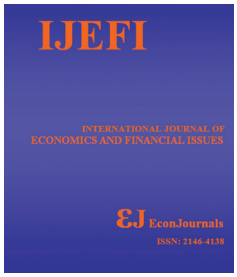

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Institutional Pathways to Africa's Resource Self-Reliance: A Systematic Review of Governance, Digitalisation and Sustainability Dynamics

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ABSTRACT

Africa's persistent paradox of resource abundance and economic dependence underscores a structural gap between abundant natural resources and institutional capabilities. This study synthesises multidisciplinary evidence on how governance quality and digitalisation jointly promote sustainable, self-reliant resource economies in Africa. Adopting the PRISMA methodology, we reviewed research outputs (2017-2025) and applied a tightened inclusion criterion requiring governance or digitalisation-related content in the titles, abstract and keywords. The study adopts an integrated framework that incorporates institutional theory, the resource-based view and dynamic capabilities theory to explain how institutional factors and digital readiness co-develop resilience and inclusivity in value creation. From the search, twenty-one studies met the criteria, concentrated in energy and extractive sectors, with institutional analyses distributed across Micro (2), Meso (3) and Macro (16) levels. Findings reveal a sharp rise in scholarship between 2023 and 2025, reflecting increased attention to digital governance reforms and sustainability-driven policy frameworks aligned with IFRS S1/S2 and the Agenda 2063 framework. Thematically, findings reveal that: (i) governance transparency and enforcement are drivers of accountability, (ii) digitalisation is a catalyst for traceability, fiscal efficiency and stakeholder inclusivity, and (iii) sustainability is achieved through the integration of governance and digitalisation. The study proposes a triadic conceptual framework that links institutional capacity, digital transformation and sustainability, highlighting the need for unified regional standards, adaptive and flexible governance, and capacity-building across Africa. The study concluded with actionable pathways, including regulatory coherence, data transparency, cross-border digital infrastructure, green industrial policies, and public-private partnerships, all aimed at Africa's energy and extractive sectors.

Keywords: Africa, Resource-Based Economy, Institutional Quality, Digitalisation, Self-Reliance, PRISMA
JEL Classifications: O13, O17, O33, Q01, Q32

1. INTRODUCTION

Global statistics and research affirm that Africa holds a significant share of the world's natural resources (oil, gas, minerals, arable land) and a rapidly growing population (Nakouwo et al., 2023; Papa et al., 2023). However, the continent and its nations consistently underperform and struggle to convert their natural assets and endowments into long-term sustainable prosperity (Huang et al., 2025; Olaniyi and Odhiambo, 2025).

Furthermore, this complex situation of resource abundance amid economic challenges has persisted for decades despite efforts and regional development reforms such as the African Mining Vision (2009), the Agenda 2063 "Africa We Want", and the African Continental Free Trade Area (ACFTA), which aim to transform the African economy. This critical gap in development highlights institutional and governance quality deficiencies that hinder the transition from a resource economy to a sustainable and self-reliant region (Yende, 2025; Niyitunga and Musya, 2024; Mncube, 2023; Sooryamoorthy, 2023).

Over the last two decades of research scrutiny, it has become evident that the "resource-curse trinity" stunts African resource economies due to a weak institutional framework, ineffective policies, rent-seeking and corruption (Tikum, 2025; Akpan and Umoh, 2021). To provide a solution, reforms have been implemented in decentralisation, transparency, and accountability; however, there is no proper enforcement or data visibility. Additionally, governance failures in cadastres, procurement systems and energy markets can lead to fiscal leakages, environmental issues, and a loss of investor confidence (Jeram, 2024). Therefore, the structural issue is not merely to design better policies and regulations but to make them more observable, enforceable and inclusive over time.

Simultaneously, the growth in digitalisation penetration in Africa (mobile broadband, electronic payment systems, blockchain, internet of things (IoT) sensors and artificial intelligence (AI)) presents a critical opportunity to transform the governance framework in Africa (Omol et al., 2024; Ogundipe et al., 2023; Shenkoya, 2023). Digital systems can automate compliance monitoring, record transactions in real-time, and maintain a public database on licensing procurement and revenue generated (Domingo and Shiferaw, 2022; Enaifoghe, 2021). In Africa, successful interventions and models (Rwanda's Irembo e-Government portal, Ghana's e-procurement system, Kenya's M-Pesa and South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP)) validate how digitalisation promotes transparency and quality outcomes.

Nevertheless, evidence shows that digital tools can compromise transparency if adopted without an effective institutional framework, role separation, or a legal establishment of digital records (Sharmin and Chowdhury, 2025; Lazor et al., 2024; David et al., 2023). This highlights that digitalisation could be a complementary system rather than a replacement for governance quality.

Furthermore, global crises (such as COVID-19, the US-Iran war, the Russian-Ukrainian conflict and climate-induced supply disruption) have heightened the created an urgency for nations' self-sufficiency and sustainable industrialisation. Africa's resource-based economy is a central focus of this agenda. To achieve self-reliance, Africa must localise value chains, strengthen financial capacity and ensure that technology systems serve domestic development goals. This discussion then shifts from "how to attract foreign direct investments" to "how to govern natural resources digitally and institutionally to preserve value." Despite the critical need, scholarly evidence integrating micro-institutional behaviours (small firms and communities) with macro-economic and institutional design (laws and institutional frameworks in a digital context remains inconsistent.

Despite the growing body of research on e-governance, extractive industry transparency, and ICT for development, several conceptual and empirical gaps exist. First, research on governance and digitalisation is evaluated individually. Very few studies integrate both drivers to achieve resource sustainability (Mncwango and Mncwango, 2024; Ndemo and Mkalama, 2023; Umbach and Tkalec, 2022), and none focus on the energy and extractive sectors. Additionally, there are limited studies on multi-level analysis, with previous research focusing on either national reforms or firm-level adoption, without integrating all institutional levels in an economy. Furthermore, empirical studies lack theoretical foundations that link governance reforms, digital competencies and self-reliance outcomes. Addressing these research gaps is critical for policy and sustainability scholarship. Theoretically, integrating institutional theory, the resource-based view, and dynamic capabilities theory offers a novel perspective for understanding how governance quality and digitalisation function as complementary mechanisms in a natural resource-rich economy.

Empirically, this study employs a PRISMA-based systematic review of 21 peer-reviewed articles (2017-2025) to identify cross-sectoral patterns, institutional synergies and policy outcomes. Practically, the research findings can guide the African Union, the Southern African Development Community (SADC), the Economic Communities of West African States (ECOWAS) and ACFTA units as they design digital governance standards for the energy and extractive sectors. Therefore, by integrating governance and digitalisation within a sustainability model, this study responds to the need to move Africa from a region rich in natural resources to a self-running and independent economy.

Accordingly, the study seeks to:

i. To systematically synthesise the literature on governance, digitalisation and sustainability within Africa's resource economy
ii. To examine how micro and macro–institutional interactions influence Africa's transition towards regional self-sufficiency
iii. To develop a conceptual framework linking governance capacity, digital transformation and sustainable/self-reliant outcomes
iv. To identify knowledge gaps and policy directions for strengthening institutional synergies for Africa's resource-driven resilience.

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

The theoretical framework of the study is presented in Table 1.

The conceptual framework of the study is presented in Figure 1.

3. METHODOLOGY

3.1. Protocol and Strategy

The study adopted a PRISMA methodology to ensure a well-structured review, transparency and reproducibility. The study employed descriptive mapping and qualitative synthesis. The systematic review adopted the following structure:

i. Planning the review by defining the research objectives, inclusion and exclusion criteria and search strings
ii. Identification and retrieval of literature from SCOPUS, using related keywords
iii. Screening process through removal of duplicates and filtration based on title, abstract and keywords
iv. Eligibility screening by introducing full-text inclusion criteria

Table 1: Theoretical synthesis

Theory	Core proposition	Application to the study	Representative studies
Institutional theory	Institutional rules, norms, values and governance systems shape behaviour and national outcomes	This theory explains how governance quality, integrity, enforcement and institutional adaptation influence sustainable resource management	Yende (2025); Niyitunga and Musya (2024)
Resource-based view (RBV) theory	Organisational and national competitiveness depends on capitalising unique, valuable and inimitable resources	This theory posits that digital technologies and governance systems are strategic drivers for long-term sustainability and resource self-reliance	Papa et al. (2023); Umbach and Tkalec (2023)
Dynamic capabilities theory (DCT)	Firms and institutions must continuously adapt to economic and environmental changes to achieve sustainable performance	It highlights how adaptive governance and technology adoption build resilience in resource-based economies	Huang et al. (2025)

Source: Authors' Computation (2025)

Table 2: Inclusion and exclusion criteria

Criterion	Inclusion	Exclusion
Study type	Peer-reviewed, empirical and systematic review papers	Editorials, notes, non-academic articles
Language	English	Non-English
Period	2017-2025	Pre-2017
Geographic location	Africa focused	Developed economy studies
Focus	Governance and digitalisation	Purely ICT without institutional relevance

Source: Authors' Computation (2025)

Figure 1: Conceptual pathway to Africa's resource independence

Source: Authors' computation (2025)

v. Inclusion and exclusion process through data extraction from review, appraisal and interpretation.

The SCOPUS database was chosen due to its global acceptance, wide coverage of interdisciplinary research. The study spans the period from 2017 to 2025, focusing on studies in English, peer-reviewed articles and conference papers. The search on SCOPUS was conducted using a Boolean combination of search strings related to Sub-Saharan Africa, Africa, Resource economy (including energy, mining, cross-sectoral terms), governance, institutions, digitalisation (e-governance, ICT, blockchain, AI, fintech), sustainability and self-reliance. From the search, 24 studies were retrieved, and 21 studies met the inclusion criteria as shown in Figure 2.

3.2. Eligibility Criteria

As presented in Table 2, the inclusion and exclusion criteria were designed to ensure methodological rigour, conceptual coherence, and alignment with the study's objective of examining the governance-digitalisation nexus in Africa's resource economies. While this stringent filtering reduced the sample size, it enhanced analytical precision and ensured that the final dataset robustly captured the research objectives..

3.3. Study Counts and PRISMA Design

The study selection process followed a structured PRISMA protocol to ensure transparency, replicability, and methodological rigour in identifying relevant literature as presented in Figure 2. An initial search of the SCOPUS database yielded 24 records, all of which were retained after the duplicate removal process. After all key checks in line with PRISMA, a final sample of 21 peer-reviewed articles was included in the review. This focused sample provides the final dataset, which is analytically robust and well-aligned with the study's objectives.

3.4. Data extraction and synthesis

To achieve the research objective, we deduplicated and screened the titles and abstracts. A comprehensive extraction sheet was populated based on authors, year, country/region, sector, institutional level, theory, methods and key insights. Applying an integrated criterion of governance and digitalisation, the review was carried. The final synthesis comprised studies with relevance and clear institutional linkages to resource self-reliance. The review captured diverse sectoral coverage, primarily within the energy and extractive sectors. For synthesis, a thematic analysis was conducted, structured around three interconnected mechanisms: governance levers, digitalisation and sustainability. The study was also evaluated under three institutional levers (macro, meso and micro). This integrated methodology provided a multidimensional understanding of how governance capacity and digitalisation collectively shape Africa's pathway toward resource-based independence.

4. RESULTS

4.1. Descriptive Analysis

From the final reviewed literature of 21 peer-reviewed studies that explicitly examined both governance or institutional systems and digitalisation or technology-based mechanisms within African resource sectors (Table 3). The study's scope reflects the period when the African government adopted e-governance, digitalisation of the energy market, and digital financial systems.

The review reveals a heavily dominated macro-level analysis (76%), showing that most research focuses on national policy, governance and institutional frameworks as presented in Table

3 and Figure 3. Only a limited number of studies (24%) capture meso and micro-level interactions (such as organisational readiness and community resource governance, local digital platforms, SMEs, and cooperatives), suggesting a research gap in bottom-up institutional interaction and localised self-reliance models. The imbalance across institutional levels highlights the need to strengthen linkages through participatory digital governance and localised innovation, as it is a limitation towards achieving sustainable resource self-reliance.

Furthermore, institutionally, the studies cover all three levels as shown in Figure 3:

i. Micro, where digital systems and tools are deployed in small firms, communities or local value-chain stores. This covers activities such as mobile payments to artisans and community monitoring platforms for environmental issues.
ii. Meso, where the unit of analysis is the sector and covers actions such as renewable energy procurement, national mining cadastre, petroleum cadastre, local content e-registration, and
iii. Macro, where focus is on national or regional policy formulation, coordinated exchange of data and cross-border energy resource coordination.

From these findings, it is evident that digitalisation is not occurring at the national level, in terms of policy, but is being driven from the micro level by firms, municipalities and even funded projects. In addition, geographically, South Africa dominates the reviewed literature, which is expected given the scale and development of its energy sector, the commencement of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), and the advancement of system planning and data transparency model in its electricity market. The next cluster consists of African multi-country studies that focused on SSA as an integrated resource region, while the remainder (10) covers the wider SSA and North African region (Ghana, Nigeria, Morocco, Ethiopia).

The theoretical evaluation reveals a focus on institutional and resource-based view theory, jointly accounting for 72% of all reviewed works (Table 4 and Figure 4). This alignment reflects the centrality of governance and capability development in Africa's sustainability goals. The institutional theory tenets underscore the function of formal rules, legitimacy, social acceptance and regulatory quality in shaping sustainable resource governance. Also, the resource-based view theory expands on the idea of how digitalisation and technological capabilities can be leveraged as key strategic assets for competitiveness and self-reliance.

Furthermore, a smaller faction of research employs the ecological modernisation theory, the ICT for development theory and the dynamic capabilities theory. This highlights an increasing recognition of adaptive and technology-inclusive processes in sustainability transitions, but a gap in studies connecting digitalisation, institutional governance, sustainability and long-term resilience in Africa's resource economy.

Table 5 and Figure 5 show the sectoral mapping of the reviewed studies. The findings reveal a strong dominance of research on environmental sustainability and climate outcomes, highlighting a growing concern about emissions, ecological degradation, and green growth pathways in resource-dependent economies. Secondly, the energy sector emerges as the second most prominent

Table 3: Institutional analysis

Institutional level	Frequency	Percentage
Macro (national and policy level)	16	76
Meso (organisational and sectoral level	3	14
Micro (community and firm level)	2	10

Source: Authors' Computation (2025)

Table 4: Theoretical framework analysis

Theoretical framework	Number of studies	Share of studies (%)
Institutional / Governance Theory	14	67%
Environmental–Growth Sustainability Theories (EKC, Ecological Modernisation, Endogenous Growth, Cobb–Douglas)	12	57%
Digitalisation & Innovation Theories (ICT4D, Digital Transformation, FinTech, Blockchain, Innovation/Diffusion)	11	52%
Resource Curse / Resource Dependence Theory	9	43%
Green Finance & Financial Inclusion Theory	4	19%
Systems & Resilience Frameworks (Socio-technical systems, DRR, Open science, Governance resilience)	3	14%
Dynamic Capabilities Theory	2	10%
Global Value Chain (GVC) Theory	1	5%
Human Development & Social Systems Theory (UHC, Social determinants, People-centred systems)	1	5%

Source: Authors' Computation (2025)

Table 5: Sectoral analysis

Sector/focus area	Frequency	Percentage
Environmental Sustainability & Climate Outcomes	14	67%
Energy & Energy Transition	9	43%
Digital Governance & Public Sector Transformation	8	38%
Agriculture & Primary Natural Resources	6	29%
Finance, Fintech & Green Investment	4	19%
Industrial Transformation, GVCs & Structural Change	4	19%
Resilience, Disaster Management & Social Systems	3	14%
Humanitarian/Resilience Systems	1	7

Source: Authors' Computation (2025)

Table 6: Publication year analysis

Year	Number of publications	Percentage
2017	1	5
2020	1	5
2023	2	10
2024	4	19
2025	13	62

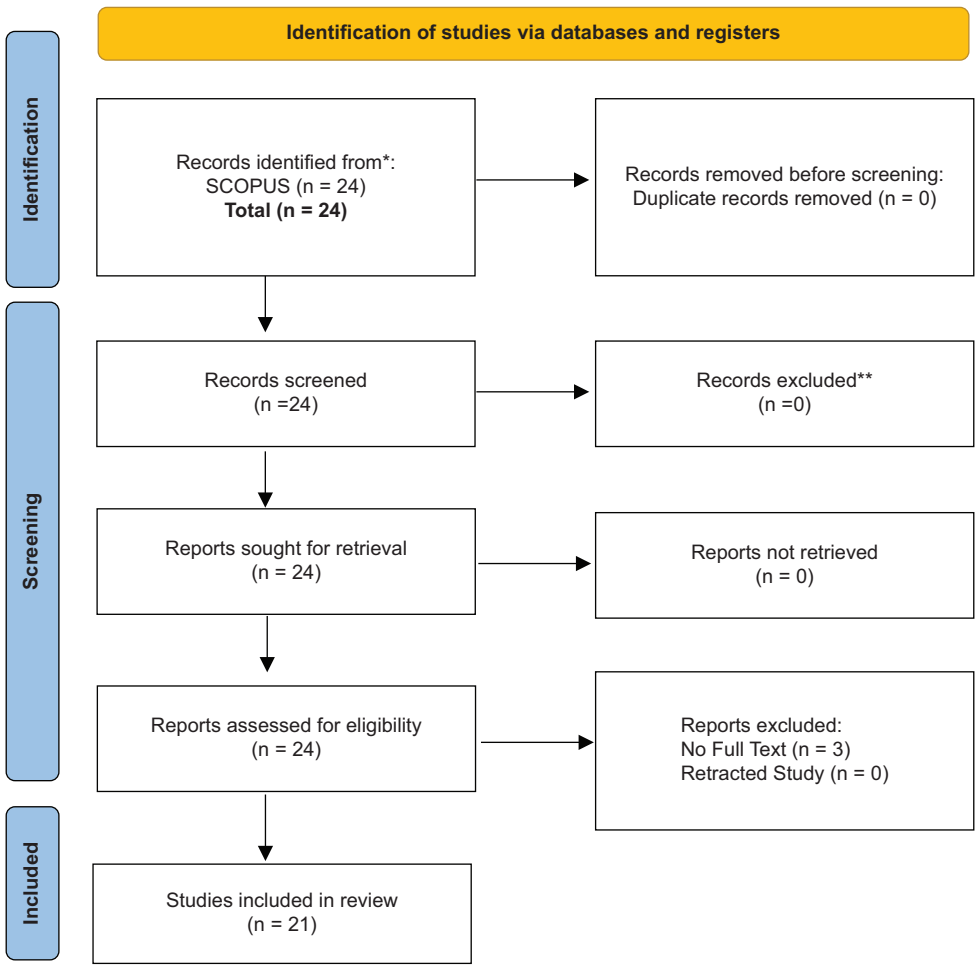
Source: Authors' Computation (2025)

Table 7: Summary of key descriptive distribution

Variable	Dominant category	Frequency (%)	Interpretation
Study type	Quantitative research design	56	Indicates growing empirical outcomes of institutional research
Sector focus	Energy and extractive	44	Emphasis on governance-energy linkages for sustainability
Institutional level	Macro (national and policy)	50	Demonstrates the dominance of the top-down governance approach
Theory used	Institutional theory, resource-based view theory and dynamic capabilities theories	62	It highlights theoretical convergence around governance and competitiveness
Dimension	Governance and Digitalisation	48	Shows increased recognition of integrated frameworks
Methodology	Econometric analysis/systematic review/ Hybrid	71	It highlights a robust analytical orientation towards policy evaluation
Outcome	Sustainability/Self-reliance	67	It indicates the strategic transition focus of current research on sustainability

Source: Authors' Computation (2025)

Figure 2: PRISMA flow chart

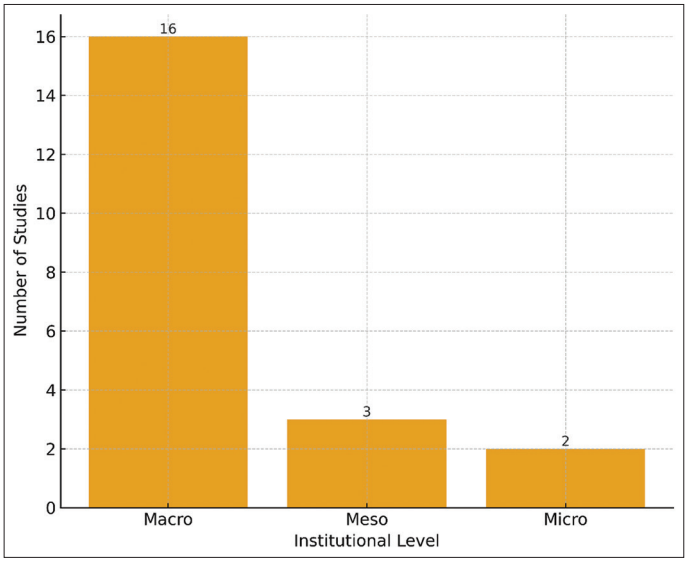


sector. This dominance affirms Africa's reliance on extractive and energy-based output. This lends credence to the research objective, which is to apply digital governance reforms in improving transparency and efficiency in these sectors.

Furthermore, studies addressing digital governance and public-sector transformation are significant, highlighting cross-sectoral integration of digitalisation (e.g., satellite monitoring, e-farming platforms and renewable energy tracking systems) and promoting the relevance of digital tools in enhancing ecological resilience and productivity. In addition, only a few studies explore finance-driven mechanisms, structural and humanitarian sectors, which capture industrial transformation and supply-chain resilience. This limited representation calls for future research into broader sectors such as manufacturing, urban resilience, food security systems, and clean energy models, aligning with Africa's Agenda 2063 aspiration for inclusive industrialisation and self-reliant economies.

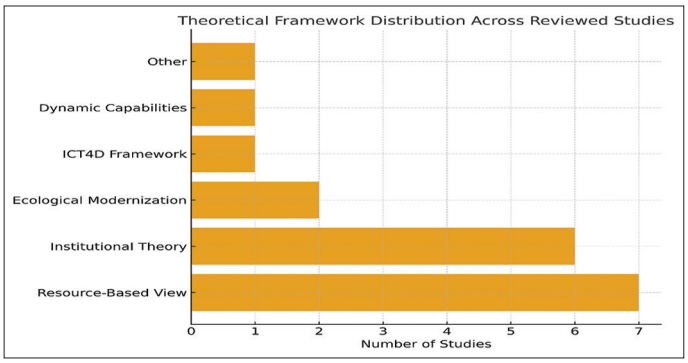
Table 6 presents the publication based on year analysis. Table 6 and Figure 6 capture the publication frequency per year, relating to

Figure 3: Institutional analysis



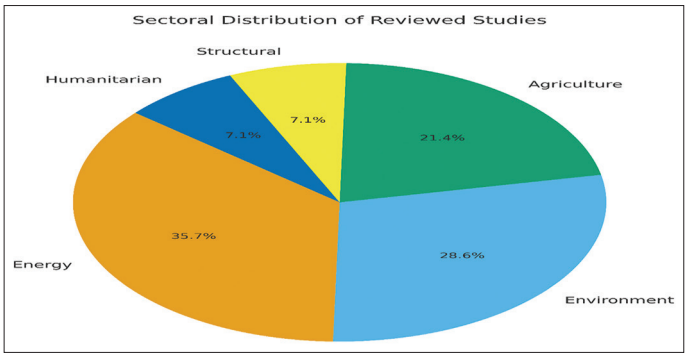
Source: Authors' computation (2025)

Figure 4: Theoretical framework analysis



Source: Authors' computation (2025)

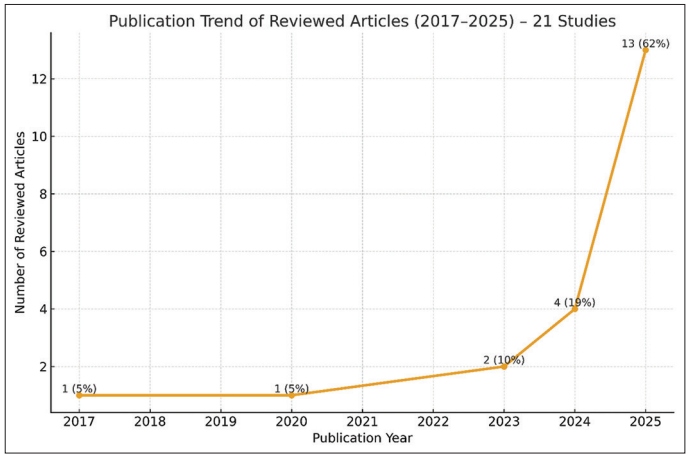
Figure 5: Sectoral analysis of reviewed studies



Source: Authors' computation (2025)

governance, digitalisation and sustainability in Africa. The findings indicate a progressive trend in research linking governance, digitalisation and sustainability in Africa's resource economy. Furthermore, there was a significant increase in publications from 2024 to 2025, which contributed over 80% of the reviewed articles, corresponding with the increased visibility of IFRS S1/S2, the implementation of Agenda 2063 and digital public governance initiatives in Africa. These outcomes highlight a transitional phase from exploratory discourse to empirical and policy-oriented

Figure 6: Publication year trend



Source: Authors' computation (2025)

research, noting 2025 as the year of transition for scholarly research in institutional self-reliance and digital transformation.

4.2. Governance-Digitalisation Interaction Patterns

From the reviewed studies, a clear empirical pattern emerges and is presented in Table 7: digitalisation alone rarely improves governance. Rather, the review highlights a conditional effect, which is that digitalisation ensures transparent, compliance, and allocative efficiency benefits only when introduced in a credible institutional environment. Also, the patterns can be broken down as thus:

i. Digital systems in public governance, integrated with clear legal statutes, reduce the discretionary power of human officials. In mining reforms (e.g., Ghana, Botswana), online license applications and cadastral information have reduced informal gatekeeping, complemented by a regulatory system that ensures service timeliness, provides appeal mechanisms and requirements. Therefore, without institutional structures, digitalisation is ineffective.
ii. Studies that focused on environmental and safety compliance in mining and energy sectors show that remote sensors, supervisory control and data acquisition (SCADA) and IOT monitoring models help identify breaches. Furthermore, regulators can only sanction if the legal framework recognises that digital evidence is material and admissible, and if the agency has the capacity to issue administrative fines. For instance, South Africa's experience with emission disclosure and Nigeria's experience under NEITI illustrate the notion of transparency and accountability. This, therefore, empowers auditors, since there is an existing accountability framework.
iii. The digital procurement portal can be effective, and there can be increased visibility of tenders, reduced processing period, where procurement laws are in place and objective. In essence, technology enables monitoring while the law ensures order and accountability.
iv. Digital finance expands inclusivity if consumer and SME protections are in place. For instance, studies citing mobile money and electronic payment to small firms and communities reflect the Kenyan M-Pesa experience.

Table 8: Summary of key findings

S. No.	Author (s) name	Region/focus	Main resource angle	Governance/ institutional angle	Digital/Technology angle	Key finding/takeaway
1	Ngulube (2025)	Tropical Africa/ SSA	Natural resources at the farm/ smallholder scale	Calls for local/ extension-level institutions to make sustainability knowledge usable	ICT tools for farmer knowledge-sharing	ICT can close the environmental-governance gap if local institutions adopt the tools
2	Riaz et al. (2025)	BRICS+incl. SA	Energy–growth–environment	Macroeconomic–governance framing	Economy-wide digitalization	Growth and resource use worsen footprint; governance/technology can partially offset
3	Mousseuknadji Kouladoum et al. (2025)	ECCAS/Central Africa	Not sector-specific; macro-resource relevance	Institutional quality (corruption control, effectiveness)	ICT diffusion as enabler	Better institutions+ICT and finance drive industrial/services value-added; weak governance slows transformation.
4	Liu et al. (2025)	BRICS+	Natural resources and emissions	Talks about institutional pathways to resilience	Digitalisation+green innovation	Digitalisation accelerates the shift from an extractive to a resilient pathway in the presence of supportive institutions
5	Ahatsi and Olanrewaju (2025)	Sub-Saharan Africa (multi-country)	Humanitarian logistics (resource flows)	cross-border coordination rules and data governance	AI and Big Data, key focus	AI enhances disaster logistics and resource efficiency, but fragmentation and inadequate data governance limit the benefits of resilience.
6	Saba et al. (2025)	Global (incl. SSA, MENA)	Environmental degradation (CO^2)	Governance quality paradox	ICT as a monitoring tool	Globally, governance often coincides with higher emissions (growth bias); in SSA, ICT can reduce emissions and should be integrated into environmental oversight.
7	Pimenow et al. (2025)	Global (incl. Africa cases)	Ecosystems: agri, water, forest, energy	Governance as "policy support"	AI/IoT/digital twins as enablers	AI helps reach SDGs when guided by policy/standards
8	Irfan et al. (2025)	BRICS+SSA (emerging economies)	ICT trade, natural resources	Government effectiveness	ICT trade/green innovation/digital capacity	ICT×resources→green innovation when governance is sound
9	Kinuthia et al. (2025)	42 African countries	Renewable energy transition	Institutional quality as a moderator	Digital/renewable systems	Renewable energy reduces degradation; strong institutions amplify gains, while weak governance negates the benefits of transition.
10	Zhang et al. (2025)	BRICS	Natural resource governance and energy security	Digital government and policy effectiveness	E-government, blockchain, green finance	Digital government instruments accelerate the achievement of the SDGs by enhancing governance in the natural resource and energy sectors.
11	Zhang et al. (2025)	MENA (19 countries)	GVCs/resources and environment	Governance as a precondition	ICT, innovation, digital finance	ICT/innovation reduce degradation; resource rents worsen it; financial inclusion is double-edged without regulation.
12	Ibrahim et al. (2025)	North-South Africa	Disaster and crisis management capacity	Governance= collaborative and institutional	AI and geoinformatics	Calls for a strategic framework: Cross-border digital platforms need agreed governance to work
13	Afinowi (2025)	Sub-Saharan Africa	WEF nexus/digital transformation	Governance	Digital transformation	Digital transformation in the Global South improves sustainability outcomes through enhanced governance coordination and institutional integration
14	Saba et al. (2024)	BRICS	ICT, renewables, industrialisation	Institutional quality enabling	ICT+renewables	ICT and renewables reduce CO_2 in the short term; rebound risks and weak institutions can reverse gains in the long run—governance must steer.
15	Hasan et al. (2024)	Sub-Saharan Africa	Sustainable mineral policy/ ESG	Institutional and social governance	Fintech/green finance	GDP-only growth harms SDGs; fintech, ESG and governance support diversified, sustainable mineral development.

(Contd...)

Table 8: ***(Continued)***

S. No.	Author (s) name	Region/focus	Main resource angle	Governance/ institutional angle	Digital/Technology angle	Key finding/takeaway
16	Udeagha and Muchapondwa (2023)	BRICS	SDGs: emissions, finance, rents, Natural resource rent	Institutional capacity for green finance	Fintech/green finance	Fintech helps channel resource rents to green projects when governance is stable
17	Sriyono (2020)	Global (incl. Africa potential)	Water governance	Data governance and contracts	Blockchain+smart contracts	Blockchain can enhance transparency, pricing, and MRV water rights; however, it requires governance to facilitate adoption and equity.
18	Agyepong et al. (2017)	Sub-Saharan Africa	Public health systems (resource for HR and data)	Governance reform and accountability	Digital health/ innovation/data systems	People-centred governance, domestic finance, and innovation can help close health gaps—core to human capital self-reliance.
19	Guan et al. (2024)	Global (incl. Africa)	Natural resource rents	Governance digitalisation and human capital	Digital government	Digital government raises resource rents in mature systems; the effect is insignificant in Africa due to low ICT penetration/institutional readiness.
20	Bashir et al. (2024)	Global / resource-dependent economies	Natural resource utilisation and environmental sustainability	Governance quality conditions gains	Digitalisation and technological advancement	Digitalisation and strong institutional governance jointly improve sustainability outcomes.
21	Achuo et al. (2023)	Africa (33 SSA+4 MENA)	Resource rents, energy transition	Governance quality (disaggregated)	ICT development/ digitalisation	Resource rents harm growth and environment; governance and ICT individually help, but interactions determine net outcomes; renewables reduce emissions.

Source: Authors' Computation (2025)

4.3. Sectoral Comparative Analysis

In the energy sector, the digital disclosure of bid documentation and grid connection data increases investors' confidence. With a proper institutional framework, there is a guarantee of off-take contracts and deployment is accelerated. For instance, Morocco and Egypt's experiences with a centralised renewables procurement system show similar results. Furthermore, in the mining sector, digital cadastres and revenue-collection platforms improve revenue collection (royalties) and minimise overlapping mining rights. Also, nations that published maps and license status attracted more formal investments than those without a digitalised disclosure system.

5. DISCUSSION OF FINDINGS

From an institutional theory perspective, the review findings show that African governments are using digital tools to mitigate information asymmetry and enhance rule enforcement (Table 8). Nevertheless, digitalisation does not replace institutional structures but amplifies what already exists. If an institution has low autonomy and high political manipulations, the digitalised system embodies that (Mncube, 2023).

From a resource-based view theory perspective, African resource economies possess valuable natural assets (minerals, renewable resources, wildlife and biodiversity). Notwithstanding, convert them into value and sustainable rents by building intangible resources such as data disclosure standards, regulatory frameworks and human capital development for analytics. The studies reviewed confirm these assertions that nations which invested in these components (South Africa, Rwanda, Ghana) were better at extracting value from digitalisation. Additionally, the dynamic capabilities theory (DCT) helps explain variations in performance across nations, specifically in terms of nations, regulators and ministries that can sense technological opportunities (such as open data and digitalisation), seize them through reforms, partnerships and system reconfiguration.

Furthermore, a striking issue in the African setting is that when digitalisation platforms are launched, they are reported as successful, but they rarely scale nationally. Our systematic review highlights these recurring failures, including the lack of recognition in law or regulation, system maintenance is donor-funded and not institutionalised, the absence of inter-agency data sharing rules, and a lack of stakeholder activism. This confirms the research's notions that digitalisation must be paired with an improved institutional framework to contribute to regional self-reliance.

In addition, our findings imply that self-reliance emerges when resource flows are traceable in real-time through digitalisation, rules and regulations are upheld through a quality institutional framework, and local firms demonstrate active participation through affordable digital platforms. For instance, nations like Rwanda (Irembo e-government), Ghana (e-procurement, Single Treasury Account Model) and Nigeria (NEITI and other advancing e-payment platforms for extractives), provide practical evidence that when these three structures exist, a nation can create value, negotiate better with external partners and allocate resources more efficiently to development priorities.

5.1. Discussion by Objectives

Objective 1: To systematically synthesise the literature on governance, digitalisation and sustainability within Africa's resource economy.

The systematic review provides two key findings. First, the African model and policy-driven actions regarding digitalisation have been problem-driven as they emerge in sectors (energy, mining and extractive) where a lack of transparency and timeliness can be costly. Additionally, evidence on digitalisation and governance remains fragmented, as most studies focus on a single instrument of digitalisation (e-cadastre, e-procurement, and mobile payments) and do not integrate the entire system from institutional reform to digitalisation to sustainability/self-reliance.

Also, the synthesis highlights a paradigm shift from isolated governance systems or ICT policies to integrative frameworks. That is, governance alone improved transparency but lacked accountability without the adoption of digitalisation. Concurrently, digitalisation without an institutional framework achieves limited development outcomes. Therefore, this institutional-digitalisation nexus forms the foundation of Africa's emerging self-reliance models.

The implications of these findings are that integrated governance-digital systems can reduce fraudulent financial inflows and boost fiscal efficiency in mining and energy licensing.

Objective 2: To examine how micro and macro–institutional interactions influence Africa's transition towards regional self-sufficiency.

From the review, it is seen that digitalisation benefits were realised when two or more levels were aligned. For instance, a micro-level digital payment to small miners, artisans, and the community only improve inclusivity when a meso-level or macro-level regulation requires disbursement and recognises the transaction data. Additionally, a sectoral e-procurement system only enhances allocation efficiency when a macro procurement regulation establishes the needed criteria and timeline. In addition, a macro open database on energy and mining can only improve compliance when firms, municipalities and communities have digital capabilities, effective reporting and follow-up.

Evidence from the review shows that community-level institutions function effectively when macro-institutions provide the enabling and stable environment (Ngulube, 2025; Ahatsi and Olanrewaju, 2025). This finding strongly supports a multi-institutionalism framework, which highlights that digitalisation is the transmission mechanism between all levels of the economy. That is, micro actors (firms, cooperatives, municipalities) can disclose high-quality data if national policies and regulations demand it. This strongly affirms the postulations of the dynamic capabilities theory; nations that can reconfigure their processes across levels derive more benefits from digitalisation. This further explains that self-sufficiency is not just the availability of natural assets, but the ability to convert them into value. This whole process requires a micro-meso-macro integration. The review shows that where this alignment was present, external dependence was minimal.

Objective 3: to develop a conceptual framework linking governance capacity, digital transformation and sustainable/self-reliant outcomes.

The review evidence provides clarity that digitalisation functions in 3 different roles:

i. Observability function through making resource flows, contract awards, permits and payments visible and accountable (using open data, e-portals and dashboards).
ii. Enforcement function, making it easier to detect and sanction non-compliance (using IOT, remote sensing, e-payment with audit trails).
iii. Inclusion function, making it feasible for smaller micro firms and informal actors' activism.

Nonetheless, these functions are only can only transform Africa into a self-reliant economy when they are founded on four governance pillars (legal recognition of digital data, role separation and accountability, interoperability and analytical capacity. Therefore, the conceptual framework is:

Digitalisation-----Governance Pillars-------Capacity for Self-reliance

Objective 4: To identify knowledge gaps and policy directions for strengthening institutional synergies for Africa's resource-driven resilience.

The review findings indicate that the energy and extractive sector significantly dominates the African economy, while the blue economy, land restoration systems and indigenous resource economies are understudied. Also, very few studies have quantified fiscal and environmental outcomes of digital governance. In addition, studies did not examine cross-border data for power pools, transnational natural resources and joint procurement, which are the core drivers of regional self-sufficiency.

From this review, it is seen that Africa's resource self-reliance is fundamentally institutional and technological. The governance framework defines the regulatory structure that legitimises action, while digitalisation operationalises those laws through enforcing visibility, accountability, automation and traceability. The integrated impact leads to sustainable outcomes that shift the focus from short-term to achieve structural transformation. The triadic relationship aligns with the framework in Figure 1, where governance and digital transformation co-develop to drive sustainability. The implications of these outcomes are both theoretical and practical.

5.2. Economic, Managerial and Policy Implications

i. There should be policies in place to make digital data legally operative so that agencies can be motivated to keep accurate and recent datasets. For instance, Ghana Minerals Commission publishes concessions, and Botswana has long used a transparent licensing regime; South Africa recognises

electronic submissions in energy regulation.

ii. Integration of e-procurement and e-licensing to open contracting standards. This is achieved by publishing bid notices, evaluation criteria, winning bids and contracts. Open data for contracts reduces off-budget deals in extractive industries and makes it more difficult to allocate resource rights with due process.
iii. Standardisation of digital cadastres across Africa. SADC, ECOWAS and the African Union can adopt a minimum data scheme for mining and energy rights and mandate member nations to disclose them.
iv. Application of digital finance to localise benefits. This includes paying community royalties and compensation through regulated mobile money with a transaction dashboard for government monitoring.
v. Protection against digital divide, this can be achieved by ensuring that all digital resource-governance systems still allow assisted or offline submission for artisans, small cooperatives and rural communities.

6. CONCLUSION

Based on the review, it can be concluded that the findings are tailored to the mining and energy sector. Digitalisation is seen as a significant multiplier, not a substitute for good governance. Where policies and regulations are clear, authority is objective, data is recognised by law, and digital tools improve licensing, procurement channels, benefit sharing and monitoring, as seen in South Africa's renewable auctions, Ghana's e-procurement and Rwanda's Irembo and Botswana's mining Cadastre. Where these conditions are missing, digitalisation remains ineffective.

For Africa to harness and transform its resource economy for regional self-sufficiency, policymakers must therefore embark on reforms to establish policies and regulations, digitalise its laws, open data laws and connect nationally digitised systems across regions. If this can be achieved, Africa can transform from a resource nation to a self-reliant region. In addition, the review concludes that Africa's journey to self-reliance is not hindered by a lack of natural resources but by a weak institutional framework, corrupt governance practices, and low digital adoption in governance. By adopting digital tools, supported by a robust institutional framework, Africa's economies can accelerate progress towards an integrated, prosperous and self-reliant nation.

Based on the research findings and synthesis, four critical policies emerge:

i. Government should prioritise preserving institutional quality through merit-based administration, a robust regulatory framework and coordinated policymaking across ministries. This can be achieved by establishing central data systems for resource revenues.
ii. African nations can embrace digitalisation by integrating blockchain, AI, and IoT for real-time control functions of extractive industries. Additionally, regional initiatives such as the African Union's Digital Transformation Strategy should be developed to ensure interoperability between national systems, thereby reducing inefficiencies.
iii. Governments should assist in human capacity development and digital literacy through partnerships with universities so that they train civil servants and regulators in digital literacy skills. This would help prevent technological exclusion and maximise policy effectiveness.
iv. There should be promotion of inclusive sustainability frameworks. This can be achieved by sustainability reforms, which integrate community-driven governance models and public-private partnerships that empower local communities in decision-making.

6.1. Limitations and Future Research

This study is based on a review of published English-language studies, which highlights that relevant reforms in other languages may be underrepresented, and some innovative systems are often described in projects rather than journals. Additionally, methodologically, we tightened the research search to include both governance and digitalisation elements, which may have excluded studies that comprehensively cover a driver of a self-reliant economy. Future research should therefore focus on constructing a panel dataset on African digital resource governance reforms and testing their effects on revenue, foreign direct investments or corruption. Additionally, studies can compare regional blocs (such as the SADC, ECOWAS, or EAC) to determine which framework and institutional architecture best enable cross-border data sharing.

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