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NIGERIA AND TECHNOLOGICAL ADVANCES: SIXTY YEARS AFTER INDEPENDENCE, 1960–2020

Echi Nwogu and Nnamdi Richard Chukwuma
Independents Scholars
revnwogu@yahoo.com; ngmicos162@gmail.com

Abstract
This essay examines the evolution of technology in Nigeria from 1960 to 2020, situating technological change within the broader trajectory of national development and governance. Technology is conceptualized not merely as material artifacts but as encompassing knowledge systems, skills, and social practices, reflecting its central role in economic growth, social transformation, and institutional development. Using qualitative historical analysis grounded in government documents and the transcript of Echi Nwogu's 2020 keynote address, the study traces key technological initiatives over six decades, highlighting the interplay between policy frameworks, investment decisions, and societal outcomes. This narrative encompasses post-colonial industrial projects, including steel plants and railways, the liberalization of telecommunications in the early 2000s, and the subsequent rise of information and communications technology (ICT) and fintech sectors. This study critically evaluates how these technological advances have reshaped Nigerian institutions, industries, and governance while exposing persistent challenges such as policy inconsistency, underfunding, infrastructural deficits, and corruption. Regional examples, including the Lagos technology corridor and Eastern manufacturing hubs, illustrate the localized dynamics within national trajectories. Despite significant successes in telecommunications and the digital economy, technological development has been uneven, underscoring the importance of robust institutional support, human capital investment, entrepreneurial promotion, and policy continuity for harnessing technology's full potential in Nigeria.

Keywords: Nigeria, technological development, postcolonial industrialization, ICT and fintech, economic growth, governance and policy, innovation systems.

Introduction

Technology is widely acknowledged as a central driver of modern economic and social development. Scholars argue that no country has achieved sustained growth without integrating technology into its society, economy, and institutions. In the Nigerian context, this argument has particular resonance. At independence in 1960, Nigeria's economy was heavily reliant on agriculture and raw material exports, and colonial rule had largely neglected the development of domestic technological capacity or scientific infrastructure. In the six decades since independence, successive governments have emphasized technology as a cornerstone of national development, enacting policies and establishing institutions aimed at fostering innovation and industrialization. Yet progress has often been uneven and fragmented. As one recent analysis notes, various policy initiatives since the late twentieth century have achieved only "modest success," and Nigeria continues to lag behind peers in technological development due to systemic challenges such as

corruption, underfunding, weak institutional capacity, and infrastructural deficits.[1] This study examines the evolution of Nigeria's technological landscape from independence to 2020, interrogating both the opportunities and constraints that have shaped technological growth and assessing its broader socio-economic impacts.

In this paper, Nigeria's technological experience is situated within a broad and multidimensional conception of "technology." Technology is not treated merely as hardware or machinery but as encompassing the knowledge, competencies, skills, organizational processes, and institutional arrangements that facilitate innovation. We consider critical milestones in Nigeria's technological trajectory, including early postcolonial industrial projects such as steel complexes and rail networks, as well as later transformations driven by ICT revolutions, financial technology, and telecommunications liberalization. Key policies, institutions, and agencies—ranging from national development plans to science and technology bodies—are analysed for their role in promoting or constraining technological progress. Drawing on documentary policy records and the 2020 keynote address delivered by Rev. Canon Engr. Echi Nwogu, a veteran engineer involved in Nigeria's early infrastructure initiatives, at a conference organized on the theme "Nigeria and Technological Advancement: Sixty Years After," this historical analysis demonstrates how technology has both enabled growth and been limited by structural political-economic factors.

The scholarly literature provides important conceptual grounding for this analysis. Technology is a multi-faceted concept, encompassing far more than practical tools or machinery. At a basic level, it can be defined as "the application of scientific knowledge for practical purposes,"[2] yet leading theorists emphasize deeper social and philosophical dimensions. Philosopher Martin Heidegger described technology as "a mode of revealing," a way through which humanity "brings forth" reality, rather than merely a collection of instruments.[3] Historian Donald MacKenzie and sociologist Judy Wajcman emphasize that technology is embedded within social relations and institutional frameworks,[4] while Wiebe Bijker conceptualizes it as "a process of co-construction involving the interaction between technical artefacts, social actors, and institutional contexts."[5] Similarly, Langdon Winner argues that technology can evolve into a "form of life" that shapes societal structures and political processes.[6] For the Nigerian context, these perspectives underscore the importance of viewing technology not simply as equipment or gadgets, but as human and institutional capacity—the knowledge, competencies, and organizational frameworks required to generate, implement, and sustain technological innovation. In this sense, this study aligns with Oghuvbu *et al.* who define technology broadly as "the knowledge, competencies and skills strongly required for technological development."[7]

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[1] David Aworawo, "Costly Neglect: Technology, Industrialization and the Crisis of Development in Nigeria," *Journal of International Social Research* 4, no. 17 (Spring 2011): 269–81, https://www.sosyalarastirmalar.com/abstract/costly-neglect-technology-industrialization-and-the-crisis-of-development-in-nigeria-72923.html.

[2] *Oxford English Dictionary*, s.v. "technology."

[3] Kayode Asaju and Sunday Yohanna Ashepo, "Technology Development and National Development in Nigeria," *Journal of Emerging Technologies* 5, no. 1 (2025): 26, https://doi.org/10.5281/zenodo.15360104.

[4] Donald A. MacKenzie and Judy Wajcman, eds., *The Social Shaping of Technology*, 2nd ed. (Buckingham, UK: Open University Press, 1999), 2, http://mcgraw-hill.co.uk/openup/.

[5] Wiebe E. Bijker, *Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change* (Cambridge, MA: MIT Press, 1995).

[6] Langdon Winner, "Technologies as Forms of Life," in *The Whale and the Reactor: A Search for Limits in an Age of High Technology* (Chicago: University of Chicago Press, 1986), 3–18.

[7] Ejiroghene A. Oghuvbu et al., "Technology Policy and Sustainable Development in Nigeria," *Vestnik RUDN, International Relations* 22, no. 2 (2022): 385, https://doi.org/10.22363/2313-0660-2022-22-2-385-396.

A substantial literature links technological progress to economic growth and social change. In advanced nations, the integration of technology—from industrial machinery in the nineteenth century to contemporary digital networks—is credited with enormous productivity gains and institutional transformations. For developing economies such as Nigeria, technology offers potential improvements in infrastructure, productivity, and public services. Yet many analysts note persistent gaps between Nigeria and comparable peers. Asaju and Ashepo observe that Nigeria has underutilized even relatively simple technologies in sectors such as education and health, trailing regional competitors.[8] Ahmed attributes this tepid technology adoption to "endemic corruption, lack of funding [and] poor leadership."[9] In short, while the literature emphasizes technology as a "main driver" of development, it simultaneously highlights how weak governance and structural inefficiencies can severely frustrate its potential benefits.

Within African studies, scholars further stress the institutional and policy dimensions of technological development. Research on African science and technology policy highlights the importance of coherent national innovation strategies, capacity-building programs, and sustained investment in human capital. Oghuvbu *et al.* argue that Nigeria's numerous policy initiatives—from national development plans to the establishment of science agencies—have thus far produced "poor" outcomes, leaving the country technologically far behind industrialized nations.[10] Similarly, Aworawo's historical overview suggests that Nigeria's low-tech trajectory results both from colonial-era legacies and from postcolonial policy failures.[11] These analyses provide crucial contextual understanding but do not fully map the detailed history of Nigeria's technology evolution, leaving significant gaps in the scholarly record.

Several Nigeria-focused studies have examined discrete components of the country's technological journey. Research on the telecommunications sector documents the explosive mobile growth following 2001 and its attendant economic effects.[12] Other studies explore the emergence of information technology and digital finance, including ICT services[13] and FinTech.[14] Policy-focused studies analyze initiatives such as the 1986 National Science & Technology Policy and the 2020 Digital Economy Strategy, outlining official objectives and intended outcomes. However, there remains a significant gap in comprehensive narratives that link these disparate pieces across eras. Aworawo's historical account is the closest effort, tracing technology and industrial policy from colonial times through 2010, but it largely emphasizes industrialization rather than technological change per se.[15] Our study builds on this foundation, extending the chronological sweep through 2020 and incorporating first-hand documentary evidence, including

[8] Asaju and Ashepo, "Technology Development and National Development in Nigeria."
[9] Ibid.
[10] Oghuvbu et al., "Technology Policy and Sustainable Development in Nigeria," 385.
[11] Aworawo, "Costly Neglect," 275–80.
[12] Adeyemi Adepetun, "Nigeria at 65: How Telecom Drives Growth Across Sectors," *The Guardian*, October 1, 2025, https://guardian.ng/technology/nigeria-at-65-how-telecom-drives-growth-across-sectors/.
[13] Tolulope Oladimeji and Gbenga Folayan, "ICT and Its Impact on National Development in Nigeria: An Overview," *Research & Reviews: Journal of Engineering and Technology* 7, no. 1 (2018): 5–10, https://www.rroij.com/open-access/ict-and-its-impact-on-national-development-in-nigeria-an-overview.pdf.
[14] Olubunmi Adewole Ogunode and Rufus Ishola Akintoye, "Financial Technologies and Financial Inclusion in Emerging Economies: Perspectives from Nigeria," *Asian Journal of Economics, Business and Accounting* 23, no. 1 (2023): 38–54, https://doi.org/10.9734/ajeba/2023/v23i1915.
[15] Aworawo, "Costly Neglect," 271–75.

Nwogu's keynote address, to provide a richer, more detailed understanding of Nigeria's technological evolution.

By integrating conceptual, historical, and empirical perspectives, this study illuminates the complex interplay between technology, governance, policy, and socio-economic development in Nigeria. It highlights both the transformative potential of technology and the structural constraints that have shaped its uneven trajectory, providing a rigorous analytical foundation for the detailed examination of Nigeria's technological progress in subsequent sections.

Methodology

This study employs a qualitative historical analysis to examine Nigeria's technological development over the period 1960–2020. We systematically reviewed documentary sources and expert commentary to construct a comprehensive and nuanced account of technological change within its broader socio-political and economic context. Primary source materials include Nigerian government policy documents and white papers, such as National Development Plans, reports from the Science and Technology Commission, and official statements from the Ministries of Science, Communications, and Digital Economy. Institutional records, including data from the Nigerian Communications Commission, were also analysed to provide empirical grounding. A particularly valuable primary source is the transcript of a 2020 keynote address delivered by Echi Nwogu. The conference was a joint project of the African Humanities Research and Development Circle (AHRDC) and the Professor B. I. C. Ijomah Centre for Policy Studies and Research at the University of Nigeria, Nsukka. Nwogu's speech provides an insider historical perspective on major initiatives—ranging from steel and rail projects to industrial and technological ventures—and their subsequent trajectories. While the speech remains unpublished, it is treated here as a contemporary primary document, offering unique first-hand insights. Secondary literature, including academic articles, news analyses, and sectoral reports, was incorporated to contextualize, corroborate, and critically interpret the primary evidence.

Our analytic approach is interpretive and thematic. Materials were initially coded according to chronological phases—such as "early postindependence," "oil boom era," and "telecommunications revolution"—and subsequently according to cross-cutting thematic areas, including industrialization, ICT adoption, and sectoral impacts. Through systematic content analysis, we extracted detailed evidence on policy initiatives, major projects, and their outcomes. For example, tracing Nigeria's industrial policy involved a careful examination of National Development Plans from 1962, 1970–74, and subsequent periods, highlighting technology-related provisions and implementation strategies. Social and economic impacts were evaluated using empirical indicators reported in secondary sources, such as the contribution of ICT to GDP and employment generation. Insights from Nwogu's address were triangulated with published histories and official reports, allowing for a critical assessment of successes, limitations, and structural challenges. All sources were analysed qualitatively to assemble a coherent historical narrative and thematic evaluation of Nigeria's technological evolution, providing a rigorous foundation for understanding both achievements and persistent barriers.

Analysis: Historical Development of Technology, 1960–2020

At independence in 1960, Nigeria's technological base was extremely limited. Colonial rule had prioritized the extraction of raw materials for export over the development of local industry,

leaving Nigeria with "very low" levels of industrial and technological capacity. For example, the country had only tens of thousands of telephones, and its rail network—spanning the North to Lagos port—was largely undermaintained. In the early post-independence years, the Nigerian government began to address these gaps. The 1962 National Development Plan envisioned an industrial policy aimed at expanding manufacturing, while small research institutes—established in the 1950s—continued some work on agricultural processing. Regional governments in Lagos, the East, West, and North promoted nascent industries, including textiles and palm oil processing. However, as Aworawo notes, these efforts were modest and had achieved limited scale by 1966, illustrating the constraints of early postcolonial state capacity.[16]

The late 1960s and early 1970s—spanning the Biafran War and the subsequent oil boom—shifted attention to heavy industry and large-scale projects. In 1967, the Soviet Union was contracted to study steel production, leading by 1971 to the establishment of the Nigerian Steel Development Authority and plans for domestic steel plants. By 1979, construction began on two major steel complexes: the Delta Steel Complex at Aladja and the Ajaokuta Steel Complex (ASC) in the Middle Belt. During this period, governments also invested in mining, petrochemicals, and fertilizer projects. In parallel, Nigeria established national bodies to coordinate science and technology, such as the National Council for Science and Technology (1970) and the Ministry of Science and Technology (1979). These agencies aimed to foster research, supported by numerous institutes and university programs. The launches of NigeriaSat-1, an earth observation satellite, in 2003 (in collaboration with the UK) and NigComSat-1, a communications satellite, in 2007, reflect the continued pursuit of advanced technological capabilities into the 2000s.

Yet many ambitious projects faltered, exemplifying the challenges of industrialization under weak governance and inconsistent policy implementation. The Ajaokuta Steel Complex illustrates these difficulties. By the early 1980s, approximately $900 million had been spent, and the plant was nearly complete. Nwogu's account confirms that by 1983 the blast furnace and rolling mills were nearly finished; however, funding was diverted—primarily for political purposes related to elections—and construction halted. Over subsequent decades, the plant fell into disrepair and corruption. As Aworawo notes, after 1996 equipment was auctioned off at "give-away prices," and the project produced virtually nothing.[17] Similarly, other iron and steel initiatives struggled: the Aladja plant operated at only 20 percent capacity before shutting down, while mid-1990s audits revealed massive debt and mismanagement. In summary, while the 1970s established the conceptual and infrastructural foundations for an industrial economy, by the 1980s Nigeria's capacity to complete and operate these industries had collapsed under fiscal crises and misgovernance.

The 1970s oil boom also facilitated other technological developments. Urban infrastructure projects—including electricity plants, telecommunications exchanges, and roads—expanded as petro-revenues surged. In 1981, for instance, the Abuja National Electric Power Authority (NEPA) launched its first major gas turbine. The Railways Corporation, operational until 1969, began a slow decline thereafter. As Nwogu recounts, by 1977 the government decided to "do away" with railway freight in favour of road haulage, creating the National Freight Company. This shift accelerated rail decay: freight trucks quickly captured transport share (often through illicit means), and by 1986 the Freight Company collapsed. This episode demonstrates

[16] Ibid., 272–73.
[17] Ibid., 278.

how strategic policy decisions, rather than mere lack of technology, can undermine infrastructure that had been relatively modern at independence.

The 1980s entrenched these structural setbacks. Nigeria's first Structural Adjustment Program (1986) and enduring military rule imposed tight fiscal constraints and led to offshore borrowing. Many research institutions and industrial projects stagnated. Conversely, the decade provided opportunities abroad: thousands of Nigerian students and engineers trained internationally, including in Soviet-built Indian steel plants, and returned with advanced technical knowledge. Yet the domestic capacity to harness this human capital remained weak. Although a national science policy was promulgated in 1986, implementation was uneven, and by 1999—the return of civilian rule—the industrial sector remained largely moribund.

With the turn of the twenty-first century, Nigeria's technological trajectory shifted decisively. In 2001, the government ended the telecommunications monopoly and auctioned GSM mobile licenses. This liberalization dismantled the bottleneck created by the Nigeria Telecommunications Limited (NITEL) and precipitated an explosion of mobile communications. Within four years, active phone lines increased from under one million to over 19 million. Mobile phones and internet access expanded rapidly, enabling previously unthinkable services. By the mid-2000s, financial services began migrating onto mobile platforms, laying the groundwork for Nigeria's fintech boom in the 2010s. In parallel, the government invested in information technology infrastructure, establishing internet exchange points in Abuja and Lagos (IXPN), upgrading computer labs in schools, and implementing e-government initiatives, including the Treasury Single Account (TSA) and the national identity management system in the 2010s.

The 2010s witnessed an acceleration of digital initiatives. Recognizing the imperatives of a shifting global economy, the Federal Government launched the National Digital Economy Policy and Strategy (2020–2030), aiming to leverage ICT for job creation and economic diversification. In 2019, Nigeria inaugurated a Centre for Artificial Intelligence and Robotics in Abuja. Startup incubators and tech hubs—particularly in Lagos and Abuja—proliferated, nurturing homegrown innovations. Lagos's "Silicon Lagoon" became a hub for e-commerce and fintech companies, including Paystack and Flutterwave, which expanded across Africa. Concurrently, NigeriaSat-2 (2011) enhanced remote sensing capabilities for agriculture and disaster management. By 2020, mobile internet penetration and broadband access, though incomplete, were rapidly expanding, signalling the country's increasing digital integration.

Regional variations persisted throughout these technological developments. Lagos State emerged as the centre of Nigeria's tech economy, hosting major telecommunications firms, fintech startups, and creative industries (film, music) that leveraged digital technologies. In the Southeast, historical industrial centres—Port Harcourt, Aba, Onitsha, and Nnewi—retained some manufacturing capacity, yet many projects stalled. As Nwogu notes, Port Harcourt's planned industrial network connecting Aba and other towns was "sidelined" after the civil war, and Eastern ports (Calabar, Port Harcourt, Warri) were underutilized, while Lagos experienced over-concentration. In Northern Nigeria, legacy industries in Kano (textiles) and Kaduna (cement) persisted but suffered from neglect and outdated technology. Thus, despite the inherently national scope of digital technologies, their deployment reinforced pre-existing regional inequalities: southern financial and tech hubs surged, whereas northern and eastern industrial regions lagged behind.

Thematic Impacts of Technology

Economic Growth and Industry

New technologies have had measurable effects on Nigeria's economy, though outcomes vary across sectors. The telecommunications sector, for instance, became a major contributor to GDP: by 2020, ICT (including communications and IT services) accounted for nearly 10 percent of GDP, rising to approximately 11 percent by 2025. This sector attracted billions of dollars in investment and generated millions of direct and indirect jobs, demonstrating technology's capacity to stimulate economic activity and entrepreneurial growth. Mobile telephony, in particular, catalyzed a fintech revolution: "the ubiquitous mobile phone has become a banking tool," extending financial inclusion to previously unbanked populations. Connectivity enabled the emergence of companies such as Interswitch, alongside globalized startups like Flutterwave and Paystack, which leveraged digital payments to expand financial services.

In manufacturing, technological impact has been uneven. While heavy industries—including steel, automobile, and textile plants—collapsed under mismanagement and fiscal crises, small and medium enterprises increasingly employed modern tools to enhance productivity. For example, Nigeria's abundant natural resources have occasionally been harnessed via technology: gas and oil pipelines now utilize SCADA monitoring, and mechanized agro-processing has modernized parts of the agricultural sector. The ICT sector itself—encompassing software development, telecom equipment assembly, and digital services—has become one of the fastest-growing and most dynamic components of the Nigerian economy, reflecting the sector's transformative potential despite structural challenges.

Society and Daily Life

The diffusion of technology has reshaped daily life and social relations across Nigeria. Mobile phones and the internet revolutionized communication, enabling rural villagers to send money, access health information, or obtain market prices remotely. Social media and online platforms have provided new voices for youths, civil society actors, and activists, facilitating civic engagement and political mobilization. Education has been increasingly influenced by ICT, with universities and polytechnics incorporating digital tools into curricula and online learning gaining traction, particularly during the COVID-19 pandemic. In health, telemedicine and portable diagnostic devices are emerging, offering new opportunities for service delivery. Yet these advances coexist with challenges: electronic waste, privacy concerns, and the digital divide remain pressing issues. Many rural communities continue to lack reliable electricity and broadband, limiting their access to technological benefits that urban populations increasingly enjoy.

Governance and Institutions

Technology has also influenced governance and institutional operations. Reforms such as the Treasury Single Account (TSA), biometric national identity systems, and electronic voting registers have theoretically enhanced transparency and efficiency. Nwogu praises these reforms as examples of technology "engendering accountability," contingent on proper maintenance. Agencies such as the National Identity Management Commission (NIMC) utilize digital databases to register citizens, while civil servants increasingly rely on computers and internet resources. Public services, including tax filing and passport issuance, have migrated online, and law enforcement has adopted digital surveillance and forensic tools.

However, institutional readiness remains uneven. Legacy agencies, including the former Post & Telecommunications and the National Power Company of Nigeria (PHCN), have lost significant internal technical capacity due to the "brain drain" of skilled personnel to private or foreign sectors, impeding long-term institutional learning. While new bodies like the Federal Ministry of Communications & Digital Economy have developed forward-looking policies, implementation often falls short, hindered by inadequate funding, bureaucratic inertia, and weak monitoring. Although Nigeria designated 2007 the "Year of Science and Technology," actual Research and Development (R&D) spending has consistently remained below 1 percent of GDP. Consequently, most innovation activity is driven by private entrepreneurs operating outside formal support structures.

Social Change and Culture

Technology has significantly influenced cultural and creative sectors. The Nigerian entertainment industry—film, music, and digital art—has thrived through the adoption of modern production and distribution technologies. Nollywood, for instance, employs digital cameras and online streaming platforms to reach global audiences, creating soft-power exports for Nigeria. Mobile internet has facilitated social movements, civic engagement, and public discourse, enabling citizens to coordinate protests and community initiatives. At the same time, new social challenges have emerged, including cybercrime and the spread of misinformation, which institutional frameworks are still learning to manage effectively.

Challenges to Technological Advancement

Despite these advances, Nigeria's technological progress has been constrained by enduring structural challenges. Corruption and mismanagement remain pervasive: the Ajaokuta Steel Complex exemplifies elite resource diversion, and similar problems have plagued other sectors, such as unpaid railway contractors. Policy inconsistency is another recurrent issue. Successive governments frequently alter or abandon predecessors' plans, as exemplified by the 1970s pivot from rail to road infrastructure, which undermined decades of investment. This "policy summersault" phenomenon ensures that even ambitious programs often fail to deliver intended outcomes.

Infrastructure deficits exacerbate these problems. The power sector remains unreliable, impeding industrial and technological operations. Nwogu notes that in 2020 trains did not run, roads were poorly maintained, and factories lacked consistent electricity. Without robust power and transport networks, both imported and domestically developed technologies cannot be effectively deployed. Human capital constraints further limit progress. Although Nigeria produces skilled engineers and scientists, many emigrate or work in underfunded public laboratories. Universities and polytechnics struggle to maintain laboratories and keep pace with technological evolution.

Funding shortages for R&D and small enterprises remain chronic. Despite government rhetoric, actual budget allocations to science and technology often remain below 0.5 percent of GDP, limiting domestic innovation unless supported by foreign partnerships. The digital divide persists, leaving rural and poorer urban populations with limited access to ICT and fintech benefits. Furthermore, patterns of resource extraction continue to follow a neo-colonial logic: raw materials like cocoa and oil are predominantly exported, with limited domestic processing into

higher-value products. This restricts the development of advanced manufacturing and ensures that Nigeria remains largely a supplier of raw inputs rather than finished goods.

In sum, while Nigeria's technology sectors—particularly digital communications—have grown substantially and generated significant socio-economic effects, the full potential of technological innovation has been constrained by governance weaknesses, infrastructure deficits, and funding limitations. These structural and institutional challenges must be considered alongside the notable achievements when evaluating Nigeria's overall technological trajectory.

Conclusion

Sixty years after independence, Nigeria's technological landscape presents a complex mixture of significant achievements and enduring challenges. On one hand, the country has transitioned from inheriting minimal technological capacity in 1960 to becoming one of Africa's leading ICT markets by 2020. The mobile telecommunications revolution exemplifies this progress, with hundreds of millions of subscribers and the creation of a vibrant digital economy. Government interventions—through science and technology policies, national development plans, and digital strategies—have occasionally borne fruit, as evidenced in the expansion of e-banking, online public services, and emerging tech entrepreneurship. In parallel, digital platforms have extended financial inclusion, fostered innovation hubs, and connected Nigerian businesses and citizens to global markets, reflecting the transformative potential of technology when effectively harnessed.

Yet, these achievements coexist with recurrent setbacks. High-profile industrial projects, such as the Ajaokuta Steel Complex, remain largely unrealized despite decades of investment, while the deliberate de-prioritization of rail infrastructure contributed to national transport crises. Many early industries—including textiles, automobiles, and food processing—have been deindustrialized. Echi Nwogu observes that much of Nigeria's "technological advancement somersault is human induced," highlighting the centrality of policy failures, corruption, and governance weaknesses in limiting progress. Consequently, technological adoption and benefits have been unevenly distributed: urban centers and regions with historical industrial bases have advanced, whereas northern and eastern regions fall behind, reinforcing regional disparities.

Looking forward, Nigeria's capacity to realize its technological potential depends critically on addressing structural and institutional constraints. Stable, long-term policies, reliable infrastructure, consistent investment in human capital, and transparent governance are essential prerequisites for meaningful innovation. Nwogu's call for integrating "science, technology, innovation, and entrepreneurship" underscores the pivotal role of entrepreneurship as the operational bridge between technological competence and socio-economic transformation. By embedding research into applied enterprises, supporting incubators and venture networks, and reforming STEM education toward creativity, problem-solving, and design thinking, Nigeria can cultivate an ecosystem in which technology directly drives productivity, job creation, and inclusive development.

Ultimately, the historical record illustrates that technology alone does not guarantee development; it must be coupled with visionary leadership, institutional capacity, and an entrepreneurial culture. Only by harnessing these forces in tandem can Nigeria move "from dependence to independence," transitioning from a consumer of technology to a producer and exporter of innovative solutions. The future of Nigeria's technological trajectory, therefore, hinges

on translating lessons from past successes and failures into sustained, inclusive, and strategically guided growth across all regions and sectors of the country.