Digital Pathways for Youth Empowerment in Climate Mitigation and Resilience: Paris Agreement Alignment in Nigeria and Rwanda

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ABSTRACT

The Paris Agreement (2015) establishes a global framework for coordinated climate action, focussing on mitigation, adaptation, and capacity building. Article 12 emphasises the importance of education, public participation, and access to information, highlighting the pivotal role of youth in transformative climate governance. This study analyses the convergence of youth empowerment, digitalisation, and the execution of the Paris Agreement in Nigeria and Rwanda. The study assesses the impact of the Agreement's domestication on youth engagement in climate mitigation and resilience, as well as the role of digital governance innovations in improving effectiveness across various national contexts. Grounded in Empowerment Theory, Transformative Governance Theory, and Digital Era Governance, the study employs a qualitative comparative case study design, integrating document analysis and comparative policy review to elucidate contextual differences between Nigeria and Rwanda. The findings indicate that both countries have shown increasing institutional commitment to youth inclusion and digital innovation via initiatives such as Nigeria's Investment in Digital and Creative Enterprises (iDICE) and Three Million Technical Talent (3MTT) programmes, along with Rwanda's Digital Ambassadors Programme (DAP). The effectiveness of these initiatives is influenced by socio-economic inequalities, varying political cultures, and historical legacies that affect policy implementation. Ongoing challenges, such as inadequate Measurement, Reporting, and Verification (MRV) systems, institutional fragmentation, and disparities in digital access, persistently hinder transformative outcomes. The study concludes that aligning the implementation of the Paris Agreement with inclusive digital policies, enhancing inter-ministerial coordination, investing in youth digital competencies, and promoting multi-stakeholder collaboration will improve adaptive governance and facilitate equitable, technology-driven climate transitions in both countries.

Keywords: Rwanda and Nigeria, Paris Agreement, youth empowerment, climate governance, digital transformation.

INTRODUCTION

Climate change constitutes a complex and pressing challenge of the twenty-first century. The extensive repercussions—escalated droughts, increased sea levels, loss of biodiversity, severe flooding, and compelled migration—present considerable threats to environmental stability, economic progress, and global social structures (IPCC, 2023). The crisis is universal; however, developing nations, especially in Sub-Saharan Africa, face a disproportionate burden owing to limited adaptive capacities, fragile economies, and reliance on climate-sensitive livelihoods (World Bank, 2020). In this regional context, youth hold a contradictory role: they are highly vulnerable to the impacts of global warming, while simultaneously representing a vital demographic for fostering innovation, advocacy, and resilience in climate action (UNDP, 2013; Mulikita, 2024).

Globally, youth are becoming significant participants in climate governance by mobilising transnational campaigns, utilising digital platforms for activism, and developing technology-driven solutions (Andresen et al., 2021). Nonetheless, their involvement frequently appears to be more symbolic than systemic. Institutional

barriers such as political marginalisation, restricted financial access, and insufficient digital and climate literacy hinder meaningful participation (Asare-Nuamah & Mandaza, 2020; UNFCCC, 2021). As climate governance increasingly incorporates technological and data-driven methodologies, it is essential to ensure equitable digital participation. The development of digital infrastructures, including social media, mobile technology, and e-participation platforms, provides opportunities for enhancing youth engagement and shifting governance from hierarchical to networked structures. Without intentional inclusion, the digital divide may perpetuate existing inequalities in participation and access to climate opportunities.

The Paris Agreement, adopted in 2015 within the framework of the United Nations Framework Convention on Climate Change (UNFCCC), represents a significant milestone in international climate policy. The hybrid framework which combines binding and voluntary commitments aimed at reducing greenhouse gas emissions and enhancing adaptive capacity (UNFCCC, 2015a). Article 12 emphasises the importance of education, training, public awareness, and access to information as essential components for inclusive climate action, establishing a normative basis for youth empowerment and digital engagement (UNFCCC, 2015a; Okegbe, 2025). The implementation of these principles into national frameworks is inconsistent, especially in low- and middle-income countries (APRI, 2025; Hutagalung, 2023).

Empirical evidence demonstrates this disparity: The 2022 synthesis of Nationally Determined Contributions (NDCs) by the UNFCCC revealed that few countries explicitly recognise youth as stakeholders in climate action (UNFCCC, 2022). African states have developed youth and climate strategies; however, these initiatives often demonstrate fragmentation and insufficient digital and institutional linkages necessary for cohesive policy and participatory implementation (Ndukwe et al., 2023; Berñe et al., 2023). Youth in Nigeria constitute over 60% of the population, with digital activism and technological innovation playing crucial roles in climate advocacy and entrepreneurship. However, these grassroots initiatives are largely unconnected to established policy frameworks (NGYouthSDGs, 2024; Okafor et al., 2024). Rwanda's climate and green growth policies integrate youth involvement through green employment and capacity-building programs, which are progressively supported by digital training and e-governance frameworks, though questions persist regarding the sustainability and inclusiveness of these digitally mediated frameworks (Republic of Rwanda, 2022; Buheji et al., 2024).

Recent literature on climate governance has expanded to include digital transformation, climate justice, and participatory governance as interconnected aspects of sustainability transitions (UNESCO, 2020; Blaustein, 2024; Connect4Climate & Teach for All, 2024). Digitalisation transforms governance structures and reconfigures the distribution of knowledge, participation, and empowerment among citizens. There exists a significant gap in comprehending how digital governance mechanisms can be utilised to promote youth empowerment within national frameworks that align with the Paris Agreement, especially in Africa, where digital infrastructures and policy integration are inconsistent. This gap restricts theoretical and practical understanding of how digital pathways can convert global commitments into climate action that includes youth (Asare-Nuamah & Mandaza, 2020; Adaptation Fund, 2022).

This research examines the disparity through a comparative policy analysis of Nigeria and Rwanda, two African nations exemplifying differing governance and digitalisation frameworks. Nigeria's federal structure, substantial youth demographic, and growing digital landscape present avenues for innovation, yet they also highlight issues of institutional fragmentation and reliance on fossil fuels (Okafor et al., 2024). Rwanda's centralised governance and swift implementation of digital public infrastructure illustrate the intersection of digitalisation and political commitment in improving youth engagement and policy coordination (Republic of Rwanda, 2022; Buheji et al., 2024). This comparative analysis highlights the ways in which various institutional and digital contexts influence the adaptation of Paris Agreement commitments via strategies aimed at youth.

The study utilises a qualitative, desk-based methodology that systematically reviews scholarly literature, policy documents, and secondary data, informed by three complementary theoretical frameworks: Empowerment Theory, Transformative Governance Theory, and Digital Era Governance (DEG). Empowerment Theory emphasises the importance of agency and capacity-building as essential for meaningful participation (Perkins & Zimmerman, 1995). Transformative Governance emphasises the necessity for adaptive, inclusive, and

reflexive governance frameworks to address complex socio-ecological challenges such as climate change (Korhonen-Kurki et al., 2025). Transformative governance requires integrative adaptive and equitable approaches to manage the complexities of the biodiversity climate society (BCS) nexus. (Pascual et al, 2022). DEG expands this analysis into the digital realm by investigating the impact of information and communication technologies (ICTs), online platforms, and digital public infrastructures on governance processes. This is achieved through reintegration, user-centred design, and data-driven decision-making (Dunleavy et al., 2006; Margetts & Dunleavy, 2013). These frameworks collectively facilitate a comprehensive understanding of the intersection between empowerment, institutional transformation, and digital innovation in shaping youth-inclusive climate governance in Nigeria and Rwanda.

This study aims to achieve three interconnected objectives: (1) evaluating the integration of Paris Agreement provisions into the national climate policies of Nigeria and Rwanda; (2) examining the empowerment of youth in climate-related decision-making, innovation, and digital engagement; and (3) identifying institutional, social, and technological enablers and barriers to youth participation in both contexts. This paper advances scholarship and practice by positioning youth empowerment at the intersection of global climate governance, national policy implementation, and digital transformation. The study enhances theoretical clarity by synthesising Empowerment Theory, Transformative Governance, and Digital Era Governance into a cohesive analytical framework that connects agency, inclusivity, and technology. It provides practical insights for policymakers and development actors regarding the reconciliation of rhetorical commitments with structural empowerment. The primary assertion is that empowering youth in climate action constitutes a moral obligation and a digital opportunity, necessitating institutional reform, inclusive governance, and investment in digital infrastructures that facilitate participation and enhance resilience.

METHODOLOGY

This study adopts a qualitative, desk-based research design to examine how the Paris Agreement's provisions are incorporated into the national climate policies of Nigeria and Rwanda, with specific attention to the integration of digital pathways for youth empowerment in climate mitigation and resilience. The qualitative approach facilitates a thorough analysis of policy frameworks, institutional arrangements, and ICT-based mechanisms that promote youth participation. A comparative design facilitates the systematic identification of similarities and differences in the translation of international climate and digital governance principles into national practice. Nigeria and Rwanda were purposefully chosen due to their differing governance and digitalisation contexts; Nigeria's federal structure and developing digital ecosystem are significantly different from Rwanda's centralised governance and sophisticated e-governance systems.

The research relies solely on secondary data sources, encompassing Nationally Determined Contributions, climate strategies, youth and digital policies, and development plans. Supplementary data were sourced from reports by the UNFCCC and World Bank, peer-reviewed publications, and grey literature from youth networks and digital innovation hubs. Documents from the period 2015 to 2024 were chosen based on their relevance. A comparative policy analysis and qualitative content analysis were conducted to identify digital indicators integrated into national policies that influence youth-inclusive climate governance.

CONCEPTUAL FRAMEWORK AND REVIEW OF LITERATURE

Youth Empowerment

Youth empowerment is a complex and evolving process that enables young individuals to gain the skills, authority, and agency necessary to make informed decisions, engage with issues impacting their lives, and contribute significantly to societal change (OECD, 2021). Empowerment, as defined by the United Nations Department of Economic and Social Affairs (2012), refers to "increasing the capacity of individuals or groups to make choices and to transform those choices into desired actions and outcomes" (p. 6). Vorng (2025) defines youth empowerment as a strategy for civic engagement and social justice, emphasising the role of youth as agents of change who cultivate critical thinking, leadership, and problem-solving skills in supportive environments that acknowledge their perspectives. Perkins and Zimmerman's (1995) empowerment model—

comprising psychological, organisational, and community dimensions—serves as a foundational framework, highlighting mastery, participation, and engagement in governance.

This study defines "youth" as individuals aged 18 to 35 years, a range commonly utilised in national youth policies across Africa (YouthPolicy.org, 2024). The age range of 18 to 35 encompasses a phase characterised by significant life transitions, such as entering the workforce, participating in civic activities, and developing leadership skills. This aligns with empowerment frameworks that focus on capacity building, resource accessibility, and meaningful participation. Youth empowerment is fundamentally contingent upon structural factors, including education, inclusive policies, and institutional trust, necessitating collaboration among governments, the private sector, and civil society (UNESCO, 2023).

Ofusori (2025) identifies youth empowerment as a transformative mechanism for marginalised youth through mentorship, leadership, and resource access while Heath and Moreau (2024) contend that youth empowerment should be both transformational and sustainable, focusing on overcoming structural barriers to inclusion and fostering rights-based development via education, equality, and political participation. Fostering these dimensions establishes empowerment as a fundamental pillar, enabling young people to serve as agents of change rather than passive recipients of development interventions.

In the context of climate action, empowerment is not solely about inclusion but about enabling young people to influence and implement climate solutions and Wukelic (2025) emphasises the necessity of balancing economic empowerment—through entrepreneurship and digital skills—with civic and political inclusion .Empowering youth through digital literacy, inclusive platforms, and participatory mechanisms is essential for achieving transformative outcomes and fostering sustainable behaviour change in digital-climate governance. It is essential for promoting social inclusion, democratic participation, and sustainable development.

Climate Governance

Climate governance involves the institutional frameworks, policy instruments, and decision-making processes that societies utilise to tackle climate change mitigation, adaptation, and resilience (García-Sánchez et al., 2024). The phenomenon operates on various levels, encompassing international frameworks such as the Paris Agreement and the United Nations Framework Convention on Climate Change, as well as national, sub-national, and local contexts. It involves a diverse array of stakeholders, including states, intergovernmental organisations, private enterprises, civil society, and youth organisations (Dubash, 2021; García-Sánchez et al., 2024).

Fundamental principles including participation, transparency, accountability, and equity are essential for effective climate governance, recognising the necessity for fair distribution of burdens and benefits and the importance of inclusive decision-making (Dubash, 2021). Contemporary scholarship emphasises polycentric and transformative governance models that facilitate diverse decision-making centres and empower non-state actors, networks, and grassroots initiatives to operate alongside governments (Marquardt et al., 2022; Kellner et al., 2024). These models emphasise that governance extends beyond regulatory mandates; it involves facilitating innovation, enhancing local initiatives, and integrating systemic change within ecological, economic, and social systems. Effective climate governance necessitates the integration of scientific knowledge, inclusive policymaking, the empowerment of marginalised groups (notably youth), and the establishment of adaptive, equitable institutional arrangements focused on long-term sustainability. This is particularly vital in vulnerable regions where structural inequalities and capacity constraints are prevalent (Caro-Gonzalez, 2024); Oramah & Olsen, 2021).

Mitigation and Resilience

Mitigation and resilience are two interconnected pillars of climate action that tackle both the causes and effects of climate change. Mitigation involves intentional actions to decrease greenhouse gas (GHG) emissions and improve carbon sinks, therefore slowing the rate and extent of global warming (Intergovernmental Panel on Climate Change [IPCC], 2023a). Attaining mitigation objectives necessitates the decarbonisation of energy systems, a shift to renewable sources, enhancement of energy efficiency, and the promotion of sustainable land

use and forestry practices (IPCC, 2023b). The IPCC Sixth Assessment Report emphasises that maintaining global warming under 1.5 °C necessitates swift and substantial emission reductions across all sectors, underpinned by transformative governance and green innovation (IPCC, 2023a). Conversely, resilience denotes the ability of individuals, communities, and ecosystems to foresee, endure, adjust to, and recuperate from climate-induced shocks and stresses (Richard, 2024; Groff, 2022). Resilience is contingent upon adaptive governance, social learning, inclusive participation, and long-term planning that enhance institutional and community responses to threats including droughts, floods, and food poverty (McCarthy & Winters, n.d.).

While mitigation addresses the fundamental causes of climate change, resilience concentrates on managing its effects, especially for vulnerable populations that experience disproportionate exposure and possess limited adaptive potential. Incorporating both mitigation and resilience into governance frameworks facilitates a holistic approach to climate policy that promotes environmental sustainability, social justice, and intergenerational equity (Buheji et al., 2024). This dual emphasis highlights the significance of youth empowerment and participatory governance in developing locally pertinent and forward-looking climate solutions. Effective climate governance necessitates not just commitments to reduce emissions but also the enhancement of social and institutional capacity to endure and recuperate from climatic disturbances, ensuring that no group is marginalised in the transition to a sustainable future.

Paris Agreement

The Paris Agreement, adopted in 2015 within the framework of the United Nations Framework Convention on Climate Change (UNFCCC), signifies a pivotal moment in international climate governance, aligning nations towards a common goal of restricting global temperature increase and promoting sustainable development (UNFCCC, 2015; Akrofi, 2022). The primary aim of the Agreement, as stated in Article 2, is to restrict the increase in global average temperature to "well below 2 °C" above pre-industrial levels and to strive for a limit of 1.5 °C. This target highlights the international dedication to achieving deep decarbonisation and enhancing resilience (UNFCCC, 2015b). The Paris Agreement contrasts with the Kyoto Protocol's top-down structure by adopting a bottom-up approach that depends on voluntary national commitments. The framework implements a coordinated approach with national commitments, referred to as Nationally Determined Contributions (NDCs), directing collective advancement towards global climate objectives. The Agreement represents a transition from a prescriptive regulatory model to a governance paradigm focused on inclusivity, transparency, and long-term resilience (Higham et al, 2021). The Agreement is fundamentally based on three interconnected pillars: mitigation, adaptation, and means of implementation, which encompass climate finance, technology transfer, and capacity building (Jones Day, 2015).

The fundamental principles of the Agreement are detailed in its principal articles: Article 2 establishes its primary objective: to restrict the increase in global temperature to significantly below 2°C above pre-industrial levels, to strive for a limit of 1.5°C, and to improve adaptive capacity while ensuring that financial flows are consistent with low-carbon and climate-resilient pathways while Article 4 mandates that Parties communicate and uphold Nationally Determined Contributions (NDCs) designed to achieve a balance between anthropogenic emissions and removals. Article 7 sets forth a global objective for adaptation, emphasising the importance of resilience and adaptive capacity as fundamental components of sustainable development. The transparency framework (Article 13) and the global stocktake (Article 14) are intended to evaluate collective progress and guide future NDCs, thereby enhancing accountability and facilitating learning among Parties. Researchers emphasise that the flexible structure of the Agreement promotes inclusivity; however, it also raises issues related to the sufficiency of ambition and equity, particularlry concerning the differentiated responsibilities of developed and developing countries (Santos, 2017). The Paris Agreement presents a governance model that effectively integrates climate action with development, justice, and intergenerational equity. The provisions emphasise equity, ambition, and collaboration, establishing the Paris Agreement as a

transformative framework that enables all stakeholders, including youth, to jointly lead a sustainable, climate-resilient future (Dong, 2022; UNFCCC, 2015).

SUMMARY OF LITERATURE REVIEW

This study is informed by literature that intersects with five key thematic areas:

1. Transformative Governance and Climate Policy Frameworks,
2. Climate Governance under the Paris Agreement
3. Youth Empowerment and Participation in Climate Action,
4. Digital Pathways and Digital Era Governance, and
5. Youth Empowerment, Digitalisation and Climate Governance in Nigeria and Rwanda

Transformative Governance and Climate Policy Frameworks

Transformative governance serves as a crucial framework for tackling the systemic and multi-scalar challenges associated with climate change, as it directly addresses the structural factors that hinder significant sustainability transitions (Korhonen-Kurki et al., 2025; Hölscher et al., 2019). In contrast to adaptive or sectoral approaches that focus on incremental change, transformative governance aims for structural reconfiguration. It utilises innovative institutional forms, orchestration capacities, and cross-sector coalitions to overcome path dependencies and facilitate comprehensive system shifts (Caro-Gonzalez, 2024; Pascual et al., 2022). Transformative governance is characterised by its focus on inclusion, innovation, and changes in power dynamics (Carrington et al, 2024).

Empirical research on urban decarbonisation and landscape restoration indicates that transformative outcomes are significantly linked to multi-actor co-production, experimental governance frameworks, innovative financing mechanisms, and the institutionalisation of learning processes that enhance the scalability of local innovations (Pascual et al., 2022; Hölscher et al., 2019). Research indicates that transformative governance is effective when it integrates scientific knowledge with local values and indigenous practices, resulting in socially legitimate and technically robust interventions (Pascual et al., 2022). Crucially, transformative governance emphasises inclusion and power-rebalancing: it requires mechanisms that create voice and influence for historically marginalised groups rather than merely inviting their consultation.

Empirical reviews indicate a consistent gap: youth, despite being key beneficiaries and catalysts for long-term transformations, are often marginalised in formal governance structures (Salhi et al, 2025). The omission is notable in contexts such as Nigeria and Rwanda, where national climate strategies (e.g., Nigeria's updated NDC and Rwanda's Green Growth and Climate Resilience strategy) outline ambitious mitigation and adaptation objectives but rely on extensive societal engagement to achieve transformative change (Federal Government of Nigeria, 2021; Republic of Rwanda, 2022). Incorporating youth empowerment through formal roles in co-design processes, access to finance and innovation hubs, and capacity-building enhances the legitimacy and sustainability of transformative governance, facilitating intergenerational leadership in the transition to resilient, low-carbon development pathways (Salhi et al, 2025; Benkenstein et al, 2020).

Climate Governance under the Paris Agreement

Empirical studies highlight the dynamic nature of climate governance under the Paris Agreement, emphasising the interactions among national institutions, transnational networks, and local actors in achieving climate objectives. Higham et al. (2021) identified that the Agreement's bottom-up approach has enhanced national ownership of climate policies; while transformative governance offers a critical perspective for evaluating climate policy frameworks, as it emphasises structural change, inclusive power transfers, innovation, and comprehensive transformations rather than mere incremental modifications. Bambi et al. (2024) empirically demonstrate this in Sub-Saharan Africa: using panel data from 25 nations (1990–2020), they establish that institutional quality and effective governance are associated with reduced ecological footprints, although only up to a specific threshold, beyond which the benefits decline.

This finding underscores the necessity for governance reforms to surpass fundamental quality standards in order to enable sustainable transformations. Okafor et al. (2024) analyse mitigation and adaptation strategies in Nigeria, noting that although policies such as agroforestry, mechanisation of rice production, and methane-emission reduction exist, their institutionalisation is inconsistent. Governance deficiencies, including issues related to coordination, resource allocation, and stakeholder engagement, present substantial challenges. Their analysis highlights that technically feasible initiatives lack effectiveness in the absence of governance frameworks that empower youth, local stakeholders, and cross-sector networks. Owojori and Anwana (2025) identify systemic governance challenges, such as fossil-fuel dependency and inadequate policy coherence, within the BRICS that are similarly evident in African contexts and hinder the transition to net-zero pathways.

Pauw et al. (2019) demonstrated that nationally determined contributions (NDCs) in developing nations often lack clear mechanisms for accountability and integration into domestic development plans. Ndambwa and Moonga (2024) examined the challenges and opportunities associated with decentralising climate governance in the Global South, specifically in the Kafue wetlands of Zambia, and illustrated the effects of decentralisation and civic participation on climate adaptation outcomes. Key findings emphasised the importance of clear frameworks, capacity-building, and community engagement in improving climate governance in vulnerable regions.

The studies suggest that the Paris Agreement offers a flexible framework for multilevel governance. However, achieving its transformative potential demands inclusive participation, institutional coherence, and sustained global support.

Youth Empowerment and Participation in Climate Action

Youth empowerment serves as a normative ideal and a crucial policy necessity in climate governance, transforming young individuals from passive beneficiaries into active agents of change. Research conducted by Sloam, Pickard, and Henn (2022) classifies youth climate activism into three categories: dutiful, disruptive, and dangerous. This classification highlights the ways in which youth are increasingly challenging established paradigms and utilising innovative, and at times radical, methods of engagement. Sanyang (2021) posits that youth empowerment is crucial for the realisation of the right to development, highlighting the necessity of engaging young individuals in all phases of the development process. Javeed et al. (2022) illustrate that structural barriers, including restricted political participation, inadequate employment opportunities, and diminished social capital, hinder youth entrepreneurship and empowerment in Pakistan, emphasising the necessity for institutional reform and inclusive policy frameworks.

Despite this evidence, the involvement of youth in global climate governance frequently remains symbolic or consultative rather than transformative. The United Nations Framework Convention on Climate Change (UNFCCC, 2021) acknowledges youth as stakeholders in global climate discussions; nonetheless, their involvement is often limited to side events and non-binding declarations, rather than meaningful decision-making processes.

According to the empowerment theory proposed by Perkins and Zimmerman (1995), intentional youth empowerment necessitates access to decision-making platforms, significant capacity-building opportunities, and adequate resource support—dimensions that are often overlooked in the literature concerning the Paris Agreement. To enhance transformative climate governance, research should investigate the operationalisation of empowerment dimensions, especially in African contexts with significant youth populations that may serve as catalysts for change.

Digital Pathways and Digital Era Governance

Digital Era Governance (DEG) represents a unique governance framework wherein digital technologies—including information and communications technologies (ICTs), data analytics, platform infrastructures, and automation—play a pivotal role in shaping, delivering, and transforming public sector functions (Ravšelj et al, 2022). Empirical bibliometric evidence indicates that DEG has significantly evolved over the past two decades, transitioning from e-government service delivery to models of governance that are citizen-centric,

smart, and participatory (Ravšelj et al, 2022). A case study in Yogyakarta, Indonesia demonstrated that 'e-leadership'—the ability of senior officials to guide digital transformation—was crucial in converting digital infrastructure into institutional and policy innovation at the local level (Zuhriyati et al., 2025). An empirical investigation of digital governance in Indonesia revealed that the digital divide among low-income groups hinders inclusive governance, as poorer communities have restricted access and consequently remain excluded from digital public services (Wahyunengseh et al., 2020).

Digital policy experts in developing countries highlight the importance of coordination, regional cooperation, and capacity building as critical avenues for utilising digital technologies for development. However, power imbalances and domestic technical barriers persist, hindering progress (Phillips et al., 2020). The evidence indicates that the relationship between digital technologies and enhanced governance is not automatic or universal; it is contingent upon factors such as institutional readiness, inclusive access, leadership, and data-driven practices. While digital pathways hold transformative potential for governance, empirical studies highlight that realization of DEG requires contextually embedded strategies to avoid reinforcing existing inequalities and to foster social value from digital government reforms (Ndambwa & Moonga, 2024).

Youth Empowerment, Digitalisation and Climate Governance in Nigeria and Rwanda

Empirical studies indicate that the quality of governance and institutional thresholds significantly influence the extent to which digital tools result in climate-relevant outcomes. Bambi et al. (2024) reveal that in Sub-Saharan Africa, enhancements in institutional quality led to reductions in ecological footprints only when governance exceeds specific thresholds.

Empirical evidence from Nigeria indicates that institutional exclusion, resource limitations, and ineffective implementation frameworks persistently hinder youth involvement in climate governance (Benkenstein et al., 2020). Okafor et al. (2024) indicate that despite the presence of mitigation and adaptation policies, inconsistent institutionalisation and inadequate coordination hinder youth participation in climate entrepreneurship and policy processes. Pinchoff et al. (2025) reflects that youth encounter climate risks directly and can significantly engage in locally relevant adaptation when provided opportunities for co-production and decision-making. Nigeria's Third Nationally Determined Contribution NDC 3.0 (Federal Republic of Nigeria, 2025) recognises youth as a critical stakeholder and indicates diverse areas to cater to their interest and secure their engagement, a seeming improvement to the Updated Nationally Determined Contribution (NDC) - 2021 which dedicated a section to youth and acknowledges that they "represent a tremendous potential" (Federal Government of Nigeria, 2021 Section 6.3, paragraph 2). Nevertheless, their effectiveness is frequently hindered by bureaucratic inertia and insufficient political will.

Youth empowerment in Rwanda is integrated into national frameworks via overarching climate resilience and green growth strategies. Rwanda's NDC (Republic of Rwanda, 2020) lacks a dedicated section on youth empowerment; however, its integration with the Green Growth and Climate Resilience Strategy (GGCRS), the National Strategy for Transformation (NST1), and Vision 2050 establishes institutional frameworks for youth inclusion. However, empirical research has also identified the digital divide and rural connectivity gaps that restrict equitable youth participation (Ahishakiye & Nizeyimana, 2024), despite reports that emphasise government-driven investments in green jobs, climate education, and youth-led innovation (Republic of Rwanda, 2022).

The intersection of youth empowerment, digitalisation, and climate governance can either enhance or limit national climate ambitions, influenced by factors such as institutional capacity, digital access, and inclusive governance structures. This suggests that digital interventions should be integrated within adequately strong institutions to achieve effectiveness. Digital tools, including e-participation portals, mobile learning, and social media campaigns, have enhanced youth engagement in environmental policy dialogues in Nigeria and Rwanda (APRI, 2025; Bermeo & Santoro, 2025), nonetheless, digital divides, resulting from disparities in access to technology, education, and infrastructure, restrict participation in both nations.

Gap in Existing Literature and Contribution to Scholarship

Despite the growing body of research on youth, digitalisation, and climate governance, significant theoretical and contextual gaps persist. The Paris Agreement has shifted global climate governance towards a more participatory and facilitative model; nonetheless, mechanisms for youth engagement remain underdeveloped and insufficiently theorised. Research on transformative governance underscores the importance of inclusivity and systemic change yet often overlooks the role of youth as key participants in these transitions. A considerable amount of literature highlights administrative efficiency (Dunleavy et al., 2006; Margetts & Dunleavy, 2013) rather than the transformative and participatory potential of digitalisation for youth inclusion. Empirical studies from Nigeria and Rwanda reveal both opportunities and barriers for youth in climate action; however, there is a scarcity of comparative analyses grounded in global policy frameworks. Research (Akrofi et al., 2022; Connect4Climate & Teach For All, 2024; APRI, 2025; Bermeo & Santoro, 2025) highlights institutional constraints and resource limitations yet rarely examines the impact of digital infrastructures on enhancing youth empowerment in climate governance.

This empirical gap highlights the necessity for context-sensitive analysis regarding the role of digital pathways in enhancing youth empowerment within Africa's climate governance framework. This study addresses a gap in literature by synthesising Empowerment, Digital Era Governance, and Transformative Governance theories. It investigates how digital pathways enhance youth empowerment within the framework of the Paris Agreement in Nigeria and Rwanda, contributing to inclusive and context-sensitive models of climate leadership.

This study situates digital pathways to youth empowerment within the context of the Paris Agreement, using Nigeria and Rwanda as case studies. The study examines the impact of Article 12 provisions on youth engagement in climate mitigation and resilience efforts, highlighting the contributions of Digital Era Governance. It offers a substantial contribution to climate governance, youth empowerment policy, and sustainable development, addressing the urgent need for inclusive and context-sensitive approaches to transformative global environmental agreements.

DISCUSSION OF FINDINGS

Integration of Paris Agreement Provisions into National Climate Policies in Nigeria and Rwanda

The integration of Paris Agreement provisions into national climate policies reflects how global commitments are localized to advance inclusive climate governance. Both Nigeria and Rwanda have aligned their Nationally Determined Contributions (NDCs) with the Paris Agreement's long-term adaptation and mitigation goals, emphasizing youth engagement, digital innovation, and resilience. While both countries incorporate Article 12's focus on education, awareness, and participation, their approaches differ in institutional design and execution.

Nigeria's Third Nationally Determined Contribution (NDC 3.0, 2025) enhances the convergence of climate policy, digital transformation, and youth empowerment. Through initiatives such as the Investment in Digital and Creative Enterprises (iDICE) program and the 3 Million Technical Talent (3MTT) initiative, Nigeria integrates digital skills development into climate-smart innovation (Federal Republic of Nigeria, 2025; National Council on Climate Change [NCCC], 2022). These reflect a Digital Era Governance (DEG) logic (Dunleavy et al., 2006; Margetts & Dunleavy, 2013), where technology-driven collaboration supports inclusive climate action. However, implementation gaps persist—particularly in the monitoring, reporting, and verification (MRV) of youth-led programmes, which remain fragmented across ministries.

Rwanda, by contrast, demonstrates a more coherent and institutionally embedded model. The Green Growth and Climate Resilience Strategy (GGCRS) and Vision 2050 operationalize Article 12's principles through participatory and digital inclusion mechanisms (Republic of Rwanda, 2023). Initiatives such as the Youth Climate Action Hub, Rwanda Digital Acceleration Project, and ICT for Green Growth Program advance youth access to climate data, digital learning, and innovation (World Bank, 2024; Howard, 2023). This approach

exemplifies Transformative Governance Theory (Biermann & Kim, 2020), emphasizing multilevel collaboration and adaptive learning.

Comparatively, Nigeria's framework reflects Empowerment Theory (Zimmerman, 2012), focusing on individual digital capacity, while Rwanda's structure advances institutional and community empowerment. Together, these trajectories illustrate that translating the Paris Agreement into locally relevant outcomes requires integrated digital pathways, participatory governance, and sustained youth inclusion mechanisms.

Digital Transformation and Youth Empowerment in Climate Governance.

Recent developments in Nigeria and Rwanda reflect a growing institutional commitment to leveraging digital transformation as a mechanism for youth empowerment and climate governance. These efforts align with the participatory provisions of Article 12 of the Paris Agreement, which emphasises education, awareness, and public participation in climate action. Both countries have integrated youth engagement within digital and climate policies, yet their governance models reveal distinct patterns of institutional alignment and implementation.

In Nigeria, digital innovation has become central to youth development policy through the National Digital Economy Policy and Strategy (NDEPS, 2020–2030) and the Nigeria Startup Act (2022). Capacity-building initiatives such as the Three Million Technical Talent (3MTT) and Investment in Digital and Creative Enterprises (iDICE) programmes aim to establish an inclusive digital ecosystem that enhances youth competence and entrepreneurship (Federal Ministry of Communications, Innovation and Digital Economy [FMCIDE], 2023; African Development Bank [AfDB], 2023). These initiatives embody Empowerment Theory by strengthening youth agency and digital capacity. However, scholars such as Lawal et al. (2025) and Apraku et al, (2025) note that Nigeria's digitalisation strategy is primarily economically driven, with limited direct connection to climate resilience. While Nigeria's Nationally Determined Contribution (NDC 3.0) integrates youth engagement and digital innovation, it lacks a robust Measurement, Reporting, and Verification (MRV) mechanism to track youth-led climate contributions (The Green Institute, 2024; Federal Republic of Nigeria, 2025). This gap limits the transformative potential of digital empowerment within Nigeria's climate governance framework.

Rwanda, by contrast, has institutionalised a more coherent model that aligns digital transformation with climate resilience and youth inclusion. Through flagship initiatives such as YouthConnekt Africa, the Digital Ambassadors Programme (DAP), and the Priority Skills for Growth and Youth Employment (PSGYE), Rwanda integrates digital literacy, green innovation, and entrepreneurship into its national sustainability agenda (Dinika, 2024; World Bank, 2024). This approach reflects the Digital Era Governance (DEG) framework proposed by Dunleavy et al. (2006) and Margetts and Dunleavy (2013), emphasising networked governance and citizen co-production. Furthermore, the incorporation of digital strategies into the Green Growth and Climate Resilience Strategy (GGCRS) and Vision 2050 demonstrates Rwanda's application of Transformative Governance Theory, promoting inclusivity and adaptive policymaking (Apraku et al, 2025).

Despite the expansion of digital initiatives, both nations encounter significant digital inequality. In Nigeria, approximately one-third of youth possess reliable internet access, with disparities between rural and urban areas, as well as gender differences, hindering equitable participation (Animashaun, 2025; UNDP, 2024). Data costs in sub-Saharan Africa are among the highest globally, limiting ongoing participation in digital climate platforms. Rwanda has attained enhanced connectivity; however, financing deficiencies and reliance on donor-funded infrastructure jeopardise the long-term viability of youth-led technology initiatives (Rwanda Civil Society Platform, 2023; World Bank, 2024). The disparities highlight the necessity of integrating digital empowerment with structural investments in affordable access and digital literacy to attain sustainable climate governance outcomes.

Overall, digital transformation in Nigeria and Rwanda functions not only as a technological advancement but as a governance framework for participatory and adaptive climate action. Viewed through Empowerment Theory, Digital Era Governance, and Transformative Governance, both countries illustrate the emerging shift toward digital participation, where youth act as co-creators of climate solutions rather than passive

beneficiaries. This evolution marks an important step toward achieving the inclusive and participatory aspirations of the Paris Agreement.

Enablers and Barriers to Youth Participation in Climate Governance in Nigeria and Rwanda

The institutional, social, and technological dynamics in Nigeria and Rwanda collectively influence the opportunities and constraints encountered by youth in climate governance. Both countries' institutional frameworks have developed to acknowledge the significance of youth inclusion in national development and environmental policy. Nigeria's National Youth Policy (2019) and the Climate Change Act (2021) recognise the importance of youth in promoting environmental sustainability. Similarly, Rwanda's National Strategy for Transformation (NST1, 2017–2024) and the Green Growth and Climate Resilience Strategy (GGCRS, 2011) incorporate youth engagement in governance reforms and climate initiatives. Apraku et al. (2025) and UNDP (2024) highlight that institutional fragmentation and bureaucratic rigidity impede cross-sectoral coordination, thereby diminishing the effectiveness of youth-led initiatives in both contexts.

The increasing climate awareness among African youth, facilitated by digital activism and global networks like Fridays for Future Africa and YouthConnekt Africa, has enhanced advocacy for climate justice. In Rwanda, social mobilisation has resulted in community-based climate action and environmental education programs (Rwanda Civil Society Platform, 2023). Youth climate movements in Nigeria are active but face limitations due to restricted policy access and inconsistent government engagement (Lawal et al, 2025). Ongoing socio-economic inequalities, especially those related to gender and rural-urban divides, persistently marginalise specific youth groups from decision-making processes, reflecting wider structural issues in governance and participation (Mweha, 2025).

Technological enablers, including digital literacy initiatives, innovation hubs, and e-governance platforms, have improved access to climate data and participatory mechanisms. The Digital Ambassadors Programme in Rwanda, along with Nigeria's iDICE and 3MTT initiatives, offers digital avenues for youth empowerment and environmental entrepreneurship. The findings indicate that, although digital literacy programs are proliferating, the climate governance aspect of these initiatives remains marginal in both situations. The lack of clear policy tools linking digital empowerment to climate resilience constitutes a wasted opportunity to utilise technology for revolutionary environmental results. Moreover, barriers, such as limited internet access, high data costs, and low digital literacy, hinder equitable participation among marginalised youth, especially in rural regions (UNDP, 2024).

Article 12 of the Paris Agreement requires Parties to collaborate on education, training, and public engagement—fundamental components of young empowerment. However, its domestic implementation in both Nigeria and Rwanda is still incomplete. Nigeria's NDC 3.0 has prioritised youth inclusion and digitalisation; however, the operational framework for capturing, tracking, and verifying youth-digital-climate outcomes—such as youth empowerment indicators, digital literacy metrics, and youth-led climate innovation metrics—remains insufficiently developed. Likewise, Rwanda's NDC (2020) does not delineate youth empowerment as an independent objective but integrates it within wider socio-economic contexts. The inconsistent implementation of Article 12 in both situations underscores the necessity for more tailored strategies to integrate digital youth empowerment into climate governance.

From the perspective of Transformative Governance Theory, this inconsistency indicates a superficial shift, wherein institutions embrace participatory rhetoric without genuinely decentralising decision-making authority. Institutional recognition, social mobilisation, and digital innovation have collectively enhanced opportunities for youth participation in climate governance; however, persistent systemic and technological inequities restrict their transformative potential.

Contextual Factors Affecting Digital Youth Empowerment and Policy Effectiveness

The implementation of youth and digital empowerment policies in Nigeria and Rwanda is significantly shaped by their socio-economic and political contexts. The oil-dependent economy and federal structure of Nigeria result in uneven resource distribution and fragmented policy coordination among states, thereby undermining

the coherence of national digital and climate strategies (World Bank, 2024). High unemployment and rural poverty intensify digital exclusion, especially affecting women and low-income youth (UNDP, 2024). Rwanda's centralised governance model, established during its post-genocide reconstruction, facilitates enhanced policy alignment and institutional discipline (Republic of Rwanda, 2023). The prevailing top-down political culture restricts independent youth advocacy and may inhibit the spontaneity of civic participation (Dinika, 2024).

Historical legacies elucidate these divergences, and these trajectories influence both the administrative culture and the ability to incorporate digital and climate objectives into policy implementation. Nigeria's democratic pluralism creates avenues for youth advocacy while simultaneously subjecting initiatives to bureaucratic inertia and policy discontinuities due to shifting administrations (Okafor et al, 2024). Socio-economic and political factors limit the translation of digital empowerment into sustained climate action, despite robust policy rhetoric regarding inclusion. However, Rwanda's small population, efficient bureaucracy, and state-led development model have enabled cohesive digital governance reforms (YouthConnekt Africa, 2024).

The comparative analysis indicates that although both nations are committed to youth inclusion and digital innovation, differences in economic resources, political culture, and institutional design influence the effectiveness and sustainability of their implementation. Addressing these contextual gaps through enhanced inter-ministerial coordination in Nigeria and increased civic openness in Rwanda is essential for realising the transformative potential of digital youth empowerment in climate governance.

CONCLUSION AND RECOMMENDATIONS

The study indicates that digital transformation serves as a strategic lever for youth empowerment and inclusive climate governance in Nigeria and Rwanda. Both countries have made tangible progress in integrating youth participation and digital innovation into national climate strategies, reflecting growing alignment with the participatory principles of Article 12 of the Paris Agreement. Nigeria's approach, driven by initiatives such as the Investment in Digital and Creative Enterprises (iDICE), Three Million Technical Talent (3MTT) programme, and the National Digital Economy Policy and Strategy (NDEPS 2020–2030), illustrates an expanding ecosystem for digital inclusion and entrepreneurship. However, the climate dimension of these interventions remains underdeveloped, as existing policy frameworks—despite commitments under the Nationally Determined Contribution (NDC 3.0)—lack robust Measurement, Reporting, and Verification (MRV) mechanisms to track youth-led climate innovation (Federal Republic of Nigeria, 2025).

Rwanda presents a more integrated model that links digital empowerment directly to climate resilience and sustainability. Programmes such as YouthConnekt Africa, the Digital Ambassadors Programme (DAP), and the Priority Skills for Growth and Youth Employment (PSGYE) have strengthened the role of youth in environmental innovation and governance (Dinika, 2024; World Bank, 2024). Rwanda's Green Growth and Climate Resilience Strategy (GGCRS) and Vision 2050 institutionalise youth participation within digital and climate frameworks, embodying principles of Transformative Governance and Digital Era Governance through cross-sectoral collaboration and adaptive learning (Caro-Gonzalez, 2024).

Despite these advances, both nations face structural and systemic barriers that constrain transformative outcomes. Persistent digital inequality, limited access to finance, and uneven institutional coordination hinder the scaling of youth-led climate solutions. The implementation of Article 12 remains partial, with gaps in translating participatory commitments into measurable outcomes (UNDP, 2024). These challenges underscore the need for more coherent, data-driven, and inclusive policy instruments that operationalise youth empowerment within climate accountability systems.

To advance digital-climate synergy, both countries should prioritise the integration of youth empowerment metrics within NDC monitoring frameworks and strengthen MRV systems to assess the climate impacts of digital initiatives. Governments and development partners should invest in climate-tech incubators, expand access to green finance for youth innovators, and promote regional knowledge-sharing platforms that link digital literacy to climate action. In addition, greater collaboration between ministries of environment, youth, and digital innovation can ensure policy coherence and prevent fragmentation. Moreover, socio-political and

economic realities should be incorporated into digital-climate strategies, to enhance subnational coordination that focus on digital inclusion in rural and economically disadvantaged regions in Nigeria, whereas sustaining digital empowerment in Rwanda necessitates that youth participation transcends state-led initiatives.

The study contributes to scholarly debates by integrating Empowerment Theory, Digital Era Governance, and

Transformative Governance into a unified analytical framework. It demonstrates that meaningful youth engagement in climate governance requires not only technological access but also institutional transformation and participatory inclusion. By embedding digital empowerment within climate policy, Nigeria and Rwanda can transition from rhetorical inclusion to substantive co-production—realising the transformative potential of youth as architects of a resilient, low-carbon future.

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