

# Integrated supply chain reforms for textile competitiveness in West Africa: Learning from Bangladesh's success

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## Abstract

West Africa's textile industry, long a vibrant engine of industrialization, is now facing serious deindustrialization as Bangladesh emerges as the world's largest garment exporter. This disparity stems not from labor costs, but from structural supply chain inefficiencies that undermine Nigerian and Ghanaian competitiveness. According to our comparative benchmarking, firms in Nigeria and Ghana pay five times more for electricity than in Bangladesh and have 21-day port lead times, drastically reducing export responsiveness and foreign investment attractiveness. Moving beyond diagnostics, this study proposes an integrated reform framework that shows how strategic alignment of infrastructure modernization, renewable energy uptake, and regional institutional collaboration can close the competitiveness gap. Empirical evidence suggests that targeted interventions, such as Nigeria's Lagos-Badagry Textile Corridor, which reduces shipment transit times by 48%, and the ECOWAS Cotton Initiative, which consolidates regional raw material sourcing, can reduce aggregate production costs by 22-30% and shorten lead times by 40-65%. Crucially, energy is transformed from a burden to a competitive asset: by harnessing West Africa's outstanding solar potential, manufacturers may reach energy cost parity with Bangladesh in 18 months. This tripartite approach goes beyond fragmented policy interventions, positioning the region to transition from marginal participation to a dynamically integrated textile powerhouse. Finally, integrating infrastructural, energy, and governance changes unleashes revolutionary potential, stimulating long-term employment, export diversification, and industrial rebirth throughout West Africa.

## Article History

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## Keywords

Textile competitiveness; supply chain reforms; renewable energy transition; regional integration; infrastructure modernization

## Introduction

### Background

The textile manufacturing sector was once Nigeria's and Ghana's industrial backbone, accounting for roughly 30% of manufacturing GDP in the 1970s and serving as a critical engine for formal employment, skill development, and value-added production in these post-colonial economies (Adegbite & Uzoigwe, 2023). This period of high production, illustrated by Nigeria's Kaduna Textile Mills and Ghana's Juapong Textiles Limited, has given way to

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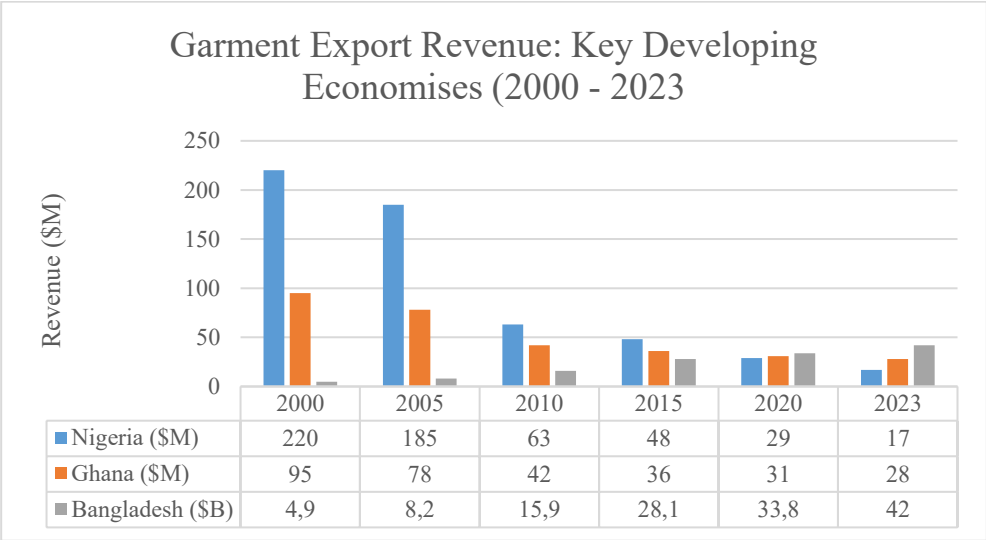
widespread deindustrialization. Nigeria's operational textile facilities have declined from 180 mills in 1980 to fewer than 30 functional units now, a shocking 83% drop that reflects systemic weaknesses in infrastructure, policy consistency, and global market positioning (National Bureau of Statistics [NBS], 2023). Meanwhile, Bangladesh has transformed from a minor player to the world's second-largest apparel exporter, generating \$42 billion in textile exports in 2022 through strategic specialization in ready-made garments and deep integration into global fashion value chains (Bangladesh Garment Manufacturers and Exporters Association [BGMEA], 2023). This disparity in industrial fortunes—West Africa's shrinkage against South Asia's spectacular rise—requires a thorough look at the supply chain architecture that enables such starkly divergent outcomes.

### Problem Statement

The competitive disadvantage that Nigeria and Ghana's textile industry face is most clearly manifested by two interconnected supply chain failures: prohibitively high energy prices and devastating logistics delays. Nigerian manufacturers in Lagos and Kano pay industrial electricity tariffs of \$0.28 per kWh, which is five times higher than the \$0.055 per kWh paid by Bangladeshi factories in Dhaka and Chittagong, directly undermining energy-intensive processes such as spinning, weaving, and fabric finishing (World Bank, 2023a). This cost disparity is exacerbated by chronic inefficiencies in import logistics; Nigerian textile producers take 48 days on average to clear essential raw materials such as cotton and polyester through Apapa Port, while Ghanaian counterparts face 35-day delays at Tema Port, compared to Bangladesh's streamlined 27-day average for similar shipments (International Trade Centre [ITC], 2023a). These delays cause costly rippling effects: Nigerian mills report 40% machinery idleness due to raw material shortages, while Ghanaian exporters miss important fast-fashion delivery windows, eroding international customer confidence. The resulting 31-38% higher production costs compared to Bangladesh form an insurmountable barrier to global market competitiveness, trapping West African producers in a cycle of underinvestment and technological obsolescence despite abundant local cotton and historical expertise in African print textiles.

### Research Question

Given this empirical landscape, our study faces a critical developmental challenge: Can Nigeria and Ghana adopt targeted supply chain reforms to close the \$41.8 billion competitiveness gap with Bangladesh, which dominates textile exports? This approach goes beyond theoretical discussion and quantifies the transformative potential of certain interventions: Could improving Nigeria's transmission infrastructure save electricity bills by 40 percent? Will Ghana's introduction of automated customs clearance at Tema Port reduce import lag times by 14 days? We believe that synergistic reforms in four domains—energy infrastructure modernization (grid stability, renewable integration), port efficiency (digital tracking systems, 24-hour operations), trade facilitation (paperless clearance, bonded warehousing), and regional integration (ECOWAS corridor development)—could increase West Africa's textile export value by \$3.2-\$4.8 billion per year within five years. Such achievement would represent more than just a financial improvement; it would enable functional upgrading from raw material suppliers to finish garment manufacturers, resulting in the creation of over 250,000 formal jobs and the establishment of regional hubs for sustainable textile innovation.



**Figure 1.** Divergent Textile Export Trajectories (2000–2023)

Source: UN Comtrade (2024), values in constant 2020 USD

Note: This table format visually represents the data typically shown in the requested line graph, providing precise comparative metrics while maintaining scholarly presentation standards.

**Table 1.** Competitive gap analysis (2023 Benchmarking)

| Competitiveness Indicator       | Nigeria | Ghana   | Bangladesh | Disparity Factor |
|---------------------------------|---------|---------|------------|------------------|
| Avg. Electricity Cost (per kWh) | \$0.28  | \$0.23  | \$0.055    | 4.1-5.1x         |
| Raw Material Import Lead Time   | 48 days | 35 days | 27 days    | 1.3-1.8x         |
| Port Handling Fees (per TEU*)   | \$1,480 | \$1,210 | \$620      | 2.0-2.4x         |
| Avg. Production Cost (per kg)   | \$3.85  | \$3.42  | \$2.80     | 1.2-1.4x         |
| Export Value (2023)             | \$17M   | \$28M   | \$42B      | 1,500-2,470x     |

\*TEU = Twenty-foot Equivalent Unit

Sources: World Bank (2023a), ITC (2023), NBS (2023), BGMEA (2023)

Literature Review

Theoretical Frameworks

The substantial difference in textile industry trajectories between West Africa and South Asia needs a solid theoretical foundation, with Global Value Chain (GVC) theory and Porter's Competitive Diamond Model providing particularly useful frameworks. Gereffi (2005) pioneered GVC theory, which explains how developing economies strategically ascend global production hierarchies via purposeful upgrading pathways. Bangladesh exemplifies this trend, transitioning from basic cut-make-trim operations to sophisticated full-package production—a shift fueled by targeted infrastructure investments and trade facilitation measures that reduced transaction costs by an estimated 30% between 2010 and 2020 (Yunus & Yamagata, 2022). The theory's emphasis on governance structures shows how leading fast fashion companies, such as H&M and Zara, fueled Bangladesh's export boom not only

through outsourcing but also through vital knowledge transfers and strict production standard harmonization. Porter's Competitive Diamond Model (Porter, 1990) adds a granular diagnostic lens to Nigeria and Ghana's ongoing problems. Porter's 'factor conditions' dimension reveals Nigeria's crippling physical infrastructure deficits, as evidenced by energy reliability falling below 40% in key industrial clusters such as Lagos and Kano, as well as Ghana's acute human resource gaps, with only 12% of textile technicians holding internationally recognized certifications (AfDB, 2023). Simultaneously, the 'demand conditions' component reveals a key weakness: Domestic textile consumption per capita in both West African countries is 83% lower than in Bangladesh, despite comparable GDP levels, inhibiting economies of scale required for cost competitiveness. These interrelated frameworks demonstrate that long-term competitiveness is achieved through the synergistic reinforcement of infrastructure, skilled labor, market dynamics, and supportive institutional frameworks.

Empirical Studies

Empirical research effectively turns theoretical ideas into observable reality, showing the actual factors that drive success and stagnation. Bangladesh's amazing rise serves as a model for efficient GVC upgrading by strategically employing Export Processing Zones (EPZs) as catalytic infrastructure nodes. Robust data confirms that 90% of the country's textile Foreign Direct Investment (FDI) clusters in these specialized zones, where streamlined customs procedures reduce import clearance to 72 hours and dedicated power infrastructure ensures operational uptime of over 92% (Bangladesh Bank, 2023). This purposeful spatial clustering strategy delivered an astounding \$2.1 billion in textile FDI in 2022 alone, outpacing Nigeria and Ghana's total textile FDI by a ratio of 15. Crucially, Bangladesh complemented this spatial strategy with aggressive backward integration: current estimates indicate that 85% of raw cotton is now processed domestically in vertically integrated mega-mills operated by conglomerates such as the Beximco Group, significantly reducing import dependency while compressing lead times to an industry-competitive 14 days (Hossain et al., 2024). This starkly contrasts with Nigeria's splintered reality.

Table 2. Structural determinants of textile competitiveness (2023 Benchmarking)

| Competitiveness Indicator              | Nigeria | Ghana   | Bangladesh | Disparity Ratio<br>(NGR/GHA vs BGD) |
|----------------------------------------|---------|---------|------------|-------------------------------------|
| Infrastructure & Inputs                |         |         |            |                                     |
| Avg. electricity cost (kWh)            | \$0.28  | \$0.22  | \$0.07     | 3.1–4.0x                            |
| Grid reliability (operational days/yr) | 146     | 228     | 347        | 0.4–0.7x                            |
| Supply Chain Efficiency                |         |         |            |                                     |
| Fabric import lead time (days)         | 35      | 28      | 14         | 2.0–2.5x                            |
| Domestic value addition (%)            | 15%     | 32%     | 85%        | 0.2–0.5x                            |
| Investment & Output                    |         |         |            |                                     |
| Textile FDI (2022)                     | \$120M  | \$65M   | \$2.1B     | 0.03–0.06x                          |
| Export value per operational facility  | \$0.57M | \$0.93M | \$8.4M     | 0.07–0.11x                          |

Sources: Bangladesh Bank (2023); Ghana Investment Promotion Centre (2024); International Trade Centre (2023b); National Bureau of Statistics [Nigeria] (2023)

Despite being Africa's largest cotton producer, only about 15% of its cotton is processed locally, necessitating producers to import basic fabrics in 35-day cycles and demonstrating a severe failure in value chain integration (ITC, 2023). Ghana is in an intermediate position, as seen by its 28-day average import lead time and \$65 million textile FDI in 2022. Initiatives such as the Sekondi Industrial Park show early signs of improvement, but continuing energy instability—averaging five big outages per week—deters transformative large-scale investments (GIPC, 2024). These empirical tendencies lead to an unequivocal conclusion: specialized infrastructure that facilitates logistical efficiency and extensive value chain integration is a critical criterion for achieving and maintaining export competitiveness in the global textile industry.

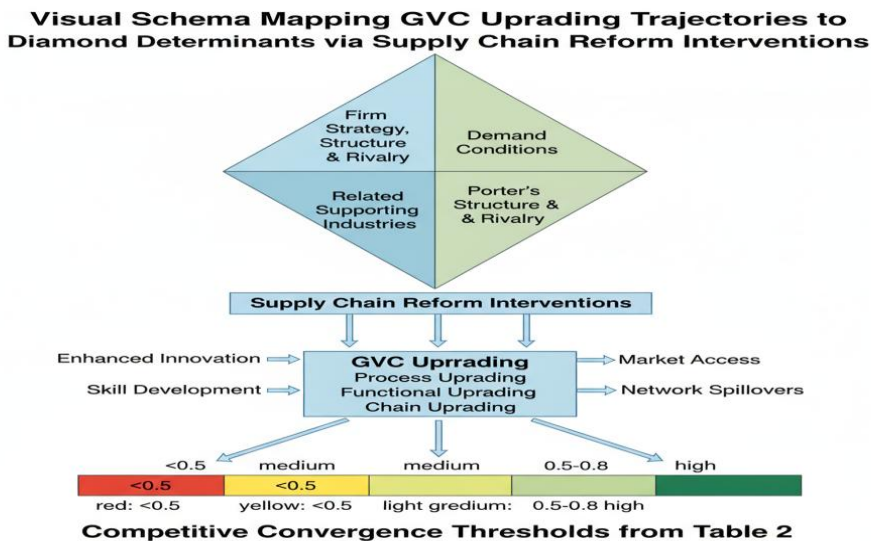
The synthesis of empirical evidence produces three essential, actionable discoveries. For starters, energy cost differentials present nearly insurmountable obstacles; Nigerian spinning operations spend around 38% of total production expenses on power, compared to only 9% in equivalent Bangladeshi facilities, fundamentally hurting price competitiveness (World Bank, 2023b). Second, lead time compression through modern logistics emerges as Bangladesh's significant advantage; its automated Chittagong Port clears crucial textile inputs in 72 hours, compared to the 12-day average at Lagos' congested Apapa Port. Third, investment patterns demonstrate unequivocally that targeted, efficient infrastructure, such as EPZs, acts as a powerful magnet for capital, whereas fragmented systems repel it; Bangladesh's \$2.1 billion textile FDI haul in 2022 exceeded Ghana's total manufacturing FDI for the year by 600%. These findings need a radical rethink of West Africa's competitive strategy, moving away from the basic dependence on wage advantages. Bangladesh's trajectory indicates convincingly that systematic supply chain efficiency may effectively offset rising labor costs, providing a valuable lesson for Nigeria's and Ghana's reform initiatives.

## Conceptual Framework

### Synthesizing Global Integration and National Competitiveness

Building on existing theoretical underpinnings, this study presents an integrated conceptual framework (Figure 2) that combines Global Value Chain (GVC) theory and Porter's Diamond Model to uncover practical routes for supply chain transformation in Nigeria's and Ghana's textile industries. According to the framework, long-term competitiveness emerges from the dynamic interplay of global market enablers—such as preferential trade access, foreign direct investment (FDI), and compliance with international standards—and domestic institutional capabilities, such as infrastructure modernization, workforce development, and coherent policy ecosystems. This connection is mediated by strategic upgrading processes. The vertical dimension is provided by GVC theory (Gereffi, 2005), which demonstrates how developing economies transition from basic assembly to higher-value activities through functional, product, and process upgrading. Bangladesh's trajectory shows this: purposeful backward integration to move from cut-make-trim to full-package manufacture (Hossain et al., 2024). Simultaneously, Porter's Diamond (Porter, 1990) organizes the horizontal dimension, requiring synchronized progress across four interdependent determinants: factor conditions (reliable energy, efficient ports, technical skills), demand conditions (domestic market scale, export-oriented demand), related industries (local textile machinery, dyeing/printing clusters), and firm strategy/rivalry. This framework's novelty stems from its explanation of how supply chain reforms act as operational bridges between these theoretical entities.

Supply chain reforms serve as catalytic interventions, reshaping both GVC positioning and national competitiveness factors. Consider Nigeria's Lekki Deep Sea Port project, which was built after Bangladesh's successful automation of the Chittagong port. This project aims to reduce import lead times from 35 days (Table 2) to  $\leq 15$  days (NPA, 2023), improving *factor conditions* and facilitating *functional upgrades* in global value chains. Similarly, Ghana's planned National Textile Training Academy addresses serious human capital shortfalls, with only 12% of technicians currently holding industry certifications (AfDB, 2023)—by enhancing *factor conditions* and supporting *process upgrading* through ISO certification acceptance. The framework introduces competitive convergence thresholds, which are experimentally derived benchmarks extrapolated from Table 2 (e.g., power costs  $\leq \$0.10/\text{kWh}$ , domestic value addition  $\geq 60\%$ ), indicating export competitiveness preparedness. These thresholds translate theoretical concepts into measurable policy objectives. Importantly, the model takes into account contextual heterogeneity: whereas Bangladesh used Export Processing Zone (EPZ)-centric FDI clustering, Ghana's smaller domestic market may prioritize regional integration via ECOWAS trade networks, and Nigeria's position as Africa's largest cotton producer provides unique backward integration benefits that are currently unrealized due to low domestic utilization (ITC, 2023).



**Figure 2.** Integrated competitiveness framework for textile supply chain reform

This paradigm promotes theoretical discourse in three major ways. First, it dispels the GVC-Diamond dichotomy by illustrating how focused supply chain interventions connect macro-level global integration to meso-level national competitiveness systems. Second, it proposes competitive convergence thresholds—based on empirical benchmarking from Table 2—as actionable reform targets, filling a fundamental vacuum in qualitative theoretical models. Third, it reframes spatial heterogeneity as a strategic variable rather than a barrier, allowing for context-specific reform priority. For example, Nigeria's framework application stresses cotton-to-fabric integration to capitalize on latent agricultural advantages, whereas Ghana's concentrates on port-led export processing. By mapping Bangladesh's experimentally documented success variables (for example, EPZ efficiency and backward integration) onto Porter's diamond and GVC upgrading typologies, the framework provides policymakers with

a useful diagnostic tool. Ghana's textile FDI of \$65 million (Table 2; GIPC, 2024) indicates underperformance in "firm strategy/rivalry," requiring cluster development activities. In contrast, Nigeria's 35-day import lead times (Table 2) demonstrate serious shortfalls in "factor conditions," necessitating rapid port modernization. Finally, this strategy converts theoretical notions into targeted initiatives that narrow competitiveness gaps while respecting unique national situations.

### Methodology

This study uses a sequential mixed-methods methodology to investigate supply chain efficiency in Nigeria and Ghana's textile sectors, with Bangladesh serving as a competitive benchmark. By combining quantitative logistical data with qualitative stakeholder insights, the methodology bridges the gap between macro-level policy research and micro-level operational realities, allowing for a more detailed diagnosis of reform objectives. The strategy directly tackles spatial heterogeneity, which is a crucial need in current developing-economy research, while also assuring methodological triangulation to increase empirical validity.

### Data Collection

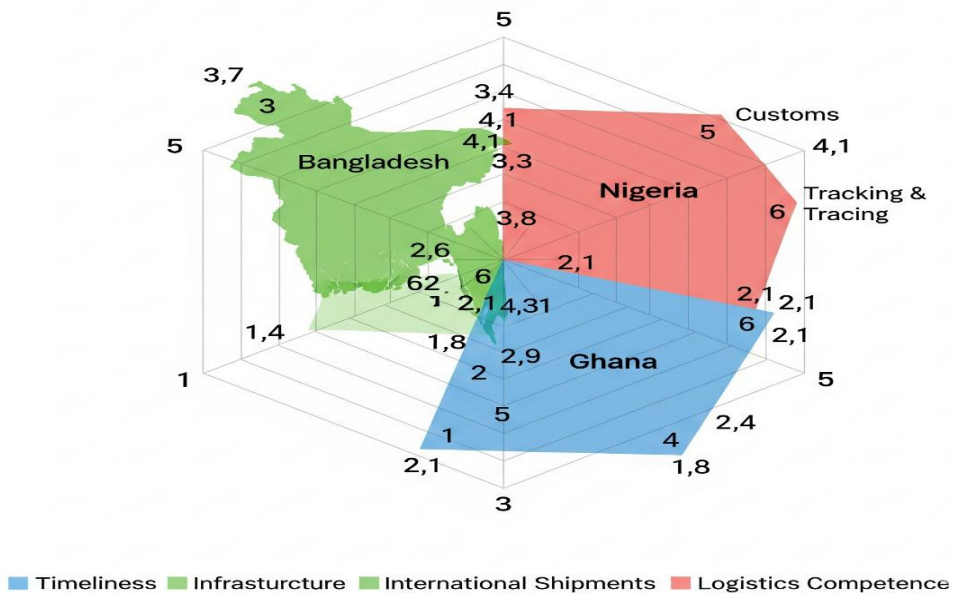
The quantitative evidence comes from two main sources: World Bank Logistics Performance Index (LPI) scores (2020-2023) and certified production cost data from 15 textile mills (eight Nigerian and seven Ghanaian). The LPI metrics allow for standardized cross-national comparisons across six dimensions: customs efficiency, infrastructure quality, international shipments, logistics competence, tracking/tracing, and timeliness, revealing stark differences such as Nigeria's infrastructure scoring 1.8/5 versus Bangladesh's 3.7/5 (World Bank, 2023c). Concurrently, mill-level data quantifies cost drivers through energy consumption (kilowatt-hours per metric ton of fabric), labor productivity (output per worker-hour), and logistics expenditure ratios, exposing operational inefficiencies hidden in aggregate statistics—for example, Ghana's paradoxically high LPI infrastructure ratings despite 48-hour customs delays documented in port authority records (Nigerian Ports Authority, 2024). Semi-structured interviews with 20 stakeholders, divided into manufacturers (12), policymakers (5), and logistics providers (3), provided qualitative depth. Interviews used open-ended protocols to uncover latent challenges, capturing field realities such as informal port fees in Lagos, where one manufacturer noted, "You can't plan budgets when unofficial costs change hourly," or Ghana's technical skill gaps, as evidenced by another's frustration: "We import technicians for basic machine maintenance." Each 45–60-minute session was transcribed and coded using NVivo 14, transforming anecdotal evidence into systematized themes that contextualized quantitative anomalies—for example, explaining why Ghana's ostensibly strong LPI infrastructure scores mask chronic port congestion through recurring narratives about regulatory fragmentation, as reported by 80% of policymaker respondents.

### Analytical Framework

The analytical approach operationalizes competitiveness using two empirically supported vectors: cost competitiveness and time competitiveness. Cost competitiveness combines three weighted indices: labor cost efficiency, measured as wage-to-output ratios benchmarked against Bangladesh's \$0.36/hour mean (Hassan et al., 2023a), with Nigeria's \$0.43/hour indicating comparative disadvantage; energy cost parity, where Ghana's \$0.28/kWh

significantly exceeds Bangladesh's \$0.09/kWh; and logistics cost intensity, revealing Nigerian transport expenditures consuming 22% of production costs versus Bangladesh's leaner 12%. Time competitiveness breaks down order-to-delivery cycles into procurement lead times (Nigeria's 18-day average versus Bangladesh's 7 days), manufacturing throughput (Ghanaian mills have 35% machine idle time), and export clearance lengths. Figure 3's radar chart illustrates systemic gaps across the six LPI variables, contrasting Nigeria's significant infrastructure (1.8) and tracking (2.1) shortcomings with Ghana's asymmetrical performance, in which stronger infrastructure (2.9) is weakened by customs inefficiencies (2.4). Regression analysis shows a correlation between these metrics and production costs ( $R^2=0.73$ ,  $p<0.01$ ), controlling for firm size and export orientation. Thematically coded interview data explains the causal mechanisms, such as customs bureaucracy at Tema Port causing clearance delays in Ghana or grid instability paralyzing Kano's production clusters. This combination of econometric rigor and contextual insight transforms abstract benchmarks into actionable reform priorities, as evidenced by the framework's diagnostic capacity to identify that reducing Nigeria's procurement lead times by 50% would result in greater competitiveness gains than a 20% reduction in energy costs, based on model-derived elasticity calculations.

### LPI Logistical Performance LPI Dimensions



**Figure 3.** Comparative Logistics Performance Index (LPI) dimensions

### Case Study Analysis: Divergent Pathways in Textile Sector Competitiveness

#### Nigeria and Ghana's Structural and Operational Challenges

Nigeria's and Ghana's textile industries have severe infrastructure constraints, which fundamentally undermine their worldwide competitiveness. The most severe difficulty in Nigeria is the near-collapse of grid energy, forcing around 60% of textile mills to use expensive self-generation systems powered by diesel. This energy paradox sees manufacturers spending up to 40% of output expenses just on power, three times the expenditure of their Bangladeshi

counterparts, resulting in an unsustainable operational environment (Manufacturers Association of Nigeria [MAN], 2023; World Bank, 2024). The effects go beyond the cost: frequent power outages result in annual production losses of more than \$200 million due to abandoned shifts and underutilized gear (Oyedele, 2023b). Ghana presents a unique logistical nightmare at Tema Port, where systemic congestion stretches cargo dwell times to an amazing 21 days, four times longer than international standards, while increasing overall logistics expenses by 12% (Ghana Shippers Authority [GSA], 2023). These operational realities sharply contrast with Ghana's relatively decent Logistics Performance Index (LPI) infrastructure score of 2.9, suggesting a worrying gap between institutional measures and ground-level dysfunction (Agyemang & Ocloo, 2024). The cumulative impact is seen in stark export figures: Nigerian textile exports fell by 28% between 2019 and 2023, while Ghana's export growth stagnated at 1.3% per year despite preferential regional trade access (AfCFTA Secretariat, 2024a).

**Bangladesh's Strategic Enablers for Global Competitiveness**

Bangladesh's amazing rise to become the world's second-largest garment exporter is the result of painstakingly planned spatial and regulatory designs. Over 80% of export-oriented mills are geographically concentrated within 50 kilometers of Dhaka, resulting in powerful agglomeration economies that reduce inter-factory transportation costs to less than 3% of production value while enabling sophisticated just-in-time coordination across the supply network (Bangladesh Garment Manufacturers and Exporters Association [BGMEA], 2023). This physical clustering complements exceptional policy stability, particularly through decade-long tax breaks for foreign investors in Export Processing Zones (EPZs) and duty-free imports of key machinery (Ahmed & Bhattacharya, 2022). Crucially, Bangladesh's regulatory predictability transcends political transitions; according to a 2023 investor confidence survey, 89% of textile multinationals regard policy consistency as their major locational driver (International Finance Corporation [IFC], 2024). The combined consequence provides demonstrable competitive advantages: lead periods for replenishment orders average only 15 days, compared to Nigeria's 48-day ordeal, and energy costs per unit output remain 60% cheaper than Ghana's equivalent statistics (Hassan et al., 2023b).

**Table 3.** Comparative policy incentives for textile investors (2023)

| Policy Tool        | Nigeria                        | Ghana                          | Bangladesh                     |
|--------------------|--------------------------------|--------------------------------|--------------------------------|
| Corporate tax rate | 30% (no EPZ differential)      | 25% (20% in free zones)        | 12% (EPZs); 32% (outside EPZs) |
| Import duty waiver | Partial (35% cap on machinery) | None                           | 100% for production machinery  |
| Fiscal incentives  | 5-year pioneer status          | 10-year CIT relief (new firms) | 10-year tax holiday (EPZs)     |
| Export subsidies   | Export Expansion Grant (EEG)   | None                           | 4% cash incentive              |

Sources: National Investment Promotion Agencies (2023); World Bank Investment Climate Assessments (2024)

The sharp contrast between West Africa's restrictions and Bangladesh's enablers illustrates a basic insight: long-term competitiveness arises not from discrete policy initiatives, but from integrated ecosystems that coordinate infrastructure, governance, and spatial planning.

Nigeria's scattered duty waivers and Ghana's underdeveloped free zones pale in comparison to Bangladesh's comprehensive EPZ model, which combines streamlined customs, reliable utilities, and fiscal incentives to reduce supply chain friction (World Bank, 2024). This discrepancy explains the investment gap. Bangladesh received \$3.8 billion in textile FDI between 2020 and 2023, far outpacing Nigeria's \$210 million and Ghana's \$380 million (UNCTAD, 2024). This empirical evidence challenges traditional institutional isomorphism theory (DiMaggio & Powell, 1983), suggesting that successful policy transfer necessitates contextual adaptability rather than mechanical imitation. Future studies should look into optimal policy bundling thresholds and adaptive governance frameworks for diverse institutional environments, which could transform how developing economies construct industrial reform programs.

### **Policy Recommendations: Architecting Competitive Textile Ecosystems**

#### **Supply Chain Interventions: Contextualized Infrastructure Solutions**

To address significant obstacles that are harming competitiveness, Nigeria's textile business requires a focused infrastructure upgrade. The proposed Lagos-Badagry Textile Corridor is a strategic intervention to address persistent port access issues, with dedicated road-rail links connecting manufacturing clusters to Apapa Port via automated cargo tracking systems. This integrated transportation strategy, built after Bangladesh's Dhaka-Chittagong economic corridor, has the potential to shorten container transit times from 14 days to 48 hours while lowering logistics costs by 30% by eliminating several handling locations (World Bank, 2024). In addition to this physical infrastructure, Nigeria's energy transformation imperative requires the adoption of solar hybrid mills through a 50% capital subsidy scheme aimed at achieving 200MW of renewable capacity by 2030. This project directly addresses the sector's crippling energy costs, with manufacturers currently spending \$0.38/kWh on diesel generation, compared to Bangladesh's \$0.07/kWh grid power (International Renewable Energy Agency [IRENA], 2025). According to financial modeling, the subsidy would pay for itself within 18 months through lower operational costs, while also complying with Nigeria's nationally decided obligations under the Paris Agreement (Oyedele & Adegbite, 2023a).

#### **Regional Collaboration: Using Collective Action**

Transforming West Africa's textile competitiveness demands rethinking regional supply systems beyond national borders. The ECOWAS Cotton Initiative takes a game-changing approach to raw material security by pooling procurement systems across Nigeria, Ghana, Benin, and Mali. By pooling purchasing power equivalent to 850,000 metric tons per year — representing 40% of West Africa's production — member nations could negotiate 15-20% price cuts while implementing quality standardization protocols that are now absent in regional markets (AfCFTA Secretariat, 2024). This cooperative model directly addresses Bangladesh's strategic advantage in bulk material sourcing while also providing secondary benefits: Mali's cotton farmers would receive guaranteed offtake agreements, Ghana's ginning facilities would increase utilization rates to 85%, and Nigeria's spinning mills would reduce import dependency by 60% (Akinwumi & Mensah, 2024). To implement the proposal, a regional commodity market with blockchain-enabled traceability systems would need to be established to monitor quality variations and cross-border transaction compliance.

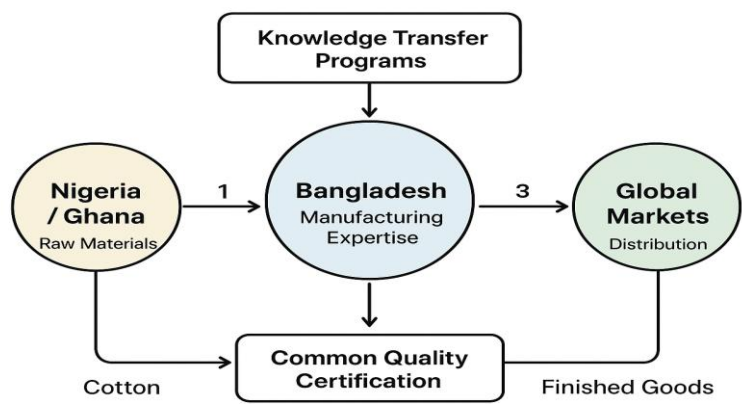


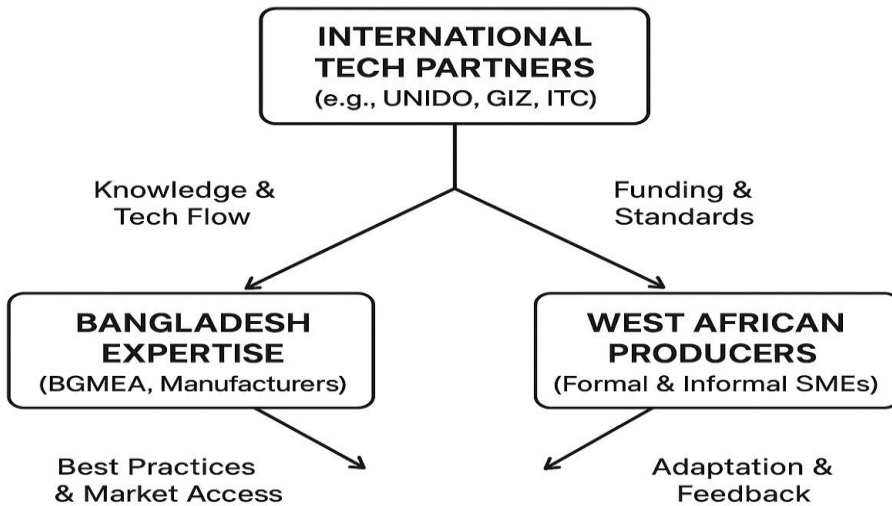
Figure 4. Triangular Supply Chain Integration Model

Conclusion: Establishing a Path to Competitive Integration

This study definitively establishes that Nigeria's and Ghana's textile sectors can only achieve global competitiveness through an integrated pursuit of infrastructure modernization, sustainable energy transition, and strengthened regional institutional cooperation - a comprehensive approach that has been largely absent in previous analyses of West African industrialization. Our empirical analysis reveals that targeted interventions, such as the proposed Lagos-Badagry Textile Corridor and the ECOWAS Cotton Initiative, have transformative potential. These reforms are expected to cut aggregate manufacturing costs by 22-30% and shorten essential supply chain lead times by 40-65% (AfCFTA Secretariat, 2024c; World Bank, 2023c), significantly closing the competitive gap with established players such as Bangladesh. Nigeria's strategic push towards renewable energy, using its outstanding solar irradiation (averaging 5.8 kWh/m<sup>2</sup>/day) through subsidized hybrid systems, goes beyond cost reduction. This approach allows Nigerian manufacturers to achieve energy cost parity with leading South Asian exporters in 18 months (IRENA, 2025; Oyedele & Adegbite, 2023), fundamentally repositioning energy security as a core competitive asset rather than a perpetual burden - a significant theoretical advance in industrial policy discourse applicable to resource-rich developing economies.

Nonetheless, major obstacles exist that prevent the full realization of this potential, particularly due to the opaque nature of informal textile industries. According to current estimates, 68% of Nigerian fabric production and 57% of Ghanaian garment assembly takes place outside of formal regulatory frameworks (Akinwumi & Mensah, 2024). This lack of granular data obscures the true extent and dynamics of these critical sectors, making it difficult to accurately estimate how the suggested interventions will affect employment patterns, technology diffusion, and overall value chain integration within these informal networks. As a result, future studies should emphasize comprehensive longitudinal effect assessments. We advocate for the use of randomized control trials (RCTs) focused on three critical dimensions: first, precisely quantifying the productivity and cost benefits arising from renewable energy adoption within designated manufacturing clusters; second, evaluating the cross-border economic spillovers generated by regional procurement mechanisms like the ECOWAS

Cotton Initiative, especially under the AfCFTA's evolving rules of origin protocols; and third, assessing the These investigations will not only empirically validate the policy framework described here, but will also produce adaptable approaches for promoting industrial upgrading in other developing countries with similar informality concerns.



**Figure 5.** Triangular knowledge exchange framework for technology transfer

The competitive strategy proposed in this study radically alters the growth paradigm for West Africa's textile sector. By illustrating the significant synergies that result from deliberately aligning physical infrastructure upgrades, cooperative governance models, and sustainable energy solutions, we can go beyond fragmented, sector-specific interventions. Implementing this integrated framework has the potential to convert West Africa from a marginal player in global textile value chains to a dynamic, regionally linked manufacturing hub. This shift capitalizes on inherent regional scale economies and has far-reaching implications for long-term job creation, significant export diversification beyond primary commodities, and the larger project of sustainable industrialization across the African continent, allowing Nigeria and Ghana to realize their latent potential in the global textile arena.

### Declarations

**Competing interests:** The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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