Examining the Intersection of Industrial Policy, Environmental Sustainability and Resource Management for Africa's Development

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Abstract

This paper focuses on the intersection of industrial policy, environmental sustainability, and resource management for Africa's development. The general objective is to examine the critical interlinkages of industrial policy, environmental sustainability and resource management for Africa's development, among other specific objectives. To achieve these objectives, a qualitative research method was adopted. This approach entailed a descriptive or textual analysis of case studies, policy documents, and expert perspectives on the industrial policies, environmental sustainability goals, and resource management of five selected African countries (Kenya, South Africa, Morocco, Ghana, and Ethiopia). The findings revealed that, there exists a positive correlation among the trio variables: industrial policy, environmental sustainability, and resource management in achieving an industrial growth that is eco-friendly for a sustainable African development; second, strategic models like green technologies, renewable energy, and circular models are likely strategies in designing industrial policies that align with environmental

sustainability; the study equally revealed that only African countries with stronger resource management frameworks are better positioned to support sustainable industrialization necessary for African development; inter alia. The paper therefore concludes that, integrating environmental sustainability and resource management into industrial policy holds immense opportunities for Africa's development. And thus, the paper recommends: First, African governments should mainstream environmental sustainability as a core industrial policy objective; besides, there should be strategic management of green resources within Africa; again, African governments should mobilize finance for green growth investments; and promote technological innovations and skills development for effective use of the natural resources that foster environmental sustainability, thereby promoting African sustainable development; inter alia.

Keywords: Development; Environmental Sustainability; Industrial Policy; Resource Management.

1.0. Introduction

1.1. Background

To be sure, industrial policy has re-emerged in recent decades as a foundational tool for structural transformation, economic diversification, and sustainable development in Africa. Traditionally, industrial policy in many African countries focused narrowly on import substitution, tariff protection, and basic manufacturing capacity building (United Nations Industrial Development Organization, 2024). While these approaches helped stimulate early industrialization efforts, they often overlooked the environmental consequences of industrial expansion, including resource depletion, pollution, and ecosystem degradation. As global pressures for climate action intensify and the environmental costs of development become more apparent, African policymakers are increasingly challenged to reconcile the objectives of industrial growth with environmental sustainability and effective resource management. This study examines the convergence of industrial policy, environmental sustainability, and resource management in Africa, highlighting how these domains interact, conflict, and offer opportunities for sustainable transformation.

In concrete terms, the notion of sustainable industrialization is grounded in the broader sustainable development agenda epitomized by the United Nations Sustainable Development Goals (SDGs), particularly SDG 9 (industry, innovation and infrastructure), SDG 12 (responsible consumption and production), and SDG 13 (climate action). These goals underscore the imperatives of fostering inclusive industrial growth while minimizing environmental harm and preserving natural resources for future generations (United Nations Environment Programme, 2023). For African countries, achieving such balance is especially critical. The continent faces a dual burden: the urgent need for accelerated industrialization to address unemployment, poverty, and structural economic transformation; and the equally pressing need to mitigate environmental degradation, biodiversity loss, and vulnerability to climate change impacts (African Development Bank Group, 2023). Thus, integrating environmental sustainability into industrial policymaking is not merely a normative ideal, it is a strategic *sine qua non* to ensure resilient and equitable development pathways. Typically, with industrial growth being the engine for economic development both within the advanced industrialized Global North countries (like the USA, UK, etc) and the Global South regions like Africa, who are toeing the path of industrialization like the advanced industrialized nations, environmental sustainability and resource management have become imperatives in their industrial policies so as to achieve a balance in their industrial activities without impairing the environment. The USA, for instance, in her industrial policy has committed herself to a "net-zero" environmental challenges by 2050 (United States of America, 2021). Similarly, the African region in the pursuit of industrial growth, is equally not unaffected in this challenge, as we shall see later.

Additionally, at the heart of this study is the recognition that resource management is a central determinant of whether industrial policy can be environmentally sustainable. Africa's rich endowment of natural resources—ranging from minerals and fossil fuels to water, forests, and fertile soils—positions the continent for potential industrial advantage. However, the way these resources are governed, allocated, and utilized determines whether they become catalysts for sustainable development or sources of environmental degradation and socioeconomic inequities. Weak governance, opaque regulatory frameworks, and rent-seeking behaviours have historically undermined resource benefits, leading

to resource curses rather than developmental dividends in many contexts (Mo Ibrahim Foundation, 2025). Conversely, countries with stronger resource governance frameworks are better able to channel natural resource wealth into infrastructure, value addition, and environmentally responsible industries. Typically, recent policy trends across African countries demonstrate an increasing awareness of the need to align industrial strategies with environmental and resource sustainability objectives. For example, Kenya's Green Economy Strategy and Implementation Plan sets out actionable pathways for low-carbon industrial development grounded in renewable energy, sustainable agriculture, and resource efficiency (Climate Development Africa, 2025). Similarly, Ethiopia's Climate-Resilient Green Economy strategy directly embeds sustainable resource management into national development and industrialization plans (Climate Development Africa, 2025). South Africa's renewable energy procurement programmes, including the Renewable Energy Independent Power Producer Procurement Programme, provide incentives for industrial decarbonization through increased uptake of solar and wind energy (South African Department of Mineral Resources and Energy, 2025). These emerging strategies illustrate a broader continental shift toward industrial policies that not only seek economic growth but also endeavour to embed environmental sustainability and resource stewardship.

Despite these advances, the literature and policy experience reveal that significant gaps remain in the integration of sustainability principles into industrial frameworks. Challenges persist in areas such as institutional coordination, financing of green technologies, regulatory enforcement, and the balancing of short-term economic imperatives with long-term environmental commitments. Governments often struggle to translate high-level sustainability rhetoric into operational policies that yield measurable ecological benefits. Moreover, the uneven adoption of green industrial frameworks across countries highlights disparities in institutional capacity, resource availability, and governance quality. These disparities raise the question of how effectively current industrial policies address environmental concerns and whether they can sustainably manage natural resources in ways that promote equitable and durable economic transformation. Therefore, this study aims to investigate the critical intersection of industrial policy, environmental sustainability and resource management in

Africa, including other specific objectives. By addressing these focal areas, the research contributes to a deeper understanding of how industrial policy can evolve beyond growth-centric paradigms toward models that balance economic, environmental, and social imperatives. By its thematic *raison d'etre* therefore, this study recognizes that Africa's industrial future is inextricably tied to its capacity to integrate environmental sustainability and resource management into its industrial policies and/or development planning. As the global economy transitions toward a more resource-efficient, low-carbon paradigm, African nations have both a challenge and an opportunity: to shape industrial policies that not only drive structural transformation but also safeguard the ecological foundations upon which long-term development depends.

1.2. Objectives of the Study

The general objective of the paper is to examine the critical intersection of industrial policy, environmental sustainability and resource management for Africa's development. However, specific objectives equally designed to guide the study in achieving the main objective include the following:

1. To ascertain how industrial policies in African countries can be designed to align with environmental sustainability goals;
2. To identify the role resource management play in shaping sustainable industrial development in Africa;
3. To find out the extent to which the current industrial policies in African nations can address environmental concerns and promote sustainable use of natural resources;
4. To investigate the key challenges and opportunities for integrating environmental sustainability into Africa's industrial policy frameworks;
5. To find out how different African countries have incorporated green growth strategies into their industrial development so as to help inform more effective industrial policies for Africa.

1.3. Methodology

This study employs a qualitative research design to explore the intersection of industrial policy, environmental sustainability, and resource management in Africa. A qualitative approach is appropriate because the research aims to gain a deep, contextual understanding of policy frameworks, governance mechanisms,

and sustainability practices, rather than quantify outcomes or test hypotheses. Qualitative research enables the exploration of perceptions, policy intentions, institutional dynamics, and implementation challenges that are often complex, context-specific, and multi-dimensional (Creswell & Poth, 2018).

Thus, the qualitative research adopts a descriptive and exploratory design, which allows for an in-depth examination of the industrial policies case studies in selected African countries and their alignment with environmental sustainability and resource management objectives. By focusing on policy documents, country case studies, and expert perspectives, the study captures nuanced insights into the strategies, opportunities, and constraints shaping sustainable industrial development. A case study approach is therefore employed within the qualitative paradigm. In line with that, the study selects five African countries—Kenya, South Africa, Morocco, Ghana, and Ethiopia—as case studies due to their varying experiences in integrating green growth and resource management into industrial policies. This approach enables cross-country comparisons, identification of best practices, and recognition of contextual factors that influence policy effectiveness (Yin, 2018).

1.4. Conceptual Clarifications

For a more epistemic insight into the discourse, certain terms that are preponderant in this essay are hereby demystified. These terms include: Development; Environmental Sustainability; Industrial Policy; Resource management.

Development

The concept of development is a complex term. This is due to its multi-dimensional nature; and hence, connotes nuanced meanings. It connotes the qualitative and quantitative improvements in the quality of human lives, including the transformation of societal institutions cutting across the social, economic, psychological, technological, political, geographical, and cultural spheres. From the frame of reference of human development, it connotes the enrichment of the human lives and not just the enrichment of the economy, with special emphasis on enabling people to have access to quality education, health care facilities, and access to means of income and livelihoods (UNDP, 2016). Again, from the lens of

sustainable development; it connotes the ability of a nation to provide the qualitative and quantitative needs of its present generation without compromising the needs of its future generations, and not harming the environment in which people live. Thus, in the context of the discourse, it is quite conceivable to affirm that, a positive interplay between industrial policy, environmental sustainability, and resource management, shall, in all intents and purposes, promote African development. For with effective industrial policies, African natural resources can be well managed, the environment sustained, and the outcome will approximate a positive development process for Africa.

Environmental Sustainability

Environmental sustainability refers to the responsible management of resources in a way that ensures the ecological balance is maintained for current and future generations. It focuses on reducing human impact on natural processes and preserving biodiversity in ecosystems. This concept emphasizes the need to integrate environmental considerations into decision-making processes across various sectors, including agriculture, industry, and urban development. According to the United Nations (2015), environmental sustainability is a cornerstone of sustainable development, aligning economic growth with environmental stewardship and social equity. The UN Sustainable Development Goals, particularly Goal 13 (Climate Action), underscore the importance of policies that promote sustainability and combat climate change (United Nations, 2015).

Industrial Policy

Industrial policy involves the strategic efforts by a government to promote the growth and competitiveness of certain sectors within the economy. This may include financial incentives, regulatory support, and infrastructure investment aimed at fostering industrial development and innovation. The underlying goal is to enhance economic performance and create jobs while addressing issues such as technological advancement and environmental sustainability. For example, the European Commission's communication on a New Industrial Strategy for Europe (2020) highlights the importance of a cohesive industrial policy that supports digital and green transitions in the economy (European Commission, 2020). This approach is designed to make industries more competitive and sustainable, aligning with broader EU goals.

Resource Management

Resource management refers to the strategic coordination of resources (natural, human, financial) to optimize their utilization while minimizing waste and ensuring sustainability. This concept encompasses various practices, including conservation, recycling, and efficient production techniques. Effective resource management seeks to balance economic growth with ecological integrity and social responsibility. The International Resource Panel (2017) indicates that efficient resource management can dramatically reduce environmental pressures while supporting economic development. This panel emphasizes the critical need for sustainable practices in resource extraction, consumption, and waste management (International Resource Panel, 2017).

Having successfully demystified the above concepts, we shall proceed to exploring some literatures that are relevant to the discourse. To be sure, the preceding introduction established the critical nexus between industrial policy, environmental sustainability, and resource management in Africa, highlighting both the imperative and the challenge of designing industrial strategies that are economically transformative and ecologically responsible. It underscored the dual pressures confronting African nations: the urgent need to accelerate industrialization and economic diversification, and the necessity to safeguard natural resources and reduce environmental degradation in the face of climate change and global sustainability imperatives. While policy initiatives in selected countries illustrate the growing recognition of green growth and resource efficiency, the introduction also revealed that policy implementation remains uneven and often constrained by institutional, financial, and technological limitations. Given these observations; in what follows, it becomes imperative to review the existing scholarly and policy literatures to understand the conceptual, theoretical, and empirical foundations that inform the intersection of the three variables: industrial policy, environmental sustainability, and resource management for Africa's development. To that we now proceed.

2.0. Literature Review

Corpuses of literatures (like, the International Resource Panel, 2017; UN Environment Programme, 2023; UN Industrial Development, 2024) have ventured, partially, into the present discourse: either on the subject of industrial

policy; or, on the subject of environmental sustainability; and/or, on the subject of resource management. But the question of the nexus between the trio concepts/variables, especially with regards to its implications for Africa's development, is yet to receive major epistemic focus from many writers. Hence, it is the thrust of this paper to contribute to knowledge by filling the missing knowledge gap in literature with the following sub-themes.

2.1. Industrial Policy in Africa-- An Overview

Industrial policy in Africa has experienced a resurgence as policymakers recognize the critical role of manufacturing and value-added production in driving structural economic transformation, job creation, and sustainable development (United Nations Industrial Development Organization [UNIDO], 2025). Historically constrained by dependence on raw commodity exports and limited industrial diversification, African economies are increasingly turning to deliberate industrial policy frameworks to foster competitiveness and address persistent development challenges such as unemployment, low productivity, and unequal participation in global value chains (African Development Bank Group, 2025). Central to Africa's industrial agenda is the African Development Bank's Industrialization Strategy for Africa 2016–2025, which outlines a comprehensive roadmap for scaling up industrial transformation. This strategy emphasizes supportive policy environments, enhanced infrastructure, access to finance, human capital development, and deeper integration into regional and global markets as key enablers of industrialization (African Development Bank Group, 2025). By placing industrialization within broader development priorities—such as the African Union's Agenda 2063 and the United Nations' Sustainable Development Goals—African governments and development partners aim to harness industrial policy as a mechanism for inclusive growth and poverty reduction.

A notable recent development is the Africa Industrialization Index (AII), jointly launched by the African Development Bank, the African Union, and UNIDO. The 'AII' provides a nuanced assessment of industrial performance across 52 countries, helping governments identify strengths and weaknesses in manufacturing, infrastructure, institutions, and macroeconomic conditions. While the index highlights modest improvements in several economies, Africa's share of global

manufacturing remains below 2 percent, underscoring the need for more proactive and context-specific industrial policies (African Development Bank Group, 2025). Hence, industrial policy in Africa today is characterized by a broad set of tools and sectoral approaches. Governments are promoting special economic zones, agro-industrial parks, and value-chain development initiatives to stimulate industrial growth in sectors such as agro-processing, light manufacturing, and technology-enabled production (UNIDO, 2025). For example, Ethiopia's industrial parks and Senegal's agro-industrial clusters have been designed to create jobs, attract foreign investment, and strengthen local capacities in processing agricultural outputs—demonstrating how targeted policies can advance structural transformation (UNIDO, 2025; United Nations Industrial Development Report, 2025).

Additionally, regional integration under the African Continental Free Trade Area (AfCFTA) also plays a strategic role in industrial policy by creating larger markets, reducing trade barriers, and facilitating intra-African value chains. Policymakers view the AfCFTA as a critical platform for enhancing competitiveness and expanding market access for African manufacturers (UNIDO, 2025). Despite these strategic directions, significant challenges persist, especially on designing industrial policies that can harmonize the processes of effective environmental sustainability and resource management in Africa. This shall be addressed in what follows.

2.1.1 Designing industrial policies in Africa that can successfully align with environmental sustainability and resource management

The integration of environmental sustainability within industrial policy is increasingly recognized as critical for African countries as they strive for economic growth while addressing the urgent challenges posed by climate change and environmental degradation. In the past, the primary focus of industrial policies in Africa was on accelerating industrialization through rapid economic growth, often at the expense of environmental concerns. However, the growing recognition of the link between industrialization and environmental impact has led to a shift towards policies that can harmonize industrial development with environmental sustainability, focusing on the green economy. Thus, the need for industrial policies to align with environmental sustainability goals in Africa is particularly urgent due to the continent's unique challenges. Africa is home to 16 of the 20 most

vulnerable countries to climate change, and its environmental resources—such as forests, water, and biodiversity—are under significant stress (African Development Bank, 2020). Industrial activities like mining, agriculture, and energy production have contributed to environmental degradation, and continued reliance on such sectors without incorporating sustainable practices could exacerbate these issues. Therefore, it is crucial for African industrial policies to create synergies between industrialization and environmental protection. Hence, to design industrial policies that align with environmental sustainability, African governments must prioritize green technologies, renewable energy, and circular economy models. Perhaps, it is quite constructive to put into context, here, a brief explanation of each of these models:

1. Green Technologies Model: Green technologies are central to decoupling economic growth from environmental degradation. Governments should prioritize policies that promote domestic innovation, manufacturing, and adoption of low-impact technologies across key sectors such as manufacturing, transportation, and agriculture. Fiscal incentives (tax credits, targeted subsidies) should be tied to local capability building, including R&D, workforce training, and technology transfer, to ensure that green industrialization fosters both domestic technological competence and value addition rather than dependence on imported technologies (Lopes, 2025). Strategic sectoral planning, as envisaged in continental frameworks such as the Africa Green Industrialisation Initiative, can mobilize finance and technical expertise to build climate-smart industries powered by sustainable technologies, also aligning with Africa's commitments under the Paris Agreement (Africa50, 2025).

2. Renewable Energy Model: Renewable energy is foundational to sustainable industrial growth in Africa, given the continent's abundant solar, wind, and geothermal potential. Governments must embed renewable energy targets within industrial policies to ensure that power generation for industry is low-carbon and resilient. Initiatives such as South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) illustrate how structured public procurement and private sector participation can scale renewable capacity while contributing to climate goals (Lopes, 2025). Similarly, infrastructure deals—such as Kenya's recent investment in transmission lines designed to strengthen grid

integration of renewables—highlight the importance of institutional frameworks to support clean energy expansion (Lopes, 2025). Besides, policy design should also include reforms like, aligning national climate targets (e.g., Nationally Determined Contributions) with industrial electricity planning. Typical of this, is Senegal's streamlined investment processes for renewable initiatives, which further attracts foreign investment (Lopes, 2025).

3. Circular Economy Model: The circular economy offers a systemic approach to reduce waste, conserve resources, and create new economic opportunities. Industrial policies embed circular principles such as waste minimization, recycling, product life extension, and materials reuse across industrial supply chains. Experience from Ethiopia's zero-emissions industrial parks, which integrate energy efficiency and waste management, demonstrates practical pathways for embedding circularity into industrial zones (Lopes, 2025). Additionally, expanding recycling infrastructure for key materials—such as aluminum, textiles, and electronics—can decrease reliance on virgin resources while creating jobs in emerging green sectors. Governments can support circularity through regulatory measures (e.g., extended producer responsibility, eco-design standards) and market instruments (e.g., landfill taxes, tradable waste credits) that internalize environmental costs and enhance resource efficiency.

However, to successfully integrate these models, African governments should adopt multi-stakeholder governance mechanisms that bring together national agencies, regional institutions, private sector partners, and civil society. Policy coherence across ministries (industry, environment, energy, finance) is essential to align incentives and avoid contradictory outcomes. Ultimately, therefore, by focusing on green technologies, renewable energy, and circular economy models, African nations can create a more sustainable and inclusive industrial future, thereby ensuring that future generations inherit a healthier and more prosperous continent.

2.2. The Role of resource management in shaping sustainable industrial development in Africa.

Sustainable industrial development in Africa cannot be divorced from effective resource management. Natural resources—ranging from minerals and forests to

water and arable land—constitute the primary inputs for industrial processes and provide essential revenue streams for many African economies. However, unchecked extraction and misuse of these resources have contributed to environmental degradation, socio-economic inequities, and the so-called "resource curse," where abundant resources paradoxically undermine long-term development (Mo Ibrahim Foundation, 2025; African Development Bank experts, 2023) . Consequently, designing and implementing robust resource management frameworks is fundamental to aligning industrialization with sustainability goals. At its core, resource management encompasses the governance, regulation, and strategic use of natural resources to optimize their contribution to national development while safeguarding environmental and social systems. Contemporary approaches in Africa emphasize transparency, accountability, and stakeholder inclusion as cornerstones of sustainable governance. For example, the Natural Resource Charter—endorsed by the African Union—provides a set of best practice principles designed to help governments ensure that natural resource extraction promotes economic growth, societal welfare, and environmental protection (Natural Resource Charter, 2014) . Similarly, standardized tools such as the Pan-African Resource Reporting Code seek to enhance transparency and investor confidence in resource sectors, enabling structured reporting and effective decision-making (AMDC, 2022). Effective resource management influences industrial development by shaping the availability, quality, and sustainability of key industrial inputs. Strategic management of minerals, for instance, allows African nations to move beyond raw material export toward value addition and industrial diversification. The African Union's recently articulated Green Minerals Strategy underscores this shift by advocating a transition from low-value raw exports to higher-value manufacturing tied to renewable energy technologies and clean industrial processes (AU Green Minerals Strategy, 2025). Besides, governance quality and institutional frameworks are also pivotal to sustainable resource management. Research indicates that stronger institutional quality mitigates the environmental impact of foreign direct investment (FDI) and resource extraction by enforcing environmental standards and aligning investor behavior with national sustainability objectives (Sustainability analysis, 2025) . Conversely, weak governance structures often facilitate resource depletion and environmental degradation, undermining both sustainability and long-term industrial growth. Thus, policy frameworks must incorporate robust regulatory

mechanisms that ensure equitable benefit sharing, environmental safeguards, and compliance with international best practices. Additionally, technological innovation plays an increasingly important role in modern resource management, enhancing monitoring, efficiency, and compliance. In Sub-Saharan Africa, for example, advancements in digital technologies—such as remote sensing and data analytics—are improving natural resource tracking and enabling more adaptive management practices (2024). These innovations support real-time assessment of extraction impacts, optimize resource use, and reduce waste, thereby fostering industrial processes that are both resource-efficient and environmentally considerate.

Furthermore, sustainable resource management encourages inclusive stakeholder engagement, particularly at the community level. Local communities often possess deep knowledge of ecosystem dynamics and sustainable practices, which can inform governance strategies that respect cultural values and environmental constraints (Pan African Strategic Desk, 2025). Engaging communities in resource decisions can also help mitigate conflict over access and use, ensuring that industrial benefits are equitably distributed and that environmental costs do not disproportionately burden vulnerable populations. Thus, the interplay between resource management and environmental sustainability is clearly evident in industrial sectors that rely heavily on natural resources as demonstrated in the foregoing utterances.

2.3. Current Industrial Policies in African Nations, and their Effectiveness in Addressing Environmental Concerns and Promoting Sustainable Use of Natural Resources (Case Studies of Kenya, South Africa, Ethiopia, Morocco, and Ghana)

Evidently, it is quite conceivable to affirm that, industrial policy in Africa is evolving from traditional export-led and extractive frameworks toward integrated sustainability paradigms that align economic growth with environmental protection and sustainable natural resource use. This shift reflects global climate commitments, internal environmental pressures, and emerging opportunities in green economic sectors. In what follows, the case studies of industrial policies of five (5) selected African countries, reflecting their commitments towards

environmental sustainability, and effective resource management that can promote African development, are hereby put into context:

Kenya

Kenya's industrial strategy increasingly incorporates sustainability goals, grounded in policies like the Green Economy Strategy and Implementation Plan (GESIP) 2016–2030 and the Energy Act 2019, which promote renewable energy, clean technologies, and resource-efficient production (Mount Kenya Times, 2024). GESIP encourages adoption of clean technologies, renewable energy and waste management systems to reduce industrial carbon footprints and enhance competitiveness. Kenya's industrialization blueprint also foregrounds green and digital factories, emphasizing AI, sustainability, and industrial parks as engines of a low-carbon industrial transition (Kizito, 2025). Notable achievements include continued expansion of geothermal, solar and wind power capacities, enhancing energy security while reducing emissions (ECDPM, 2025). However, balancing these goals with traditional infrastructure-heavy projects remains challenging; debates persist around proposals such as the 'Lamu Coal Power Station', which would expand fossil fuel dependency and heighten environmental risk (NEMA, 2019). Overall, Kenya's policy framework shows strong commitment to sustainability, but implementation hinges on robust enforcement and financing mechanisms.

South Africa

South Africa's industrial policy has gradually aligned with environmental objectives through energy transition dialogues, investment incentives, and targeted manufacturing support. A key outcome is the 2023 Electric Vehicles White Paper, supported by a R1 billion industrial development incentive to promote local EV and battery production, embedding low-emission technologies into the industrial base (Reuters, 2025). This policy seeks to reduce reliance on internal combustion vehicles and advance climate goals. At national climate and energy forums, officials have emphasized a balanced and affordable energy transition, arguing for inclusive industrial growth that does not compromise energy access for low-income populations (Reuters, 2025). However, South Africa still grapples with legacy coal dominance and grid instability, underscoring limits to industrial decarbonization without systemic energy reforms (UNIDO, 2025).

South Africa's approach illustrates a hybrid industrial policy that integrates new energy sectors while acknowledging socio-economic trade-offs.

Ethiopia

Ethiopia's industrial policy leverages eco-industrial parks and large infrastructure projects to drive environmentally conscious industrialization. For instance, the Hawassa Industrial Park is often cited as a flagship eco-industrial park with zero liquid discharge and extensive wastewater recycling, advancing sustainable industrial practices and international export competitiveness (UN Chronicle, 2025). These parks attract foreign investment while embedding environmental safeguards—a model for climate-responsible manufacturing in a developmental context. Ethiopia also pursues renewable energy expansion via mega-projects such as the Grand Ethiopian Renaissance Dam, which dramatically increases hydropower capacity and supports industrial electricity demand without fossil emissions (AP News, 2025). Yet, disputes with downstream neighbors and long-term ecosystem impacts illustrate the complexities of balancing regional environmental responsibilities with national industrial ambitions. Ethiopia's example demonstrates how targeted industrial policies can integrate ecological considerations into infrastructure and industrial expansion.

Morocco

Morocco's industrial policy is among Africa's most progressive in linking renewable energy deployment and sustainable industry development. National strategies aim to deepen the green energy ecosystem, incorporating solar, wind, and green hydrogen into industrial value chains that expand sustainable production and employment opportunities (Middle East Institute, 2024). Morocco targets high shares of renewables in electricity generation, with goals of over 50 percent renewable capacity by 2030, and has committed to phasing out coal power by 2040—a major component of industrial decarbonization policy (Reuters, 2025). The policy environment explicitly supports clean energy innovation and technology transfer, thus positioning Morocco as a regional green industrial hub (Mission Innovation, 2023). While investment attraction in renewables is strong, ensuring equitable distribution of environmental benefits and deepening integration of sustainability metrics across all industrial sectors remain ongoing policy focal points.

Ghana

Ghana's industrial policy is evolving toward sustainable use of natural resources and decarbonization. The Ghana National Energy Transition Framework (2022–2070) outlines pathways to low-carbon energy systems that support industrial development and reduce dependency on fossil fuels (Ministry of Energy, Government of Ghana, 2022). Complementary reforms such as recent mining regulations and bans on mining in forest reserves showcase the government's intent to protect critical ecosystems and water sources from industrial degradation (Reuters, 2025). Ghana's industrial policy also overlaps with renewable energy legislation dating back to the Renewable Energy Act (2011), providing a regulatory basis for renewable power incorporation into industry and energy markets (Parliament of the Republic of Ghana, 2011). Additionally, Ghana's National Electric Vehicle Policy frames sustainable transport as part of broader decarbonization and resource efficiency goals (Energy Commission of Ghana, 2023). Despite these policy instruments, implementation challenges persist, including energy reliability and enforcement capacity. Thus, Ghana's efforts underscore the importance of legal frameworks and long-term planning to reconcile industrial development with ecological preservation.

By way of evaluation: across these five case studies, industrial policies increasingly embed sustainability principles, though effectiveness varies with institutional capacity, financing, and socio-economic priorities. Kenya and Morocco exemplify proactive renewable energy and clean technology targets, while Ethiopia's eco-industrial parks illustrate practical integration of environmental safeguards in industrial hubs. South Africa's pivot to Electric Vehicles (EV) manufacturing highlights sector-specific sustainability incentives, and Ghana's emerging policy mix reflects resource protection and energy transition commitments. Thus, common policy enablers cross these reviewed countries include, regulatory frameworks, incentive schemes, and strategic integration of sustainability goals into national development plans. However, persistent challenges—such as energy reliability, enforcement gaps, and socio-economic tensions—highlight the need for robust implementation, stakeholder engagement, and financing strategies to ensure industrialization supports both economic transformation and environmental stewardship.

2.4. The Main Challenges and Opportunities for Integrating Environmental Sustainability into Africa's Industrial Policy Frameworks

Integrating environmental sustainability into industrial policy frameworks in Africa presents both critical challenges and transformative opportunities. As African nations pursue structural economic transformation, they must reconcile industrial growth objectives with environmental protection, climate resilience, and sustainable use of natural resources. This dual pursuit aligns with global commitments such as the Sustainable Development Goals and regional strategies emphasizing green industrialization (United Nations Industrial Development Organization, 2025). The ongoing discourse in policy and academic circles reveals a complex landscape of institutional constraints, capacity gaps, emerging green opportunities, and pathways for innovation.

First, there is coordination failures: A fundamental challenge in mainstreaming environmental sustainability into industrial policy lies in the coordination capacity and institutional structures within African states. Research on green industrial policy in Ethiopia, for example, highlights coordination failures among government agencies and stakeholders as a central barrier to effective implementation of sustainability-oriented policies (Koko & Noe, 2025). Divergent objectives—balancing economic, social, and environmental goals—create trade-offs that are difficult to manage without strong leadership, policy coherence, and technical expertise. Similarly, fragmented policy environments across sectors often result in weak enforcement of environmental standards, complicating efforts to embed sustainability into industrial plans (Koko & Noe, 2025).

Another constraint is limited technological capacity and infrastructure: Ordinarily, the availability of adequate and effective technological infrastructure enables clean production, resource efficiency, and circular economy practices. On the contrary, many industrial sectors in Africa operate with outdated technologies and energy systems heavily reliant on fossil fuels, impeding the transition to low-emission and resource-efficient industrial processes. While clean and efficient technologies can reduce resource waste and improve competitiveness, their adoption is often inhibited by high upfront costs, inadequate infrastructure, and limited access to finance (United Nations Economic Commission for Africa, 2024). These structural challenges are compounded by skills shortages and a lack of

indigenous research and development systems tailored to local sustainability contexts. More so, financial limitations further exacerbate integration challenges: Africa faces significant gaps in climate and sustainability financing, with substantial needs for developing renewable energy systems, sustainable infrastructure, and ecosystem-friendly industrial facilities. Financing shortfalls restrict the ability of governments and private firms to invest in sustainability transitions at scale, even when policy frameworks signal commitment. Moreover, industrial policy frameworks sometimes prioritize immediate economic growth over long-term environmental sustainability due to competing socio-economic pressures such as poverty reduction, employment creation, and energy access (African Development Bank Group, 2023).

However, despite these challenges, there are significant opportunities for integrating environmental sustainability into Africa's industrial policy frameworks. One of the most promising avenues is the untapped potential for green industries and renewable energy. According to the United Nations Environment Programme (2025), Africa's abundant renewable resource endowments—including solar, wind, and critical minerals for clean technologies—position the continent to lead sustainable industrial growth and contribute to global green supply chains. Besides, the African Environment Outlook for Business report also identifies opportunities in circular economy sectors, such as recycling and sustainable packaging, which can drive job creation while addressing environmental degradation (United Nations Environment Programme, 2023). Additionally, industrial symbiosis and eco-industrial transformation represent another key opportunity for sustainability integration. For instance, studies focusing on Nigeria's industrial parks suggest that converting conventional industrial zones into eco-industrial parks could significantly improve resource efficiency, reduce pollution, and foster circular manufacturing practices (Bilyaminu et al., 2024). While current compliance levels remain low, the diversity of industrial actors and existing infrastructure provides a foundation for policy-driven eco-industrial development that aligns economic growth with environmental stewardship. Furthermore, policy innovation and institutional experimentation also offer opportunities that can be leveraged. African countries are increasingly engaging in sustainable industrial strategies that incorporate climate considerations, clean technology adoption, and multi-

stakeholder governance. Initiatives such as the Third Industrial Development Decade for Africa (IDDA III) emphasize sustainability and resilience as guiding principles for industrialization, creating space for policy experimentation and knowledge sharing among governments, regional bodies, and international partners (United Nations Industrial Development Organization, 2025). Such frameworks can help bridge gaps between environmental objectives and industrial growth imperatives. Moreover, regional integration and market expansion under frameworks like the African Continental Free Trade Area (AfCFTA) provide further opportunities to harmonize industrial and environmental policies. By reducing trade barriers and fostering regional value chains, AfCFTA can encourage the diffusion of sustainable technologies, standards, and practices across borders, creating scale effects that make sustainability investments more viable (United Nations Industrial Development Organization, 2025).

2.5. Green Growth Strategies and Their Incorporation into Industrial Development Plans in some African Countries for Africa's Development

Green growth has emerged as a strategic priority for many African nations seeking to reconcile industrialization with environmental sustainability and climate resilience. Rather than pursuing traditional pathways that prioritize GDP growth without regard to ecological limits, green growth strategies emphasize clean energy, resource efficiency, and low-carbon industrial development (World Economic Forum, 2025). Across the continent, countries have adopted diverse approaches that reflect national priorities, resource endowments, and institutional capacities. Thus, under this rubric, the discourse highlights how green growth has been integrated into industrial plans in some selected African countries like, Kenya, South Africa, Morocco, Ghana, and Ethiopia, illustrating both policy commitments and practical implementations.

In Kenya, for instance, green growth is closely tied to national industrialization and climate action agendas. Kenya’s Green Economy Strategy and Implementation Plan (GESIP) aims to transition toward a low-carbon, climate-resilient economy by promoting renewable energy, sustainable infrastructure, and resilient livelihoods, building on the broader Vision 2030 development framework (Climate Development Africa, 2025). Kenya has also taken a leadership role in

continental green industrial cooperation through the Africa Green Industrialisation Initiative (AGII), which mobilized commitments of over US $100 billion to accelerate renewable-powered industries and value chains across Africa, with Nairobi positioned as a key secretariat host (Africa Green Industrialisation Initiative, 2025; Kenya Investment Authority, 2025). These commitments signal an intentional shift toward green industrial clusters supported by regional trade under the African Continental Free Trade Area.

Similarly, South Africa's industrial development plan incorporates green growth primarily through the energy sector. The government's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) has catalysed private investment in solar, wind, and other renewable generation, contributing significantly to the country's energy mix and aligning with industrial decarbonization goals (South African Department of Mineral Resources, 2025). Additionally, South Africa's sovereign green bond initiatives and blended finance mechanisms are emerging tools to attract private capital for sustainable industrial and energy projects, enhancing country capacity to implement green growth within industrial planning (IOL Business Report, 2025). These mechanisms help lower investment risks and embed environmental criteria directly into finance decisions supporting industry.

Again, in Morocco, green growth has been embedded in both energy and industrial policy, underpinning the nation's economic transformation. Morocco's renewable energy infrastructure—anchored by the Noor solar complex and extensive wind capacities—forms the backbone of a national industrial strategy aimed at attracting clean manufacturing and value addition, particularly in automotive supply chains, phosphate processing, and emerging battery component production (Discovery Alert, 2025). By targeting a high share of renewable power (over 50 percent by 2030) and linking it with industrial clusters, Morocco seeks to diversify its industrial base while reducing carbon emissions.

Ghana has developed a National Energy Transition Framework that informs industrial development by guiding the shift from fossil-fuel dominance toward a low-carbon energy system (Ministry of Energy Ghana, 2025). While the framework primarily addresses energy systems, it influences industrial policy by reducing the

carbon intensity of industrial power consumption and creating opportunities for clean manufacturing and value addition, especially in sectors like agro-processing and recycling.

By the same token, in Ethiopia, green growth is institutionalized through the Climate-Resilient Green Economy (CRGE) strategy, which guides the country's pursuit of rapid economic growth while minimizing greenhouse gas emissions and promoting sustainable natural resource use (Climate Development Africa, 2025). This strategy has influenced industrial decisions such as the development of renewable-powered industrial parks, where electricity derived from hydro and other renewables supports textile, pharmaceutical, and agribusiness manufacturing (African Exponent, 2025).

Thus, across these country cases, common theme emerge in their industrial policies -- that is, the incorporation of green growth into their industrial plans evidenced by their prioritization of renewable energy as the cornerstone of sustainable industrialization that is eco-friendly and capable of promoting African development. However, implementation challenges remain: including accessing sufficient long-term finance, building local capacities for green manufacturing, and ensuring that green investments also deliver social benefits such as job creation and skills development.

2.6. Industrial policy, environmental sustainability, and resource management: The Intersection.

To be sure, industrial policy has re-emerged as a central framework through which governments seek to guide structural economic transformation, accelerate technological change, and improve competitiveness. Historically, industrial policy focused on enhancing productivity and industrial diversification; however, contemporary debates emphasize green industrial policy—a form of state intervention designed not only to promote economic growth but also to achieve environmental sustainability and sound resource management (Altenburg, Behboodi & Cosbey, 2025). This intersection is critical in an era defined by climate change, resource depletion, and the urgent need for sustainable development pathways in Africa. At its core, industrial policy comprises deliberate government efforts to support specific sectors, technologies, or economic activities considered

vital for national development. Traditional approaches often prioritized output and employment without explicitly addressing environmental impacts. But as scholars note, low-carbon industrialization and climate-aligned economic strategies are now indispensable facets of industrial policy for sustainable development (Oxford Academic, 2025). This evolution reflects recognition that industrial growth and environmental protection must be mutually reinforcing rather than competing goals.

Environmental sustainability -- within industrial frameworks -- on the other hand, involves minimizing ecological degradation, reducing emissions, managing waste, and preserving natural capital. Policies shaping these outcomes range from regulatory standards and pollution controls to incentives for green technology adoption. According to recent research, stringent environmental policies can promote resource management and technological innovation, enhancing the efficiency and sustainability of industrial systems (ScienceDirect, 2025). For example, the Porter hypothesis posits that well-designed environmental regulation can spur innovation, ultimately improving both environmental performance and competitive advantage (Porter hypothesis, 2025).

Similarly, effective resource management in this context goes beyond pollution control to include sustainable extraction, equitable allocation, and technological advancement that reduces dependency on finite natural resources. Recent empirical work in Sub-Saharan Africa demonstrates that environmental policy combined with technological innovation strengthens natural resource management, supporting longer-term economic growth while safeguarding ecological systems (ScienceDirect, 2025). This evidences how integrated policies can reinforce sustainable resource use and development objectives.

Thus, the intersection of these variables becomes especially clear in concepts such as industrial ecology and eco-industrial development. Industrial ecology applies systems thinking to industrial processes, designing production cycles that mimic natural ecosystems by closing material loops and reducing waste flows (Industrial ecology, 2025). Eco-industrial parks, where by-products of one firm become inputs for another, exemplify how industrial clustering can support resource efficiency and reduce environmental footprints. Empirical case studies—such as in Nigeria

and Uganda—illustrate both opportunities and challenges in transitioning conventional industrial parks toward eco-industrial models that support sustainability goals (ScienceDirect, 2024; Frontiers in Sustainability, 2023). However, aligning industrial policy with environmental sustainability and resource management presents significant challenges. The International Monetary Fund notes that poorly crafted industrial policies can misallocate resources and create inefficiencies, especially when environmental objectives are not fully integrated into policy design (Reuters, 2025). Moreover, developing countries often grapple with institutional capacity constraints, competing development objectives, and the need to balance short-term growth with long-term sustainability commitments. Addressing these challenges demands coherent policy mixes that include regulation, incentives, technology support, and stakeholder engagement. As praxis, solutions like green industrial policy aim to balance these dimensions by directing public support toward low-carbon technologies, circular economy models, and sustainable production systems. For example, targeted government support for innovation in climate-critical sectors—such as basic materials with high emissions—can catalyze decarbonization while preserving industrial viability (Climatic Change, 2024). Similarly, industrial policies that promote urban green innovation have been shown to enhance regional environmental outcomes, further highlighting the potential for policy coherence across economic and ecological goals (Frontiers in Environmental Science, 2024).

In sum, therefore; the nexus between industrial policy, environmental sustainability and resource management in Africa reflects a positive correlation: that is to say, where there is effective industrial policy, environmental sustainability is promoted, and the natural resources efficiently managed -- and the outcome of this balanced dimension promotes African development. Thus, the intersection of these three interpenetrating variables represents a frontier of contemporary development policy. It requires policymakers to transcend traditional silos and craft integrated strategies that support economic transformation while safeguarding ecological systems and ensuring equitable use of natural resources. Only through such holistic approaches can sustainable industrial development be achieved in Africa, especially in the face of evolving global environmental challenges.

3.0. Discussion of Findings

This study examined the intersection of industrial policy, environmental sustainability, and resource management African for development. Based on the analysis of policies, country case studies, and contemporary literature, and in line with the study objectives, the following key findings emerged:

First, in view of the main objective, which is to examine the intersection among the three variables, the study reveals a positive correlation among the trio: that is, where there is effective industrial policy, environmental sustainability is promoted, and the natural resources efficiently managed, and its outcome fosters African development. The study equally made significant discoveries about the specific objectives, and the following findings equally emerged:

1. (Objective 1): Designing industrial policies with environmental sustainability goals alignment. The study finds that, in designing industrial policies that truly align with environmental sustainability goals for African development, certain strategic models can be adopted, like the green technologies model, renewable energy model, and the circular model; including the adoption of multi-stakeholder governance mechanisms that bring together national agencies, regional institutions, the private sector also the civil society, so as to achieve policy adherence across sectors, geared towards attaining industrial growth that is environmental friendly for African sustainable development.

2. (Objective 2): Role of Resource Management in Sustainable Industrial Development. The study reveals that, effective natural resource management plays a critical role in shaping sustainable industrial development. The study finds that countries (like South Africa, Morocco, and Kenya) with stronger governance frameworks for minerals, energy, land, and water resources are better positioned to support sustainable industrialization. Conversely, weak regulation of extractive industries and poor enforcement of environmental standards continue to undermine sustainability in resource-dependent economies, reinforcing the "resource curse" in some African states.

3. (Objective 3): Effectiveness of Current Industrial Policies in Addressing Environmental Concerns. The findings indicate that current industrial policies

across Africa vary significantly in effectiveness. Some countries have introduced targeted instruments—such as eco-industrial parks, renewable-powered industrial zones, and restrictions on environmentally harmful activities—which have yielded positive outcomes. However, in many cases, environmental considerations are treated as secondary to economic growth objectives. Industrial policies often lack binding environmental targets, leading to continued reliance on fossil fuels, inefficient resource use, and pollution-intensive production methods. Overall, progress is uneven and sector-specific rather than systemic.

4. (Objective 4): Key Challenges in Integrating Environmental Sustainability. The study identifies several persistent challenges limiting the integration of environmental sustainability into industrial policy frameworks. These include: Institutional fragmentation and weak policy coordination between industrial, environmental, and energy authorities; limited access to green finance and investment capital for sustainable industrial projects; technological and skills gaps, particularly in clean manufacturing and circular economy practices; competing development priorities, such as poverty reduction and employment creation, which often delay environmental commitments. However, despite these constraints, opportunities were equally discovered: For instance, significant opportunities exist for embedding green growth strategies into Africa's industrialization agenda: countries leveraging renewable energy, green minerals, and regional value chains are making tangible progress toward sustainable industrial development. Initiatives such as renewable-energy-based industrial parks, electric vehicle manufacturing incentives, and circular economy policies illustrate practical pathways for green industrialization.

5. (Objective 5): Country-Level Adoption of Green Growth Strategies
The study finds that green growth integration is most advanced in countries with clear national strategies, strong political commitment, and supportive institutional frameworks. Kenya and Ethiopia have embedded green growth into long-term development visions, while Morocco has successfully linked renewable energy expansion with industrial competitiveness. South Africa shows progress through green manufacturing incentives, though structural energy challenges persist.

Overall, green growth strategies are increasingly present but remain at different stages of maturity across African countries.

4.0. Summary and Conclusion

This study set out to examine the intersection of industrial policy, environmental sustainability, and resource management African development, with the aim of assessing how industrial development strategies can be reconciled with environmental protection and sustainable resource use. Drawing on contemporary policy frameworks, country case studies, and empirical evidence from the literature, the study demonstrates that Africa's industrialization trajectory is at a critical crossroads. While industrial policy has re-emerged as a central instrument for structural transformation, its integration with environmental sustainability and resource governance remains uneven and, in many contexts, insufficiently institutionalized. The findings reveal that African countries are increasingly incorporating sustainability objectives into industrial policy discourse, particularly in relation to renewable energy adoption, green manufacturing, and climate resilience. However, the translation of these objectives into concrete, enforceable policy actions remains limited. This disconnect is further compounded by weak institutional coordination, limited technological capacity, and constrained access to green finance. As a result, industrial expansion in several African economies continues to exert significant pressure on ecosystems, natural resources, and environmental quality. Resource management emerges as a decisive factor shaping the sustainability of industrial development. Countries with more coherent frameworks for managing natural resources are better positioned to promote value addition, reduce environmental degradation, and enhance long-term industrial competitiveness. Conversely, weak governance of natural resources perpetuates extractive, low-value industrial models that undermine both environmental sustainability and inclusive growth. The study further highlights that current industrial policies across the continent vary widely in their effectiveness, with notable progress in a few countries but persistent systemic challenges elsewhere. Importantly, the study identifies significant opportunities for advancing sustainable industrialization through green growth strategies. Africa's abundant renewable energy potential, growing endowment of critical minerals for the global energy transition, and expanding regional markets under the African Continental Free Trade Area provide a strong foundation for environmentally sustainable industrial development. The experiences of selected

countries demonstrate that, where political commitment, institutional capacity, and strategic planning converge, green industrialization is both feasible and economically viable. Nonetheless, realizing these opportunities at scale requires deliberate policy reforms and sustained investment.

Therefore, the study concludes that integrating environmental sustainability, and resource management into Africa's industrial policy frameworks is not only a developmental necessity but also a strategic opportunity. Achieving this integration demands a paradigm shift from short-term, resource-intensive industrialization toward long-term, sustainability-driven industrial transformation anchored in effective resource management and green growth principles.

5.0. Policy Recommendations

In light of the findings and conclusions of this study, the following policy recommendations are proposed to strengthen the integration of environmental sustainability and resource management into Africa's industrial policy frameworks:

1. African governments should mainstream Environmental Sustainability as a Core Industrial Policy Objective. This requires the establishment of clear environmental performance standards, measurable sustainability targets, and monitoring mechanisms that apply across industrial sectors.

2. Strengthen Resource Governance and Value Addition Strategies: Policymakers should prioritize the development of robust natural resource governance frameworks that promote transparency, accountability, and sustainable extraction.

3. Enhance Institutional Coordination and Policy Coherence across Sectors: Governments should establish inter-ministerial platforms or agencies mandated to harmonize industrial and environmental policies, reduce regulatory fragmentation, and ensure consistent implementation across sectors and levels of government.

4. Mobilize Sustainable and Green Financing for Industrial Development to mitigate the identified challenges. African countries should expand access to green finance by leveraging blended finance instruments, green bonds, climate funds, and public–private partnerships. Financial incentives should be designed to encourage private sector investment in green growth technologies.

5. Promote Technological Innovation and Skills Development. African governments that currently have weak domestic capacity in leveraging the opportunities that abound in integrating environmental sustainability into industrial policy, should invest in research and development, technology transfer, and skills training to support environmentally sustainable industrial practices. Building domestic capacity in clean manufacturing, energy efficiency, and waste management is essential for reducing reliance on imported technologies and ensuring long-term competitiveness. Partnerships with universities, research institutions, can help to ensure that.

References

Africa50 Infrastructure Investment Platform. (2025, September 25). Development impact policy. Africa50 Infrastructure Investment Platform.

African Development Bank Group (2025). Africa Industrialization Index & Africa's industrialization progress. African Development Bank Group. http://www.afdb.org

African Development Bank experts. (2023). Africa must rethink natural resources management to avoid adverse socio-economic consequences. African Development Bank.

African Development Bank Group. (2021). Annual Development Effectiveness Review 2021. African Development Bank Group

African Development Bank. (2020). African economic outlook 2020: Developing Africa's workforce. https://www.afdb.org/en/knowledge/publications/african-economic-outlook

African Exponent (2025, April 28). Top 10 geopolitical trends reshaping Africa's economies in 2025. African Exponent. https://www.africanexponent.com/top-10-geopolitical-trends-reshaping-africas-economies-2025/

Africa Green Industrialisation Initiative. (2025). Africa green industrialisation initiative has moved from conversation to collaboration. https://www.downtoearth.org.in/africa/africa-green-industrialisation-initiative-has-moved-from-conversation-to-collaboration-william-ruto

Altenburg, T., Behboodi, R., & Cosbey, A. (2025). An Industrial Policy Renaissance: The Challenges and Opportunities of Going Green. International Institute for Sustainable Development.

AMDC. (2022). Pan-African Resource Reporting Code (PARC). African Minerals Development Centre.

Aquilas, N. A., Ngangnchi, F. H., & Mbella, M. E. (2024). "Industrialization and environmental sustainability in Africa: The moderating effects of renewable and non-renewable energy consumption". *Heliyon, 10(4), Article e25681. https://doi.org/10.1016/j.heliyon.2024.e25681*

Associated Press. ([AP News] 2025, September 9). Ethiopia inaugurates Africa's largest hydroelectric dam as neighbors eye power imports. https://apnews.com/article/12ae4fcb39169cd077c538c7c112c6fd

AU Green Minerals Strategy. (2025). Unlocking Industrialisation: African Union's Call for Strategic Mineral Resource Management. TRENDSNAFRICA.

Bilyaminu, A. M., Rene, E. R., Pandey, A., Babel, S., Clement, Q. B., James, A., & Hernandez, H. G. (2024). Industrial symbiosis and eco-industrial transformation opportunities for environmental protection in Nigeria. Sustainable Production and Consumption, 49, 219–235. https://doi.org/10.1016/j.spc.2024.06.010

Climatic Change. (2024). "Green industrial policy for climate action in the basic materials industry". *Climatic Change, 177, Article 147. https://doi.org/10.1007/s10584-024-03801-7*

Climate Development Africa. (2025). Greening Africa's industrialization: Country strategies for green growth. https://www.climdev-africa.org

Creswell, J. W., & Poth, C. N. (2018). Qualitative inquiry and research design: Choosing among five approaches (4th ed.). SAGE Publications.

Discovery Alert. (2025). Africa's green industrialisation wave: Opportunities ahead. https://discoveryalert.com.au/africa-green-industrialisation-manufacturing-advantage-2025

ECDPM (2025) Navigating Green Economy and Development Objectives: African Energy Transition Opportunities and Risks, ECDPM, Maastricht.

Energy Commission of Ghana (2023), Renewable Energy Development and Industrial Growth in Ghana, Accra, Energy Commission.

Ethical Business Africa. (2025). Rethinking Africa's green industrial strategy. https://ethicalbusiness.africa/2025/10/29/rethinking-africas-green-industrial-strategy

European Commission. (2020). A new industrial strategy for Europe. European Union, Brussels.

Frontiers in Environmental Science. (2024). Impact of industrial policy on urban green innovation: empirical evidence of China's national high-tech zones.

Frontiers in Sustainability. (2023). Eco-industrial transformation in Uganda: performance evaluation of industrial parks using the international EIP framework.

International Resource Panel. (2017). Resource Efficiency: Potential and Economic Implications. United Nations Environment Programme, Nairobi.

IOL Business Report. (2025). South Africa's sovereign green bond initiatives and blended finance mechanisms as tools for attracting private capital for sustainable industrial and energy projects. IOL. https://www.iol.co.za

Kizito, Phidel (2025) "Kenya Eyes Green, Digital Factories in New Industrial Push," allAfrica.com, Nairobi.

Koko, I., & Noe, C. (2025). "A synthesis of environmental policies and identification of critical gaps in critical zones of South and East Africa". *Environments, 12(9), 326. https://doi.org/10.3390/environments12090326*

Kenya Investment Authority (2025). Kenya advances Africa's green industrialization agenda. https://www.investkenya.go.ke

Lopes, A. (2025). Fiscal incentives and domestic capacity in Africa's green industrial strategy. Ethical Business

Middle East Institute (2024) "Renewable Energy and Morocco's New Green Industries," MEI, Washington DC.

Ministry of Energy, Government of Ghana (2025), Ghana National Energy Transition Framework 2022–2070, Accra, Ministry of Energy.

Ministry of Energy, Government of Ghana (2022), Ghana National Energy Transition Framework 2022–2070, Accra, Ministry of Energy.

Mission Innovation (2023) Plans and Priorities: Morocco, Mission Innovation Secretariat, Paris.

Mo Ibrahim Foundation. (2025). Scaling-up sustainable industrialisation in Africa. https ://mo.Ibrahim.foundation/

Mount Kenya Times (2024) "Green Industrialization as a Pathway to Sustainable Development in Kenya," Mount Kenya Times, Nairobi.

National Environment Management Authority (NEMA) Kenya (2019), Environmental Impact Assessment Report for the Lamu Coal Power Plant, Nairobi, NEMA.

Natural Resource Charter. (2014). Principles for sustainable resource governance (2nd ed.). Natural Resource Governance Institute.

Oxford Academic. (2025). Climate change and industrial policy in low-carbon industrialization. Oxford University Press.

Pan African Strategic Desk. (2025). Understanding Africa's resource governance. Pan African Strategic Desk.

Parliament of the Republic of Ghana (2011), Renewable Energy Act, 2011 (Act 832), Accra, Government of Ghana.

Porter, M. E., & van der Linde, C. (2025). "Porter hypothesis: Toward a new conception of the environment-competitiveness relationship". *Journal of Economic Perspectives, 9(4), 97–118. https://doi.org/10.1257/jep.9.4.97*

Reuters. (2025). South Africa aims to revive its small nuclear reactor technology. https://www.reuters.com

ScienceDirect. (2025). The impact of environmental policy, technological innovations, and digitalisation on natural resource management in Sub-Sahara Africa. The Extractive Industries and Society, 22, Article 101608. https://www.sciencedirect.com/science/article/pii/S2214790X24002041

ScienceDirect

South African Department of Mineral Resources and Energy (2025) — for the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP)

Sustainability Analysis (2025). Sustainability and Climate Trends Paper. https://www.msci.com/documents/1296102/51277550/2025+Sustainability+and+Climate+Trends+Paper

United Nations. (2015). Transforming our world: The 2030 agenda for sustainable development*. United Nations, New York.

United Nations Development Programme (UNDP). (2022). The role of industry in achieving the SDGs. https://www.undp.org/sdg9

UNDP (2016). Human Development Report: Human Development for Everyone. New York: Communication Development Inc.

United Nations Chronicle (2025) "Making Industrialization in Africa Sustainable," UN Chronicle, United Nations, New York.

United Nations Economic Commission for Africa. (2024). Economic Report on Africa 2024: Investing in a Just and Sustainable Transition in Africa. https://www.uneca.org

United Nations Economic Commission for Africa. (2020). Assessing progress in Africa's industrialization. https://www.uneca.org

United Nations Environment Programme. (2025). Africa's green business opportunities are abundant, UNEP study shows. https://www.unep.org

United Nations Environment Programme. (2023). Africa Environment Outlook for Business. https://www.unep.org

United Nations Industrial Development Organization. (2025). UNIDO launches the Industrial Development Report 2024 in Africa. https://www.unido.org

United Nations Industrial Development Organization (UNIDO) (2024), Eco-Industrial Parks Programme in Ethiopia, Vienna, UNIDO.

United States Government. (2021). Executive Order 14008: Tackling the climate crisis at home and abroad. Federal Register, 86(19), 7619–7633. https://www.federalregister.gov/

World Economic Forum. (2025). Africa's green opportunity to be an industrial powerhouse. https://www.weforum.org/stories/2025/03/africa-green-opportunity-industrial-powerhouse

Yin, R. K. (2018). Case study research and applications: Design and methods (6th ed.). Sage Publications.