

Aligning Ghana's Apparel Industry with Global Best Practices: A Critical Assessment of Sourcing, Production, and Distribution Operations

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Abstract

This study examines how Ghana's apparel manufacturing sector aligns with international best practices in sourcing, production, and distribution. Recognizing the transformative potential of the industry within the context of policy frameworks like the African Continental Free Trade Area (AfCFTA), the study explores the operational, technological, and sustainability dimensions that define competitiveness in the global apparel value chain. Using a quantitative descriptive design, data were collected from 317 industry professionals across major industrial hubs in Ghana. The findings indicate a moderate adoption of sustainable sourcing practices, including traceability and ethical procurement, though supplier development and compliance monitoring remain underdeveloped. Quality control and ethical labour standards are prioritized in production, yet gaps persist in automation, lean manufacturing, and technological integration. Distribution practices reflect a strong interest in timely delivery and sustainable packaging but reveal limited implementation of data-driven logistics, e-commerce, and advanced digital tools such as RFID and predictive analytics. The study identifies critical challenges ranging from infrastructural limitations and technological constraints to workforce skill gaps that hinder the sector's complete alignment with global standards. Policy implications include the need for targeted support in automation, digital transformation, and vocational training, alongside stronger regulatory frameworks for sustainability and labour practices. While the sector shows promising alignment in certain areas, comprehensive adoption of best practices is essential for positioning Ghana as a competitive apparel hub. The study contributes to broader discussions on

industrial upgrading in Sub-Saharan Africa and provides strategic insights for enhancing the global integration and sustainability of localized apparel manufacturing.

Keywords

Apparel Manufacturing, Distribution, Ghana, Global Best Practices, Production, Sourcing

1. Introduction

The global apparel industry is a complex and dynamic sector that plays a vital role in economic development, employment creation, and industrialization. In developed and developing economies, the apparel manufacturing sector is a catalyst for export-led growth and a gateway to participation in global value chains (Kabish, 2023; Staritz & Frederick, 2016). As globalization accelerates and consumer demands become more sophisticated, apparel manufacturers must adopt international best practices that enhance competitiveness, ensure quality, and foster sustainability (Hossain et al., 2025; Kumar et al., 2024; Taplin, 2014). Ghana's apparel industry holds significant potential to contribute to national development within this global context, provided that it aligns its sourcing, production, and distribution strategies with globally accepted standards.

Ghana's apparel manufacturing landscape is undergoing a period of transformation, driven by a convergence of policy support, private-sector initiatives, and increased global demand for ethically produced garments (Nkrumah et al., 2025a; Glover et al., 2024; Adwoa, 2022). Traditionally characterized by small-scale operations and informal production systems, the Ghanaian apparel sector increasingly embraces formalized structures, innovative technologies, and export-oriented production models. Nevertheless, several systemic challenges persist, including inconsistent supply chains, inadequate technical capacity, and limited access to international markets. Ghanaian manufacturers must adopt global best practices across the apparel value chain to effectively leverage the opportunities presented by global trade agreements, such as regional initiatives like the African Continental Free Trade Area (AfCFTA).

Best practices in sourcing within the global apparel industry, as inferred by Garcia-Torres et al. (2022) and Bhandari et al. (2022), emphasize ethical procurement, transparency, and the integration of sustainable raw materials. In Ghana, Yamoah et al. (2024) indicate that sourcing challenges often stem from the overreliance on imported fabrics and limited local textile production. Nevertheless, a growing movement towards sustainable and culturally embedded textiles such as kente, batik, and wax prints offers unique opportunities for value creation and product differentiation. Truant et al. (2024) and Johnsen et al. (2018) inferred that incorporating best practices in supplier vetting, quality assurance, and supply chain traceability can empower local manufacturers to secure more consistent inputs

and establish trust with international buyers, especially in a market increasingly concerned with environmental and social governance metrics.

On the production front, global best practices prioritize lean manufacturing, workforce development, quality control, and technology integration (del Ángel Márquez & López Perez, 2024; Saraswat et al., 2024). In the Ghanaian context, aligning production processes with international benchmarks involves a systematic overhaul of traditional manufacturing systems. Capacity building through vocational training, adopting computer-aided design (CAD) (Chaudhary et al., 2020), manufacturing tools, and compliance with international labour and safety standards are critical to enhancing productivity and competitiveness. Furthermore, by fostering innovation and efficiency through Total Quality Management (TQM) frameworks and green manufacturing practices, Nkrumah et al. (2025b) can position Ghanaian firms to meet the requirements of high-end fashion retailers and mass-market distributors alike.

The distribution component of the apparel value chain is equally critical and increasingly shaped by digital transformation, omnichannel retailing, and agile logistics (Reinartz et al., 2019). Ghanaian apparel producers face unique challenges in this regard, including infrastructural bottlenecks, limited logistics integration, and restricted access to international shipping networks (Kuteyi & Winkler, 2022). Best distribution practices emphasize customer-centric strategies, efficient inventory management, and optimisation of last-mile delivery. With strategic investments in e-commerce platforms, partnerships with third-party logistics providers, and regional distribution hubs, Ghanaian firms can better position themselves in both domestic and export markets. Moreover, leveraging data analytics to forecast demand and optimize supply chain responsiveness is vital for remaining competitive in a fast-paced industry.

This study, thus, explores the application and implications of global best practices in sourcing, production, and distribution within Ghana's apparel manufacturing sector. Through a combination of literature review, industry analysis, and stakeholder engagement, it aims to identify actionable strategies that can foster industry growth, sustainability, and global competitiveness. Challenges and transformative pathways within Ghana's apparel industry, the study seeks to contribute to broader discussions on industrial upgrading in Sub-Saharan Africa and the potential for localized sectors to thrive in an increasingly interconnected global marketplace.

2. Literature Review

2.1. Significance of the Apparel Industry (Economic, Social, and Cultural)

The global apparel industry, a vital cog in the wheel of the world's economy, boasts a staggering valuation of over \$1.5 trillion, showcasing its immense scale and pivotal role in international commerce (Fernandez-Stark et al., 2022). This expansive sector, encompassing everything from textile production to retail, is a key driver

of economic growth, employing approximately 75 million individuals worldwide, thereby underscoring its status as a significant source of livelihood (Posner, 2024).

The industry's impact on employment is particularly pronounced in developing countries, where it often serves as a gateway to formal employment for many, especially women. In countries like Bangladesh, the apparel sector is the economy's lifeline, contributing around 20% to the GDP and accounting for more than 80% of total exports (Chowdhury et al., 2024; Tasneem & Yeasmin, 2024). Similarly, in Vietnam, the textile and apparel industry accounts for nearly 15% of total GDP, with exports valued at \$39 billion in 2019, making it one of the leading sectors driving economic growth (Ram & Kalidasan, 2024). The industry's contributions extend beyond economic measures, acting as a catalyst for technological innovation and sustainability initiatives. The push towards reducing the environmental footprint has led to significant investments in green technologies and sustainable materials, with the global market for sustainable textiles projected to reach \$8.2 billion by 2023 (Fernandez-Stark et al., 2022).

This shift towards sustainability reflects the industry's adaptability to changing market demands and its commitment to addressing critical environmental challenges. The apparel industry's influence on global trade dynamics cannot be overstated. Its complex and highly globalized supply chains have been instrumental in shaping the economic landscapes of many nations, fostering international cooperation, and promoting global trade (Dobos & Éltető, 2023; Rana & Allen, 2021). The industry's ability to adapt to shifting geopolitical landscapes and consumer preferences further highlights its agility and resilience in the face of challenges, ensuring its continued growth and significance on the global stage.

In Africa, the apparel industry emerges as a pivotal sector offering significant prospects for propelling economic development and achieving industrial diversification (Obonyilo & Marciniak, 2023). Recognizing its immense potential, nations like Ethiopia, Kenya, and Lesotho have positioned the sector at the forefront of their industrialization strategies. These countries are capitalizing on unique competitive edges such as lower labour costs and the benefits of preferential trade agreements like the African Growth and Opportunity Act (AGOA) (World Economic Forum, 2023), which provides them with tariff-free access to the U.S. market. Such strategic advantages are harnessed to attract substantial foreign investment, aiming to integrate these economies more deeply into the global apparel and textile value chain.

2.2. Global Best Practices in Apparel Manufacturing

Global best practices in apparel manufacturing have evolved significantly, mirroring the industry's dynamic nature and underscoring the need for sustainable, efficient, and socially responsible operations (Macchion, 2024). Integrating advanced technologies, sustainability initiatives, and ethical labour standards increasingly shapes global best practices in apparel manufacturing. The adoption of Industry 4.0 technologies, such as the Internet of Things (IoT), Radio Frequency

Identification (RFID), and additive manufacturing, has revolutionized production processes. These technologies enhance real-time tracking, improve inventory management, and facilitate efficient production workflows. Lean manufacturing principles, including value stream mapping and continuous improvement strategies, further reduce waste and improve operational efficiency (Deepthi & Bansal, 2024; Monteiro et al., 2024).

Sustainability has become a central focus in apparel manufacturing, with companies implementing eco-friendly practices to minimize environmental impact (Rahaman et al., 2024; Chowdhury et al., 2022). Using recycled materials, water-efficient dyeing techniques, and energy-efficient machinery are among the strategies employed to promote green manufacturing (Bonelli et al., 2024). The Higg Index serves as a standardized tool for assessing environmental and social sustainability across the supply chain, enabling companies to identify areas for improvement and track progress (Gonçalves & Silva, 2021). Additionally, zero-waste fashion approaches, such as zero-waste pattern design, aim to eliminate textile waste during production (ElShishtawy et al., 2022; Lei & Li, 2021).

According to Rana (2024), ethical labour practices are also integral to global best practices in apparel manufacturing. Companies are increasingly committed to ensuring safe working conditions, fair wages, and compliance with labour laws. Regular factory audits, transparency in supply chains, and adherence to international labour standards are measures taken to uphold workers' rights (Athreya, 2022; Payne et al., 2022). Thus, global best practices in apparel manufacturing encompass integrating advanced technologies, commitment to sustainability, adherence to ethical labour standards, and continuous innovation. These practices improve operational efficiency and product quality and contribute to the industry's social and environmental responsibility. As the apparel industry evolves, embracing these best practices will be essential for achieving long-term success and sustainability.

2.3. Sourcing Practices in the Apparel Manufacturing

Sourcing practices in the apparel manufacturing sector have undergone significant transformations in recent years, driven by globalization, technological advancements, and evolving consumer expectations (Arrigo, 2020; Ha-Brookshire, 2017). Historically, apparel companies have relied on low-cost country sourcing (LCCS) to minimize production expenses by leveraging cheaper labour markets in countries like China, India, and Bangladesh (Jensen & Whitfield, 2022). While this strategy has enabled cost efficiencies and expanded product variety, it has also introduced challenges related to supply chain complexity, quality control, and ethical labour practices.

Lee (2010) noted that the shift towards global sourcing has been facilitated by advancements in technology and transportation, making it easier to trade raw, unfinished, or finished products across borders. However, this globalization has also increased scrutiny over labour conditions in sourcing countries. Reports of

worker exploitation, such as excessive recruitment fees leading to debt bondage, have prompted brands to implement comprehensive supply chain monitoring programs. Organizations like the Fair Labor Association (FLA) have played a pivotal role in promoting labour compliance and ethical sourcing practices across the industry (Hofmann et al., 2022; Ha-Brookshire, 2015). In response to these challenges, some apparel companies are exploring alternative sourcing strategies, including reshoring and nearshoring. This approach reduces reliance on overseas manufacturing and addresses labour practices and concerns about supply chain transparency.

Technological innovations are also reshaping sourcing practices in the apparel sector. Adopting lean methodologies and automation has enabled manufacturers to optimize production processes, reduce lead times, and improve overall efficiency (Ahmed et al., 2024; Saraswat et al., 2024; George et al., 2022). Furthermore, integrating digital tools for size grid management and demand forecasting has enhanced decision-making capabilities, allowing companies to better align production with consumer preferences.

2.4. Production Processes in Ghana's Apparel Manufacturing Industry

The apparel manufacturing industry in Ghana has undergone notable transitions, driven by shifting global supply chain dynamics, local industrial policies, and increasing consumer demand for locally made garments. While Ghana's apparel sector remains relatively small compared to global players, it plays a critical role in employment generation and industrial diversification. According to Sarpong et al. (2024) and Amankwah et al. (2023), the production process in Ghanaian apparel firms typically involves labour-intensive activities such as cutting, sewing, pressing, and finishing, with limited integration of automation and computer-aided design (CAD). While creating employment opportunities, this labour dependency also exposes firms to inefficiencies stemming from inconsistent skill levels, outdated machinery, and non-standardized processes.

Technological integration within Ghana's apparel industry remains minimal, posing significant challenges to efficiency, product quality, and global competitiveness. Boateng et al. (2024) infer that many small and medium-scale apparel manufacturers still operate without digital production planning systems or quality control protocols. As pointed out by Saraswat et al. (2024), this technological gap limits their ability to compete with imported garments and meet large-scale export demands. However, recent policy interventions under the Ghana CARES "Obaa-tan Pa" programme and the support of the Ghana Export Promotion Authority (GEPA) have sought to enhance capacity through skill development and machinery upgrades (Owusu-Agyeman & Aryeh-Adjei, 2024). Despite these efforts, implementation gaps persist due to financial constraints, lack of technical expertise, and infrastructural deficits.

Workforce competence and production efficiency remain interlinked in

Ghana's apparel production process (Anyigba et al., 2024). Anyigba et al. (2024) infer that vocational and technical education in apparel design often lacks alignment with industrial production demands, leading to a mismatch between training and the practical skills required on the factory floor. Production efficiency is further hindered by high employee turnover and informal employment practices, which reduce organizational commitment and institutional knowledge retention. These human resource challenges, coupled with limited standard operating procedures (SOPs), create inconsistencies in output and quality, affecting local brand reputation and international competitiveness.

Production planning and inventory management systems in Ghana's apparel industry also lack sophistication (Opoku et al., 2020). According to Bigson et al. (2019), most apparel firms rely on manual planning and batch production, increasing lead time and limiting responsiveness to market trends. Unlike lean manufacturing systems common in East Asian production hubs, Ghanaian firms rarely employ just-in-time (JIT) systems or enterprise resource planning (ERP) software. As a result, overproduction, fabric wastage, and delivery delays are frequent. The absence of data-driven decision-making tools hinders continuous improvement in manufacturing performance and contributes to the sector's slow growth trajectory.

Boateng et al. (2024) infer that quality assurance in the apparel production process is underdeveloped in many Ghanaian firms. As explained by Zanu et al. (2023), few firms adhere to internationally recognized quality management systems such as ISO 9001 or the World Responsible Accredited Production (WRAP) standards. The lack of quality benchmarks limits the industry's access to lucrative international markets. Poor quality control also affects customer satisfaction in local markets, where imported secondhand clothing often outperforms local products' consistency and finishing (Yao et al., 2025). Strengthening quality assurance frameworks, adopting continuous quality improvement models, and investing in quality control training are, thus, imperative for the sustainable growth of the apparel manufacturing industry in Ghana.

2.5. Benchmarking Ghana's Apparel Industry against Standards

As pointed out earlier, in recent decades, the global apparel manufacturing sector has experienced significant shifts, driven mainly by the relocation of production from developed to developing countries (Hoque et al., 2022; Whitfield et al., 2020; Altenburg et al., 2020). Such geographic shifts in production raise critical questions regarding compliance with international standards and adopting global best practices (Tebaldi et al., 2022; Shen et al., 2021; Todeschini et al., 2017). Global best practices in apparel manufacturing encompass a broad range of areas, including sustainable production processes, employee welfare and rights, quality control, supply chain transparency, and compliance with environmental standards (Wren, 2022; Zhang et al., 2022; Morris et al., 2021; Bubicz et al., 2021).

An increasing number of apparel manufacturers are globally incorporating

these practices in response to rising consumer awareness and stringent regulatory requirements (Bianchi & Birtwistle, 2020). Similarly, the garment industry in Ghana, although smaller than global giants such as China, India, and Bangladesh, has witnessed steady growth over the years (Appiadu et al., 2022; Amankwah-Amoah, 2022). However, reports suggest the presence of challenges, including low productivity, inadequate skill sets, and compliance gaps in adhering to global best practices (Chejor et al., 2020).

In contrast, as mentioned earlier, their offshore counterparts, particularly those in countries such as Bangladesh, China, and India, have made significant strides in adopting global best practices, although challenges persist in areas such as labour rights and environmental compliance (Podrecca et al., 2021; Huq and Stevenson, 2020). Their comparative advantages in scale, technology, and skill have propelled these countries to the forefront of the global garment industry.

The apparel manufacturing industry operates within a highly competitive and regulated global environment, where adherence to best practices is essential for efficiency, sustainability, and market competitiveness. Sourcing, production, and distribution form the backbone of apparel manufacturing, and aligning these processes with global standards ensures quality control, ethical compliance, and supply chain resilience.

3. Methodology

This study employed a descriptive quantitative research design to evaluate the sourcing, production, and distribution operations of apparel manufacturing firms in Ghana. The primary objective was to assess the extent to which these operations align with global best practices, with a specific focus on sustainability, labour compliance, and quality standards. The research targeted small and medium-sized apparel manufacturing enterprises (SMEs) located in key industrial centers of Ghana, including Accra, Tema, Kumasi, and Tamale. A total of 383 structured questionnaires were distributed using purposive sampling to reach managers, supervisors, and quality assurance officers. Out of the distributed questionnaires, 317 were completed and deemed valid for analysis, yielding an effective response rate of approximately 82.8 percent, which is considered robust for making inferences about the broader formal garment sector in Ghana (Mensah & Merkurjev, 2020).

Data were collected using a self-administered questionnaire developed based on established industry standards and relevant scholarly literature (Leon et al., 2022; Kozlowski et al., 2019). The instrument was designed to measure three core constructs with sourcing operations, production operations, and distribution operations, with each item rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Demographic information was also gathered to contextualize the responses. Before the main study, a pilot survey was conducted with 30 SMEs that were not part of the final sample. Feedback from this pilot led to minor adjustments for clarity and relevance, and Cronbach's alpha coefficients

for the main constructs ranged between 0.76 and 0.88, thereby confirming strong internal consistency (Som et al., 2017).

Data analysis was conducted using SPSS (Version 26), where descriptive statistics (mean scores and standard deviations) were computed to evaluate the extent of compliance with international best practices across various operational domains. The results were organized into frequency tables and measurement model tables, with exploratory and confirmatory factor analyses performed to ensure a robust measurement model. Ethical approval for the study was obtained from the relevant institutional review board prior to data collection. Participants were informed about the study's objectives and provided informed consent before participating, with assurances of confidentiality and anonymity maintained throughout the research process (Tolich, 2020).

4. Results and Discussions

4.1. Attributes of Fashion Houses in Ghana

The survey results indicate that the majority of Ghanaian apparel enterprises are concentrated in Greater Accra, which accounts for 54.9% ($n = 174$) of respondents. This concentration reflects Accra's status as the primary hub for fashion and cultural innovation, benefiting from advanced commercial infrastructure, a large consumer market, and robust business support services. In contrast, the Ashanti Region contributes 24.6% ($n = 78$) of the sample, highlighting its significant role in textile production, particularly in traditional activities such as Kente weaving. The Northern Region, with 20.5% ($n = 65$) of the enterprises, signifies a growing industry presence outside the traditional urban centres, although these areas may face challenges regarding access to resources, skilled labour, and business development services. Expanding tailored industry support in these regions could promote decentralization and balanced economic growth across the country (Nsawah & Phiri, 2023).

In terms of years in operation, 35.0% ($n = 110$) of businesses have been operational for six to ten years, indicating a substantial proportion of firms that have reached stability and sustainability. Meanwhile, 25.0% ($n = 79$) have been in operation for one to five years, reflecting a steady influx of new entrants, while 15.1% ($n = 48$) have operated for eleven to fifteen years, and another 15.1% ($n = 48$) for more than fifteen years. A smaller segment (10.1%, $n = 32$) comprises businesses less than one year old, signifying a dynamic yet highly competitive market. The presence of many younger firms suggests growing entrepreneurial interest driven by evolving fashion trends, the increasing demand for locally produced apparel, and supportive government initiatives, though the sustainability and scalability of these new ventures remain uncertain (Mensah & Merkurjev, 2020).

Regarding legal structure, an overwhelming majority of firms (93.7%, $n = 299$) operate as sole proprietorships. This dominance implies that most enterprises are small, informally structured, and independently managed. While sole proprietorships offer flexibility and ease of establishment, they often struggle with scaling

operations, accessing capital, and meeting regulatory compliance standards. Only 6.3% (n = 18) of businesses are structured as limited liability companies, indicating a low level of formalization that may hamper investors' confidence and limit growth prospects. Enhancing formalization through regulatory training, access to credit, and tax incentives could improve long-term business prospects (Truong & Bui, 2022).

The workforce data, as shown in Table 1, reveal that 39.7% (n = 126) of enterprises operate with one to five employees, followed by 30.0% (n = 95) with six to ten employees. This suggests that most firms function as small workshops rather than large-scale factories. A modest shift towards medium-sized enterprises is observed, with 15.1% (n = 48) employing eleven to fifteen workers and 10.1% (n = 32) having 16 to 20 employees, while only 5.0% (n = 16) have more than twenty workers. Such small workforce sizes indicate potential challenges in terms of production capacity and the ability to meet large-volume orders, which may impact overall efficiency and competitiveness.

Table 1. Descriptive statistics on sourcing operations.

Statement	N	Min.	Max.	Mean	±SD
Sourcing raw materials from the local or domestic market	317	1	5	3.51	1.084
Sourcing raw materials from the global/foreign market	317	1	5	3.74	1.027
Using sustainable materials and practices in sourcing raw materials helps reduce environmental impact and supports responsible sourcing practices	317	1	5	4.02	0.859
Sourcing from multiple countries to mitigate risks and ensure supply chain resilience	317	1	5	3.88	1.032
Ability to track materials and products throughout the supply chain for transparency	317	1	5	3.90	1.063
Measures such as adherence to environmental regulations, worker safety standards, and fair labour practices	317	1	5	3.98	0.935
Traceability of the origin of raw materials through the supply chain	317	1	5	3.95	0.953
Brands conduct regular assessments of suppliers' factories to verify compliance with labour, health and safety, and environmental standards	317	1	5	3.60	1.029
Brands invest in training and development programs to help suppliers improve their sustainable manufacturing capabilities	317	1	5	3.50	1.107
Leading brands work with a range of suppliers across different countries to avoid over-reliance on any single source and mitigate supply chain risks	317	1	5	3.84	1.031

In terms of revenue distribution, many businesses operate on modest earnings. According to the data, 34.7% (n = 110) generate less than GHS 1000 per month, with 24.9% (n = 79) earning between GHS 1000 and GHS 2999. A smaller fraction

of enterprises reported higher income levels, with 15.1% (n = 48) earning between GHS 3000 and GHS 4999, 10.1% (n = 32) between GHS 5000 and GHS 6999, and only 6.9% (n = 22) between GHS 7000 and GHS 8999, while 5.0% (n = 16) reported revenues exceeding GHS 9000. An additional 3.15% (n = 10) of respondents opted not to disclose their revenue. The prevalence of low revenue among many firms indicates challenges related to pricing, production efficiency, and market access. Strengthening financial literacy, expanding market linkages, and improving access to funding may help these businesses enhance revenue generation and support scaling operations.

4.2. Sourcing Operations

The results indicate varying degrees of agreement on sourcing practices, with some statements receiving stronger agreement than others. The findings revealed that respondents highly agreed that using sustainable materials and practices in sourcing helps reduce environmental impact and supports responsible sourcing practices (M = 4.02, \pm SD = 0.859). Similarly, respondents showed relatively strong agreement with the importance of adhering to environmental regulations, worker safety standards, and fair labour practices (M = 3.98, \pm SD = 0.935), as well as ensuring traceability of raw materials throughout the supply chain (M = 3.95, \pm SD = 0.953). Additionally, sourcing from multiple countries to mitigate risks and enhance supply chain resilience was also rated highly (M = 3.88, \pm SD = 1.032), suggesting that diversification in sourcing strategies is recognized as a key component in ensuring supply stability.

While sourcing raw materials from global markets (M = 3.74, \pm SD = 1.027) received slightly stronger agreement compared to sourcing from local/domestic markets (M = 3.51, \pm SD = 1.084), the results indicate a balance between local and international supply chains in Ghana's apparel industry. Respondents also acknowledged the significance of tracking materials and products throughout the supply chain for transparency (M = 3.90, \pm SD = 1.063), which aligns with industry trends toward supply chain visibility and accountability.

However, compliance monitoring and supplier development received relatively lower agreement levels. For instance, brands conducting regular assessments of suppliers' factories to verify compliance with labour, health, safety, and environmental standards had a mean score of 3.60 (\pm SD = 1.029), indicating moderate levels of compliance enforcement. Likewise, investment in training and development programs to help suppliers improve sustainable manufacturing capabilities recorded the lowest agreement (M = 3.50, \pm SD = 1.107), reflecting potential gaps in supplier capacity-building initiatives.

The overall trend of responses suggests that while Ghanaian garment manufacturers recognize the importance of sustainable and transparent sourcing practices, compliance monitoring and supplier capacity development require further improvement. Strengthening training programs, enforcing compliance assessments, and integrating technology-driven supply chain transparency mechanisms could

enhance the competitiveness and sustainability of the sourcing operations in the industry.

4.3. Production Operation

The study assesses the production operations of apparel manufacturing firms within the study area to determine the feasibility of apparel production among garment producers in Ghana. The descriptive statistical results are presented in **Table 2**.

Table 2. Descriptive statistics on production operations.

Statement	N	Min.	Max.	Mean	±SD
Monitoring and reducing water usage, energy consumption, waste, and emissions in manufacturing processes	317	1	5	3.88	1.053
Adherence to workplace safety regulations and implementation of worker protection measures	317	1	5	3.95	0.996
Lean manufacturing techniques to minimize waste and optimize productivity	317	1	5	3.75	1.014
Ethical labour practices in apparel production process operations	317	1	5	3.91	1.072
Metrics around reducing energy consumption and water usage in manufacturing processes	317	1	5	3.84	1.039
Practices to minimize waste, reuse materials, and responsibly dispose of any waste	317	1	5	3.90	1.014
Indicators related to fair wages, reasonable working hours, and safe, healthy working conditions for workers	317	1	5	3.94	1.041
Lean manufacturing principles, recycling initiatives, and closed-loop production models cut textile waste	317	1	5	3.79	1.073
Advanced wastewater treatment, water recycling, and efficient dyeing/washing technologies help minimize water use	317	1	5	3.85	1.028
Automation and technological advancements to improve efficiency, productivity, and product quality	317	1	5	3.70	1.098
Consistency and reliability of quality control systems help ensure high standards and consistency in the final product	317	1	5	4.05	0.938
Adherence to labour inspection systems and enforcement of regulations can contribute to higher compliance rates	317	1	5	3.94	1.031

The results indicate moderate to strong agreement across key production operation indicators, suggesting that while compliance with best practices is evident, there remains room for improvement. The findings show that ensuring con-

sistency and reliability in quality control systems received the highest agreement among respondents ($M = 4.05, \pm SD = 0.938$). This suggests that garment manufacturers prioritize product quality assurance as a competitive strategy. Similarly, adherence to workplace safety regulations and worker protection measures ($M = 3.95, \pm SD = 0.996$) and compliance with labour inspection systems ($M = 3.94, \pm SD = 1.031$) were rated relatively high, highlighting efforts to maintain safe and fair working environments.

Respondents also acknowledged the importance of ethical labour practices in apparel production ($M = 3.91, \pm SD = 1.072$) and fair wages, reasonable working hours, and safe working conditions for employees ($M = 3.94, \pm SD = 1.041$). These results indicated that while compliance with ethical labour standards is recognized, it may not yet be fully institutionalized across the industry. Concerning resource efficiency, responses indicate moderate agreement with efforts to monitor and reduce water and energy consumption, minimize waste, and reduce emissions ($M = 3.88, \pm SD = 1.053$). Furthermore, lean manufacturing techniques aimed at reducing waste and optimizing productivity received a mean score of 3.75 ($\pm SD = 1.014$), suggesting progress in adopting efficiency-driven production models.

However, automation and technological advancements in production recorded the lowest agreement ($M = 3.70, \pm SD = 1.098$), indicating potential challenges in adopting modern production technologies. While advanced wastewater treatment, water recycling, and efficient dyeing/washing technologies received a moderate agreement level ($M = 3.85, \pm SD = 1.028$), the variability in responses suggests uneven implementation of sustainable practices across firms.

The respondents suggested that quality control and compliance with workplace safety standards are key priorities for Ghanaian garment manufacturers. However, greater investment in automation, technological advancements, and sustainable production practices will be necessary to enhance the industry's efficiency, environmental sustainability, and global competitiveness.

4.4. Distribution Operations

The study assesses the distribution operations of apparel manufacturing firms within the study area to determine the feasibility of distribution operations among garment producers in Ghana. The descriptive statistical results are presented in **Table 3**.

The findings indicate that respondents strongly agreed that efficient distribution strategies help minimize delays and ensure timely deliveries ($M = 4.01, \pm SD = 0.93$). Similarly, using recyclable, reusable, or biodegradable packaging materials was also rated highly ($M = 3.99, \pm SD = 1.07$), reflecting growing awareness of sustainable packaging solutions in Ghana's apparel industry.

However, while eco-friendly delivery methods, such as electric vehicles ($M = 1.19, \pm SD = 1.21$) and advanced logistics management systems ($M = 3.89, \pm SD = 1.01$), were acknowledged as necessary, their standard deviations suggest variabil-

ity in implementation. This indicates that while some firms have adopted these practices, others have yet to integrate them into their distribution models fully.

Table 3. Descriptive statistics on distribution operations.

Statement	N	Min.	Max.	Mean	±SD
Efficient transportation, warehousing, and inventory management to reduce carbon footprint and costs	317	1	5	3.12	1.02
Use of recyclable, reusable, or biodegradable packaging materials	317	1	5	3.99	1.07
Adoption of eco-friendly delivery methods, such as electric vehicles, to minimize the environmental impact of product distribution	317	1	5	1.19	1.21
Measures to track and reduce greenhouse gas emissions from logistics and shipping	317	1	5	2.52	1.12
Deployment of advanced logistics management systems to optimize distribution operations	317	1	5	3.89	1.01
Utilization of predictive analytics and AI to identify trends and drive strategic decision-making	317	1	5	2.01	1.06
Development of robust e-commerce platforms and mobile apps to enable seamless online sales	317	1	5	1.52	1.08
Efficient distribution strategies to minimize delays and ensure timely deliveries	317	1	5	4.01	0.93
Using data-driven demand forecasts to match supply with demand, minimizing excess inventory, and leveraging strategic partnerships with suppliers, logistics providers, and retailers	317	1	5	1.24	1.03
Utilization of technologies like RFID and predictive analytics to increase visibility and responsiveness	317	1	5	1.51	1.08
Focusing on omnichannel distribution through seamless integration of online and offline sales channels for a consistent customer experience	317	1	5	3.70	1.09
Leveraging data to personalize the shopping experience across all touchpoints	317	1	5	3.65	1.11

Notably, tracking and reducing greenhouse gas emissions from logistics and shipping had a low mean score ($M = 2.52$, $\pm SD = 1.12$), suggesting limited adoption of environmental impact mitigation strategies in supply chain logistics. Similarly, utilization of predictive analytics and AI for strategic decision-making ($M = 2.01$, $\pm SD = 1.06$) and development of robust e-commerce platforms and mobile apps for online sales ($M = 1.52$, $\pm SD = 1.08$) were among the lowest-rated indicators. These results suggest that digital transformation and data-driven distribution strategies remain underdeveloped within Ghana's apparel sector. The least agreed-upon practice was using data-driven demand forecasts to match supply with demand and leveraging strategic partnerships ($M = 1.24$, $\pm SD = 1.03$). Addi-

tionally, utilization of RFID and predictive analytics for visibility and responsiveness ($M = 1.51, \pm SD = 1.08$) was also rated poorly, signaling significant gaps in technological adoption and supply chain optimization.

The trend of responses suggests that traditional distribution methods remain dominant in Ghana's apparel industry, with some progress toward sustainability and efficient logistics management. However, the lack of digital integration, predictive analytics, and advanced e-commerce strategies highlights critical areas for improvement. Addressing these challenges through technological investment, capacity building, and regulatory support will enhance the competitiveness and sustainability of distribution operations within the industry.

5. Implications and Limitations

The findings of this study underscore the need for targeted policy interventions to strengthen Ghana's apparel manufacturing industry and align it more closely with global best practices. At the national level, there is a critical need for policies that support technological modernization, including subsidies or tax incentives for adopting automation and digital tools in production and distribution. The study revealed significant gaps in integrating advanced technologies such as predictive analytics, RFID systems, and e-commerce platforms—areas that require urgent attention in industrial policy formulation. Furthermore, policy frameworks should encourage investment in vocational and technical training programs tailored to the apparel industry's evolving needs. The relatively moderate performance in supplier development and compliance monitoring calls for stronger regulatory oversight, including establishing national standards for sustainable sourcing, labour practices, and quality assurance. Government support through initiatives like the Ghana CARES “Obaatan Pa” programme should be deepened and expanded to ensure that small and medium-sized enterprises (SMEs) are equipped to participate competitively in regional and international value chains under the African Continental Free Trade Area (AfCFTA).

The study highlights several ethical and social dimensions as well that are critical to the sustainability and inclusivity of Ghana's apparel industry. While there is a general acknowledgement of the importance of ethical labour practices, fair wages, and workplace safety, the findings suggest uneven implementation across firms. This inconsistency poses ethical concerns related to labour rights, particularly in informal and semi-formal production settings where enforcement mechanisms are weak. Socially, the industry holds great potential to empower marginalized groups, particularly women, through formal employment and skills development. However, these benefits can only be fully realized if ethical standards are institutionalized and enforced across the board.

Furthermore, the low adoption of environmentally responsible logistics practices and the underutilization of technologies to reduce emissions point to a need for greater corporate accountability. Ethical sourcing and production are no longer optional but imperative in a global market that increasingly demands

transparency and responsibility. Promoting these values is essential not only for gaining market access but also for safeguarding the dignity and welfare of the workforce.

Although this study provides valuable insights into the adoption of global best practices in Ghana's apparel industry, some limitations must be acknowledged. Firstly, the study primarily relied on descriptive statistics from survey responses, which, while informative, may not fully capture the complexities of implementation and impact. Secondly, the study is geographically limited and may not fully reflect regional disparities in apparel manufacturing practices across Ghana. Moreover, the cross-sectional design limited the ability to assess longitudinal progress or the impact of recent policy interventions. Finally, the analysis did not explore deeply the cost structures or economic trade-offs involved in adopting best practices, which could be a critical consideration for firms with limited resources. Future studies could incorporate longitudinal data, case studies, and economic modelling to provide a more holistic sector evaluation.

6. Conclusion

This study affirms that while Ghana's apparel manufacturing sector demonstrates awareness and partial implementation of global best practices in sourcing, production, and distribution, significant gaps remain, particularly in digital transformation, supplier development, and sustainable logistics. The industry's strengths lie in its commitment to ethical labour practices, quality control, and growing interest in sustainable materials. However, greater investment in technology, regulatory oversight, and skills development is essential to achieve competitiveness in the global marketplace. Policymakers, industry stakeholders, and development partners must work collaboratively to build a robust ecosystem that supports industrial upgrading, fosters innovation, and promotes ethical and sustainable growth. Bridging the gaps identified in this study can position Ghana as a dynamic player in the global apparel value chain and contribute meaningfully to economic transformation and social development in Sub-Saharan Africa.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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