productivity gaps, promoting entrepreneurship initiatives that dismiss their legitimacy as self-sustaining economic systems. Das (2020:75 76) adds that authorities seek to transform self-employment, including street vending, through branding and formal registration. In a similar vein, Oke et al. (2020:112) positioned informal economic activities as underdeveloped sectors that require policies that encourage entrepreneurship to boost their development.

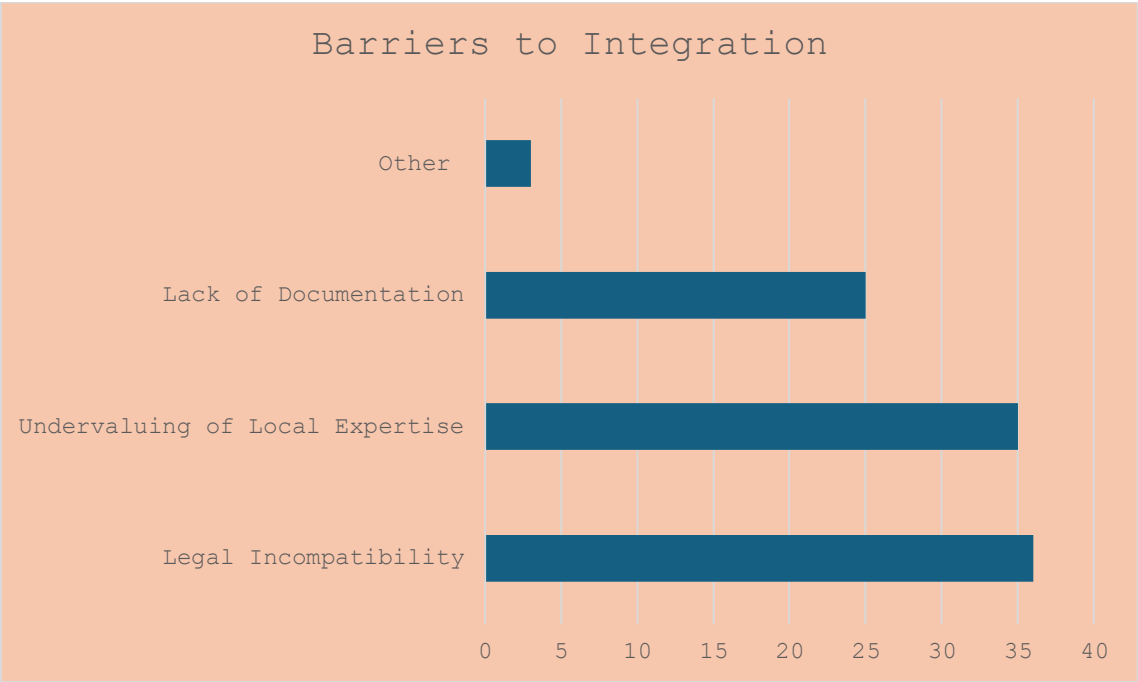
In South Africa, minibus taxis are often perceived as chaotic and ungovernable (Musakwa & Mokoena, 2017, p. 17), inefficient, and lacking innovation and sustainability (Das, 2020:77). These weaknesses have been used to justify the development of BRT systems as a formalised mass transit in major metros. Bus Rapid Transit systems are designed to improve reliability and efficiency through dedicated, controlled routes that together enhance safety and reduce travel time. In this framing, BRT becomes a mechanism for modernising and restructuring urban public transport by introducing performance standards. According to Oke

et al. (2020:113), smart mobility involves capturing real-time data and analysing it using smart hardware, such as sensors. ICT then reduces mobility systems to data and emission problems that it can fix. Informal environments, such as self-dug wells and improvised sanitation systems, are terrains of risk, rather than expressions of living (Musakwa & Mokoena, 2017, p. 15). Explicitly, informal urban ecosystems are insufficient and require transformation (Oke et al., 2020, p. 111).

Scholarly studies (Oke et al., 2020; Das, 2020; Nephawe, 2023; Meijer, 2016) interpret informal systems predominantly as technical deficiencies that require standardisation, regulation, or elimination, rather than recognising them as relational participants in urban governance. Formal governance objectives reframe these systems to prioritise the creation of smart economies, environments, mobilities, and

communities. This process of enframing, as reflected in South African smart city models, reveals a deeper ontological tension, whereby informal systems are not engaged for their intrinsic governance capacity or embedded knowledge, but are instead rendered available for transformation and adaptation. Formal governance structures attribute value to informal systems according to their potential for assimilation into predetermined development trajectories. Consequently, enframing does not just order informality as standing reserves; it produces very concrete legal, epistemic, and documentary obstacles that make inclusivity in governance difficult. The literature reviewed in Covidence converges on three dominant exclusion categories.

Figure 7: Barriers to Integration



The reviewed literature, illustrated in Figure 5, indicates that, due to *legal incompatibility*, informal systems often

operate in grey zones. These include backyard rentals, unlicensed taxis, shack-lord utilities, para-transit, and waste

reclaimers. This leads to a lack of recognition (#142, #150, #156), the cultivation of illegal practices (#153, #148), and weak regulation (#49, #45). This lack of documentation leads to exclusion from planning (#152, #142, #19), which in turn causes conflict with formal procedures (#66)—culminating in exclusion from smart city plans, weak integration into infrastructure (#110, #141). A lack of documentation makes integration difficult because informal practices are criminalised, unrecognised or just tolerated without protection. Therefore, formal institutions are too rigid to engage with them without rewriting the regulatory frameworks.

Concerning the *undervaluing of local expertise*, the reviewed literature illustrated in Figure 5 state that community knowledge, which includes survivalist strategies, mobility patterns, waste recycling, and grassroots planning, is consistently marginalised, lived knowledge (#184, #136), indigenous epistemologies (#152, #39, #33), grassroots protests and enumeration (#135, #143). Community-driven processes (#141, #8, #9) are sidelined, resistance is framed as obstruction (#135), and there is a lack of participatory mechanisms (#12, #27). Integration is blocked because formal governance frameworks for smart city development do not recognise indigenous or tacit knowledge, instead privileging technocratic and standardised knowledge. This creates epistemic injustice, thus treating informal actors as data gaps rather than knowledge holders.

Informal practices are under-documented, invisible in data systems, or misrepresented. This creates a recognition gap where city planners lack credible records to legitimise informal practices. Ad hoc practices are undocumented (#13, #99), including the prevalence of weak governance capacity (#49), and a lack of procedural space (#71). Absent legal categories (#22, #10), poor recognition of operators (#13), and weak protection (#12).

Without systematic documentation, informal systems remain invisible to formal institutions, which reinforces why exclusion persists. However, a small portion of codes capture residual barriers, such as resistance to digitalisation (#30, #56), mistrust of authorities (#99, #74), or fragmented representation (#119). These are less dominant but still reveal context-specific tensions that complicate integration.

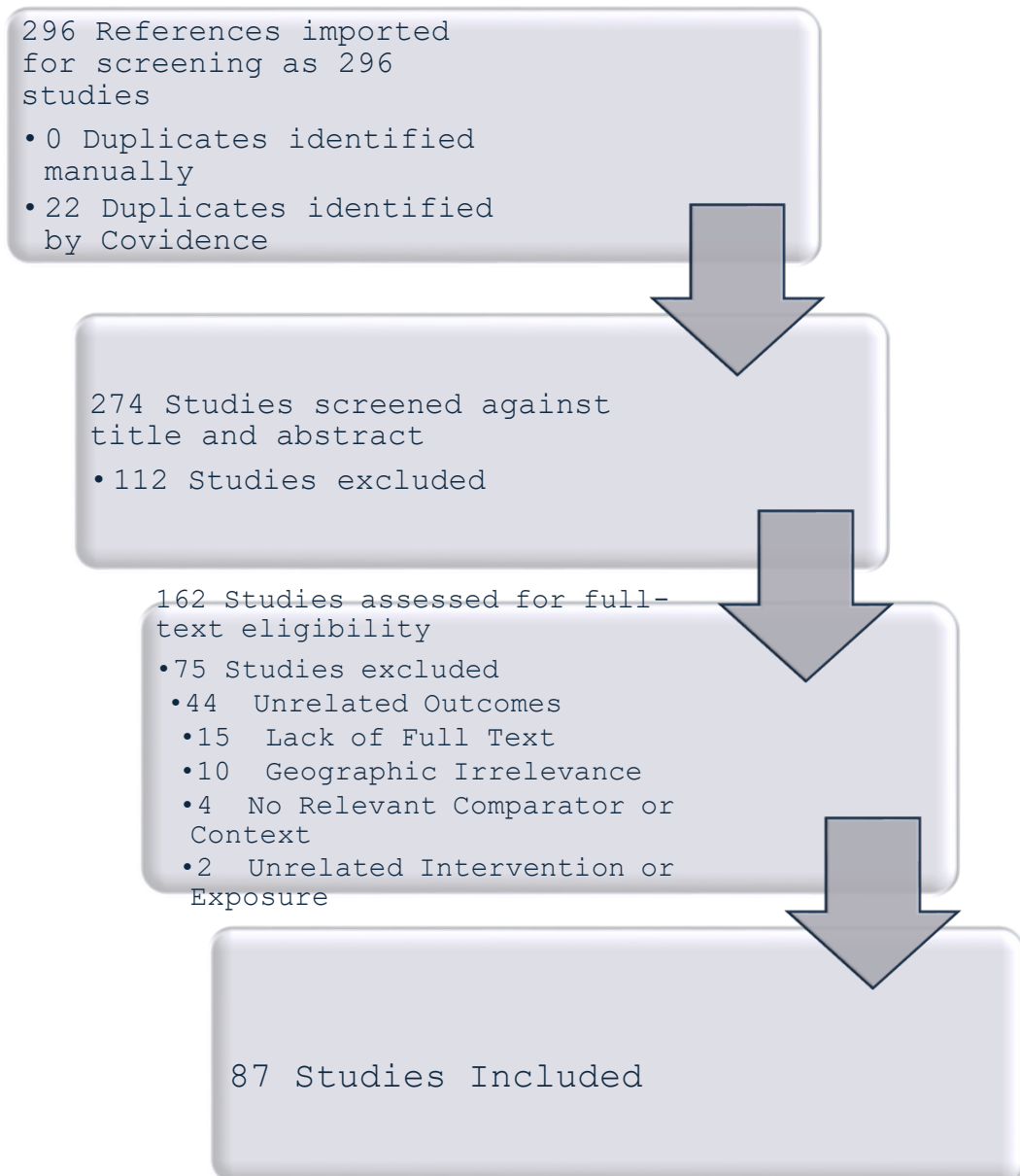
The barriers identified, including legal incompatibility (36%), undervaluing of local knowledge in information systems (35%), and a lack of documentation (25%), reflect the persistence of rigid systems in smart city governance. Stout and Love (2015) and White (2000) argue that rigid, fixed, and colonising systems reduce being to what is legally codified, procedurally sanctioned, or spatially legible to the state. As a result, informal systems are criminalised as illegality (#153, #148), excluded from planning (#152, #19), or erased from spatial imaginaries (#110, #141). Indigenous knowledge is not recognised as epistemic substance but dismissed as “data gaps” (#71, #22, #72). These reviewed findings reflect Heidegger's standing-reserves, in which informality is reduced to data, inefficiency, or a risk to be corrected. This illustrates a profound ontological colonisation in which only technocratic truth claims (Stout & Love, 2021) are permitted in smart city governance, while foreclosing the plurality explored in Q3.

Indigenous Knowledge and Relational Alternatives

Building on this ontological colonisation, the analysis turns to whether smart city literature engages with weak ontologies rooted in indigenous knowledge such as Ubuntu, communal practices, and ecological stewardship as outlined by Stout and Love (2021). This shift foregrounds the governance frontier: can smart cities loosen rigid technocratic logics and evolve into

relational, culturally grounded systems of
co-governance?

Figure 8: PRISMA for Question 3

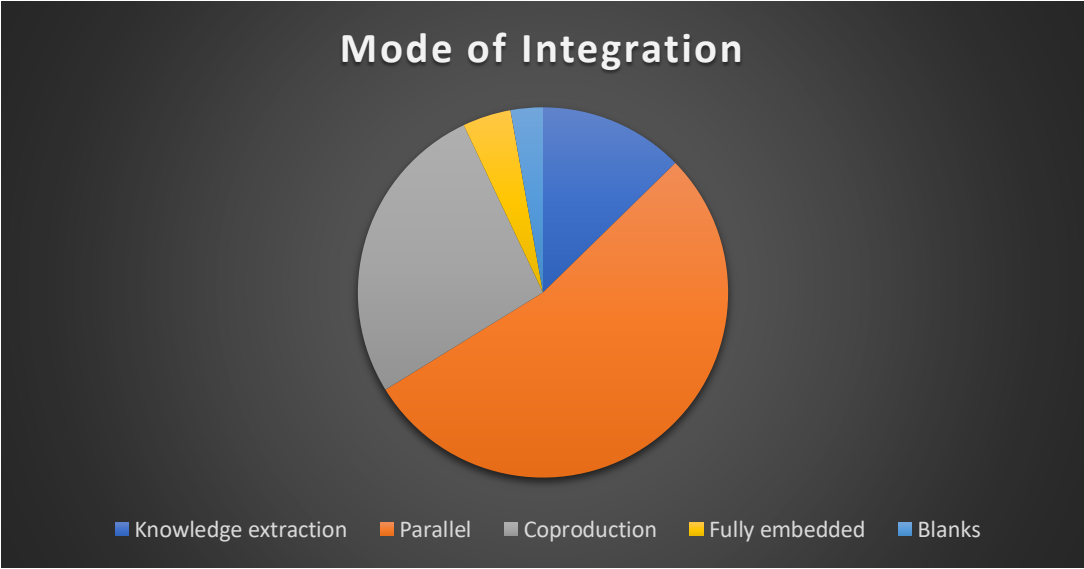


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Figure 8 presents the PRISMA flow diagram outlining the selection process. Ultimately, 87 studies met the inclusion criteria, and data were extracted to examine whether relational ontologies embedded in indigenous knowledge, such as Ubuntu,

Figure 9: Mode of Integration

communal practices, and ecological stewardship, are acknowledged, ignored, or incorporated. The findings from the reviewed literature are discussed to illustrate the deepened ontological contrast.



Indigenous and informal knowledge undeniably exists within the smart city discourse. However, it is vehemently not accepted, reduced instead to extractable data, and tolerated parallel systems without genuine recognition, sometimes as coproduction or fully embedded. Concerning knowledge extraction, informal practices serve as valuable data sources to be mined. The data is valuable only as extractable inputs, while erasing the lived experiences. Regarding the parallel coexistence, formal and informal systems operate side by side with genuine interaction. In this regard, informal systems are tolerated or mined without recognition.

They are allowed to persist, but as a standing reserve, to be excluded from the category of legitimate governance. Coproduction and fully embedded open what Heidegger determines as a place where danger grows, the saving power (Kaplan, 2009). Knowledge extraction and parallel existence revealed the possibilities of another way of revealing. Thus, alerting to what is missing, and opening a window of opportunities and a breakthrough. The limits of *enframing* reveal the significance of weak ontologies, particularly Indigenous knowledge and survival strategies, as further illustrated in the following table.

Table 3: Indigenous Knowledge and Survival Strategies

Type of Knowledge	Covidence #
INFORMAL HOUSING	148, 56, 67, 65
INFORMAL ECONOMY	93, 84, 47, 12, 52, 49, 12, 59, 60, 99, 143, 140, 172, 94, 116, 53, 136, 58
INFORMAL GOVERNANCE	224, 30, 150, 138, 140, 152, 39, 26, 19, 25, 19, 17, 9, 8, 6,2,1
INFORMAL MOBILITY	142, 74, 66
INFORMAL PEOPLE	29, 27, 25, 21, 19, 17, 13, 3, 2,1
INFORMAL PEOPLE	156, 29, 27, 25, 21, 19, 17, 13, 3, 2, 1, 149, 22, 72, 84, 140, 118, 110, 33, 30, 39, 26, 153
INFORMAL ENVIRONMENT	142, 71, 76, 59, 136, 56, 34

The reviewed literature in figure 8 illustrates that informal housing adapts to urban challenges through informal rental practices (148), spatial repurposing (67), and street trading (65), demonstrating how residents shape housing and settlement spaces outside of formal systems. Such practices embody resilience in a failing housing system in South Africa, and signal tensions with formal planning systems. Concerning the informal economy, these draw heavily on communal finances and grassroots innovation. Ubuntu-based mechanisms (stokvel, burial societies, black tax illustrated by #93, 84, 47, 12, 52, 49) create safety nets. Women adapt household economies through collective savings (84), while grassroots entrepreneurship manifests through apprenticeships (#140). This reflects a system of indigenous innovations rooted in social and communal networks. Further, the informal governance system emphasises communal authority, legitimacy, and restorative approaches. Conflict resolution (39, 26) and community policing forums (152) demonstrate hybrid models of security, while Ubuntu

philosophy (25, 19, 17, 9, 8, 6, 2, 1) frames governance as a collective responsibility. These governance initiatives reflect co-governance. Mobility illustrates adaptation in navigating social and ecological constraints. Khoikhoi transhumance (#142), reflects long-standing environmental adaptation, and citizenship-based infrastructure adaptations (#66), show continuity between indigenous mobility and contemporary urban resilience. Consequently, indigenous knowledge in housing, economy, governance, mobility, people, and the environment provides alternative logics of resilience and survival because it is profoundly relational; these survival strategies supplement and support failing formal smart city governance systems. While challenging Western bureaucratic logics of hierarchy and efficiency, it engages with plural and relational governance alternatives.

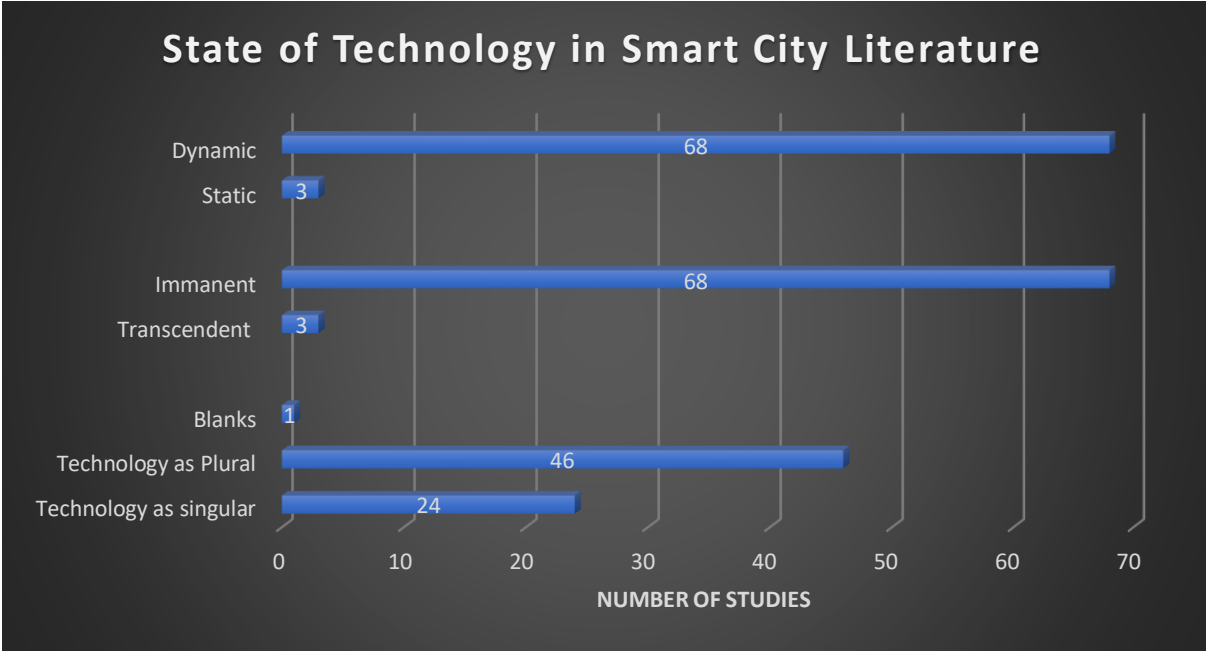
Transforming Governance Frontiers

Findings from Q1–Q3 reveal that the challenge facing informal systems in smart city governance lies less in inefficiency

than in an ontological conflict rooted in the concept of enframing. Formal systems privilege Western individualism, calculability, bureaucracy, and codified knowledge, reducing urban life to a standing reserve of data, procedures, and spatial order in the South African context. In contrast, informal systems disclose the city through lived experiences and survival strategies, offering alternative modes of urban life that resist technocratic reduction. These divergent modes of revealing confront one another. One mode orders reality through conceptual enframing, reflecting a strong ontology, while the other opens a world grounded in communal being and flexibility, embodying a weak ontology (Stout & Love, 2021). Strong ontologies are characterised as fixed and rigid, claiming to represent permanent truth. As such, they are colonising in nature when confronting difference (Stout & Love, 2021, p. 430). Whereas weak ontologies are either open to contestation

and plurality or inherently embrace change and fluidity, which enables adaptation (Stout & Love, 2021, p. 430). Explicitly, the literature findings demonstrate a firm reliance on a hybrid, atomistic and hierarchical Western liberal strong-ontology perspective. Atomistic privileges individualism, calculability, datafication and positivist empiricism as well as competitive market logics. Hierarchical structures lean on bureaucracy, legality, proceduralism, spatial ordering, and then coercive authority. To reinforce, Smart City discourse reduces life to discrete, measurable units (285, 244, 213, 210, 60). Quantitative monitoring of service usage, housing needs, and citizen movements (285, 213). Master planning imposes rigid spatial order, sidelining adaptive upgrading (271, 212, 45, 62): hierarchical policing and top-down authority as centralised mechanisms of control (278, 260). The following findings confirm this assertion.

Figure 10: State of Technology in Smart City Literature



The reviewed literature shows that technology is conceptualised as immanent,

dynamic, and plural; yet, urban life is still reduced to multiple data points, flattened

into commensurable metrics for optimisation. While these pluralities appear to acknowledge difference, they are flattened into commensurable metrics. At the same time, a hierarchical singular ontology remains present, privileging order, legality and spatial rationalisation. This produces a hierarchy of dominance, Atomistic over Hierarchical, where calculative pluralism leads, while hierarchical order stabilises and legitimises technocratic authority. These privilege Western individualism, proceduralism, and formalised knowledge systems, while enabling ontological colonisation, as identified by Stout & Love (2021:431).

On another note, informal systems embody weak, relational ontologies. These expose the limits of Western bureaucratic rationalities and offer pathways of adaptive governance that weaken the hold of strong ontologies in smart city paradigms. Indigenous Knowledge Systems and spirituality (Amoah, 2010) embody a weak ontology grounded in relational process. In this paper, indigenous knowledge systems do not erase order but weaken its rigidity through *restorative conflict resolution* (176, 130) and *Ubuntu-inspired economic reciprocity* (225, 44, 69), amongst other knowledge systems presented in Table 2. Remarkably, the truth is not fixed in singular law or calculative metrics but emerges through *interdependence, kinship, and dialogical* becoming. Stout & Love (2021: 431–432) argue that such weak ontologies allow governance to remain open to contestation and plurality, offering integrative pathways where strong atomistic and hierarchical claims are

infused with *communal spirituality*, reciprocity, and care.

Across smart city domains, Atomistic and Hierarchical principles grounded in TPA, NPM, and NPS stabilise governance by privileging legality, bureaucracy, and procedural order (TPA) and calculability, efficiency, and market rationalism (NPM). Order and predictability are provided, but rigidity narrows admissible truths and systematically excludes informal practices and indigenous knowledge. In contrast, indigenous knowledge systems grounded in *ubuntu caregiving, communal tenure, cooperative finance, restorative justice, tacit wisdom, and solidarity economies* mitigate this rigidity without compromising order or efficiency, resulting in ICTs that operate within relations of reciprocity, stewardship, and coproduction.

Through integrative governance as a transformative frontier, the stabilising strengths of strong ontologies are not discarded; instead, their enframing grip is loosened by infusing weak, indigenous, and relational ontologies. TPA and NPM principles operate through enframing, ordering urban life into calculable, procedural standing-reserve laws and metrics within the smart city discourse. However, city planning and technological metrics should not be imposed as fixed frameworks, but rather co-designed with communities and open to plurality. As a result, transformative governance frontiers shift from rigid technocratic domination towards a more relational and revealing approach, anchored in order but responsive to plurality.

Conclusion

Smart city development in South Africa reveals a governance paradox: informal systems possess indigenous knowledge vital to urban life. However, it is often regarded as inefficiencies to be eliminated or data to be extracted without being acknowledged. This paper applies

Heidegger's concepts of the essence of technology and the mode of revealing, and utilises the saving power of enframing by viewing indigenous knowledge as a relational ontology. The paper suggests that effective governance must adopt an integrative, relational approach to public

administration. Future research should investigate how relational governance can be formalised within smart city planning,

utilising legal pluralism, co-designed technologies, and the acknowledgement of indigenous epistemologies.

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