

Exploring Challenges and Adoption Factors of Business Intelligence Systems in Nigerian Textile and Apparel Industry

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Abstract

The Nigerian Textile and Apparel industry holds significant growth potential through adopting Business Intelligence Systems (BIS) to enhance decision-making and competitiveness. This study explores industry challenges and factors affecting BIS adoption, aiming to understand their impact on development. Using a multi-stage methodology, seven (7) in-depth interviews with industry representatives identified five (5) major challenges and six (6) key factors. The Best Worst Method (BWM) ranked these factors, revealing high costs and limited awareness as significant barriers to BIS adoption, negatively impacting growth. Despite lower rankings, issues like data availability and system compatibility remain critical, particularly for financially constrained stakeholders. The study concludes that BIS adoption is hindered by systemic industry challenges and recommends targeted investment in training and awareness programs to support successful BIS integration and sustainable development in the Nigerian T&A sector.

Keywords: Business Intelligence Systems (BIS), Nigerian Textile and Apparel (T&A), Thematic Analysis, Best Worst Method (BWM), Business Intelligence (BI), Company Participant (CP).

Introduction

The Nigerian textile industry, once a thriving sector, now faces numerous challenges that impede its growth and global competitiveness (Odey, 2018). Insufficient access to modern technology and equipment hampers the sector's global competitiveness (Omar, et al., 2019) while the scarcity of raw materials and the presence of smuggled foreign textiles continue to impede its development (Niu, et al. 2021). Additionally, the industry's challenges are compounded by infrastructure deficiencies, including unreliable power supply and a lack of spare parts, resulting in reduced efficiency, higher costs, and constraints on its growth potential (Onwuamaeze, 2022; Caseiro and Coelho, 2019; Niu, et al., 2021).

In an era of rapid digital transformation, the adoption of Business Intelligence Systems (BIS) offers promising solutions to these challenges by enabling data driven decision- making and fostering innovation (Abideen, 2020; Aleksandrova and Khabib, 2022). While BIS has demonstrated its value in various industries, such as healthcare and manufacturing, its integration within the textile sector, particularly in developing countries like Nigeria, remains underexplored (Wang and Byrd, 2019; Yang et al., 2022).

The Textile and Apparel industry plays a significant role in the global economy, contributing to trade, employment, and revenue generation (Leal Filho, et al., 2019). However, this industry is plagued by issues such as inefficiencies in decision-making, supply chain management, and inventory control, which hinder its ability to compete on the global stage (Mohiuddin et al., 2022). The introduction of BIS may help to address these issues by providing tools that enhance operational efficiency, customer relationship management, and overall business performance (Ahmad et al., 2020b). Despite the recognized potential of BIS, the Nigerian textile industry has been slow to embrace these technologies, often due to a lack of awareness, limited resources, and the complexity of integrating BIS into existing systems (Ngai, et al., 2014); Lee et al., 2018); Furthermore, empirical research focusing on the adoption of BIS in this specific industry context is limited, leaving a gap in understanding the unique challenges and opportunities that exist (Kinkel et al., 2020; Salisu et al., 2021).

This research aims to address this gap, firstly through identifying the challenges in the Nigerian Textile and Apparel industry within the context of BIS and their impacts on the industry development; and secondly through investigating the factors that influence the adoption of BIS in the Nigerian Textile and Apparel (T&A) Industry. This work also acknowledges Božič & Dimovski's work (Božič and Dimovski, 2019) that the limited availability of literature, empirical evidence, and conceptual models examining how Business Intelligence (BI) can support and enhance innovation. This presents a gap in our understanding of how BI-derived information might successfully drive advancement within organizations because the current corpus of literature on this subject is equivocal (Ngai et al., 2014). Therefore, the goal of this study is to develop an understanding of the adoption of Business Intelligence Systems in the Nigerian Textile and Apparel industry with a view to identify the challenges in the Nigerian Textile and Apparel industry and their impact on industry development, also to explore factors within the Textile and Apparel industry that affect the adoption of Business Intelligence Systems (BIS).

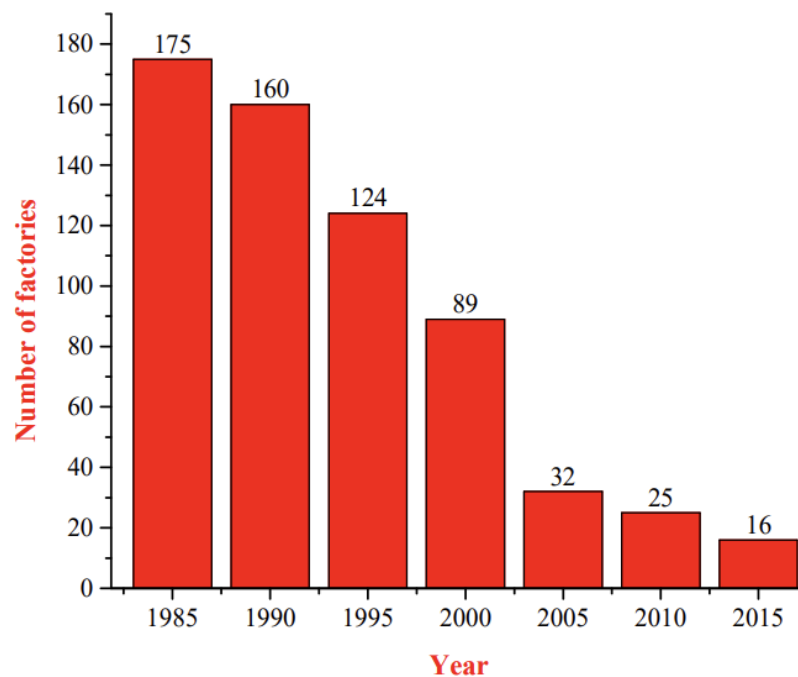
The following research questions enable the research aim to be achieved: (i) What are the challenges faced in the Nigerian Textile and Apparel industry and their impact on industry development. (ii) what are the factors within the Nigerian Textile and Apparel industry that affect the adoption of Business Intelligence Systems (BIS). This research contributes to the understanding of BIS adoption, informs industry practices, and fosters developmental growth within the Textile and Apparel industry.

The Nigerian Textile Industry

According to Ishaya and Folarin (2012), the textile sector in Nigeria has a rich history, with cultural practices like Aso-Oke, Akwete, and Kano's dyeing pits underscoring its cultural importance as these traditions persist due to the essential human need for clothing. (Muhammad et al., (2018), provides an in-depth assessment of Nigeria's textile industry, emphasizing its historical importance and the challenges that have contributed to its decline since the mid-1980s, aligning with the first objective of this research. The industry's

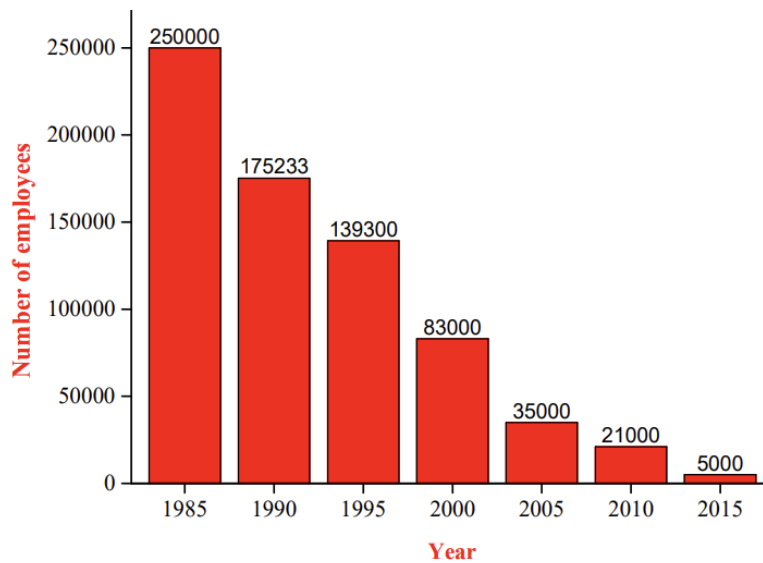
once thriving state, characterized by remarkable textile exports and an impressive annual growth rate of 67 percent prior to 1985, has now been overshadowed by a series of formidable obstacles such as aging infrastructure, global competition, inconsistent power supply, and high production cost (Owen et al., 2016).

Historically, the Nigerian textile industry played a vital role in the country's economy, serving as the largest employer after the government and a key player in the manufacturing sector, providing employment opportunities for over one million Nigerians Owen et al., (2016), raises a crucial concern regarding the future of the Nigerian textile industry, emphasizing the urgent need for intervention by the federal government. The industry's vulnerability to potential extinction signifies yet another instance where the government has faced challenges in preventing the decline of a pivotal industrial sector. Similar past situations with the collapse of the tyre manufacturing and paper industries underscore the gravity of the current situation in the Textile and Apparel industry, which seems to be on a distressing trajectory towards closure (Onwuamaeze, 2022). According to Ishaya & Folarin (2012), a notable factor attributing to the decline of the industry is the substantial cost of Nigerian fabrics in comparison to more affordable imported textiles. A key objective of this research was to shed light on the challenges that have driven numerous operators to shut down their textile plants. Consequently, the number of active mills has drastically decreased from nearly 200 to less than 20 (Figure 1), and the industry's workforce has experienced a substantial reduction, declining from 500,000 employees to less than 20,000 (Figure 2).



Source: Central Bank of Nigeria and Field Survey

Figure 11 - Number of textile factories in Nigeria 1985-2015. (Muhammad et al 2018)



Source: Central Bank of Nigeria and Field Survey

Figure 12 - Employment statistics of textile industry. (Muhammad et al 2018)

Muhammad et al (2018), effectively establish a comparison between the current state and the colonial era in the 1950s when finished textiles were imported from the United Kingdom. The findings by Muhammad et al (2018) and Onwuamaeze, (2022), indicates the pressing need for comprehensive research and strategic policies aimed at reviving the Nigerian textile industry. The implications of the textile industry's potential extinction go beyond economic concerns, as it can profoundly impact employment, industrial development, and the country's overall socio-economic landscape (Onwuamaeze, 2022). Addressing these challenges requires collaborative efforts from policymakers' industry stakeholders, and the broader community to pave the way for a more prosperous and resilient textile industry in Nigeria. Business Intelligence Systems (BIS) can help revitalize Nigeria's textile industry by providing real-time insights into costs, inefficiencies, and market trends. BIS supports better decision-making, cost optimization, demand forecasting, inventory control, and supply chain efficiency. It also enhances data visibility, enabling performance tracking and evidence-based policymaking. By adopting BIS, the industry can boost productivity, cut waste, and improve competitiveness, offering a pathway toward recovery and long-term sustainability.

Challenges and Opportunities in the Nigerian Textile Industry

In both developed and developing economies, industrial growth hinges on efficient production processes and the adoption of innovative technologies. (Javaid et al.,2024). In Nigeria, the Textile and Apparel industry, once a thriving sector, now faces numerous challenges that hinder its contribution to the country's economic development. This research aims to examine these challenges, particularly within the context of Business

Intelligence Systems (BIS), and assess their impact on the industry's growth and competitiveness. By identifying the factors influencing BIS adoption, this study contributes to understanding how technology can drive innovation and enhance production capacities in the Nigerian Textile and Apparel industry. Insufficient access to modern technology and equipment hampers the sector's global competitiveness (Renne, 2019), while the scarcity of raw materials and the presence of smuggled foreign textiles continue to impede its development (Oshodi, 2023). Additionally, the industry's challenges are compounded by infrastructure deficiencies, including unreliable power supply and a lack of spare parts, resulting in reduced efficiency, higher costs, and constraints on its growth potential (Owen et al., 2016; Ekpo, 2018; Oshodi, 2023).

Addressing these critical issues is crucial to bolster the industry's prospects for sustained growth and enhanced competitiveness in the market. This review explores the relevant literature on industry challenges and the role of BIS, linking each discussion to the research objectives and questions on the challenges faced in the Nigerian Textile and Apparel industry and their impact on industry development

Infrastructural Decay and Lack of Modern

The Nigerian textile industry heavily depends on foreign technology, machines, and accessories, leading to significant costs and complexities associated with importing these resources (Diogu et al, 2014; Renne, 2019). A consistent issue highlighted by literature is the lack of comprehensive knowledge about the intricate components of these machines contributing to inadequate maintenance practices, impacting their performance and longevity (Odey 2018). As these machines age, they deteriorate, and non-functioning machines are disassembled to salvage parts, negatively affecting production and product quality (Renne, 2019). Prioritizing Nigeria's technological development is crucial, focusing on local fabrication of spare parts and machine modification to enhance productivity and drive advancements in the industry (OECD, 2020). These initiatives hold the potential to reduce dependency on imports, enhance production efficiency, and create a more competitive and self-sustaining textile sector (OECD, 2020).

Global Recession

According to Ayhan et al., (2021) the global recession is significantly affecting nations worldwide, with developing countries facing heightened vulnerability. Low economic growth rates, closures of businesses unable to compete with advanced counterparts, and rising unemployment are among the observed repercussions (Song and Zhou, 2020). Moreover, the economic downturn in developed markets, stringent environmental regulations, and currency appreciation in China are further complicating the challenges faced by economies (Diogu et al 2014), In response, developing countries must adopt comprehensive and strategic policies to navigate this complex economic landscape, fostering resilience and sustainable growth amidst a dynamic interplay of global trends, technological advancements, and regulatory pressures.

Smuggling of Textile Goods

The persisting issue of smuggling in the textile trade poses a significant threat to the survival of the Nigerian textile industry (de Coster, 2018). Despite the higher cost of local textiles, they are often perceived as inferior to cheaper foreign alternatives, giving foreign textiles a competitive advantage in the market and motivating smugglers to import prohibited materials into Nigeria (Odey, 2018). Strengthening regulations and border control measures is essential to curb smuggling effectively. While Bawalla and Adenuga, (2017) opine that policymakers should focus on promoting the competitiveness of domestic textiles, improving the quality and appeal of local products, and creating an enabling environment that discourages smuggling activities. Joseph, (2014), suggest that consumer awareness campaigns can also encourage the support of Nigerian-made textiles. A comprehensive and collaborative approach involving government, industry players, and consumers is crucial for combating smuggling and reviving the Nigerian textile industry (Renne, 2019)

Energy Crisis

The energy infrastructure deficit in Nigeria is a formidable obstacle to industrialization and economic growth (Renne, 2019) and the lack of consistent and sufficient power supply demands urgent attention and effective solutions (Joseph, 2014). The textile industry, heavily reliant on a reliable power supply, suffers greatly from the energy crisis. de Coster, (2018) emphasize the pivotal role of electricity and petroleum products in supporting various economic sectors, including textiles. Additionally, the industry has faced a decline in public electricity supply, with an evident disparity in allocation between residential and industrial consumption. Over time, the overall electricity supply has also decreased (PHCN, 2003-2008), leading to higher production costs and product prices. This hinders the industry's global competitiveness.

Furthermore, Bailey, (2023) asserts that the energy crisis threatens the Nigerian textile industry's growth and competitiveness as unreliable power supply hampers production efficiency and raises costs for consumers. This is vital for supporting the textile industry's growth and contributing to Nigeria's economic development.

Invasion of Local Markets by Importation

The Nigerian Textile Industry is grappling with a significant challenge due to the influx of low-cost textile products, particularly from China, flooding the domestic market (de Coster, 2018; Renne, 2019; Toye, 2020). This surge of inexpensive imports has greatly affected the industry's prospects (Owen et al, 2016) leading to substantial losses in terms of foreign earnings and employment opportunities. This decline serves as a clear warning, underscoring the persistently challenging and unfavourable operating environment for the textile industry in Nigeria, necessitating the urgency of digitization initiatives in the sector. (de Coster, 2018).

Business Intelligence (BI)

According to Omar et al., (2019), Business Intelligence (BI) can effectively address key challenges in the Nigerian Textile and Apparel (T&A) industry by enhancing decision-making, reducing costs, and improving operational efficiency. Through real-time data analysis, BI tools help firms identify inefficiencies in production, manage resources more effectively, and respond swiftly to market changes. BI also supports supply chain optimization and demand forecasting, which are crucial in a resource-constrained environment. By addressing issues such as high operational costs, limited awareness, and poor data utilization, BI can drive innovation and competitiveness, ultimately contributing to the sustainable development of the Nigerian T&A industry. (Omar et al., 2019); Jafari et al.;2023)

Business intelligence (BI) is a comprehensive concept that encompasses the collection, integration, analysis, and visualization of organizational data, all aimed at improving the decision-making process (Fink et al., 2017) Bordeleau et al (2018), suggests that data collection and analysis have been fundamental aspects of BI for many years. In furtherance, Santos, et al., (2017) asserts that with the emergence of Industry 4.0 technologies, traditional BI methods must evolve to cope with the vast volumes of data generated. These advanced technologies produce massive amounts of data that necessitate effective processing and utilization in decision-making processes, ultimately striving to generate significant value for companies (Santos, et al., 2017). The evolution of BI practices is a crucial area of exploration to understand how businesses can harness the full potential of data-driven insights for strategic and operational advantages. (Bordeleau et al 2018). (Figure 3) depicts the sequential phases of a business intelligence (BI) initiative.

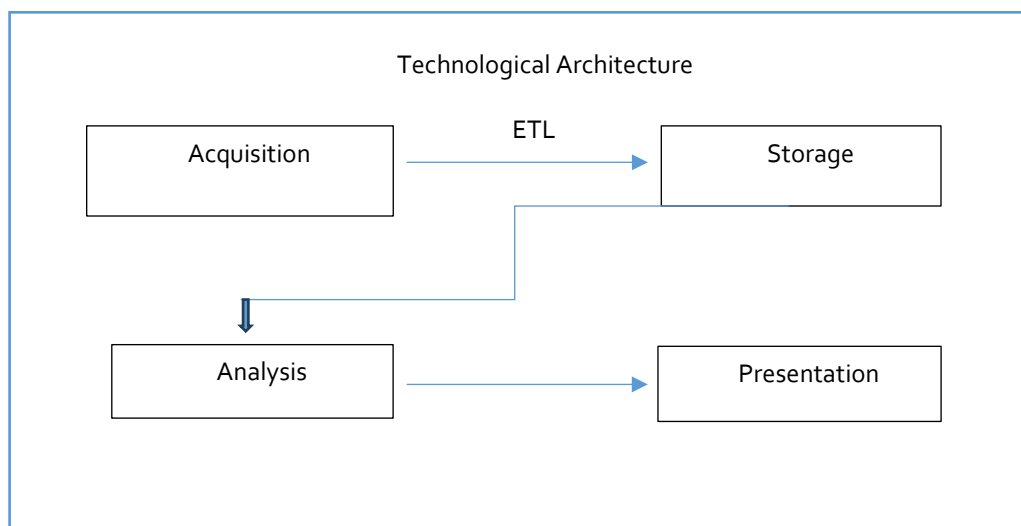


Figure 13- Phases of BI Bordeleau et al (2018)

According to Bordeleau et al (2018), the process commences with data collection, followed by the extraction, transformation, and loading (ETL) of the data into a multidimensional database, commonly known as a Data Warehouse. Subsequently, the data is subjected to

analysis and presented through diverse methods, including reports, interactive data discovery (Hänel and Felden 2016), alerts, operational graphical user dashboards (Groger and Stach, 2014). These stages are underpinned by a technical architecture, typically encompassing a data warehouse.

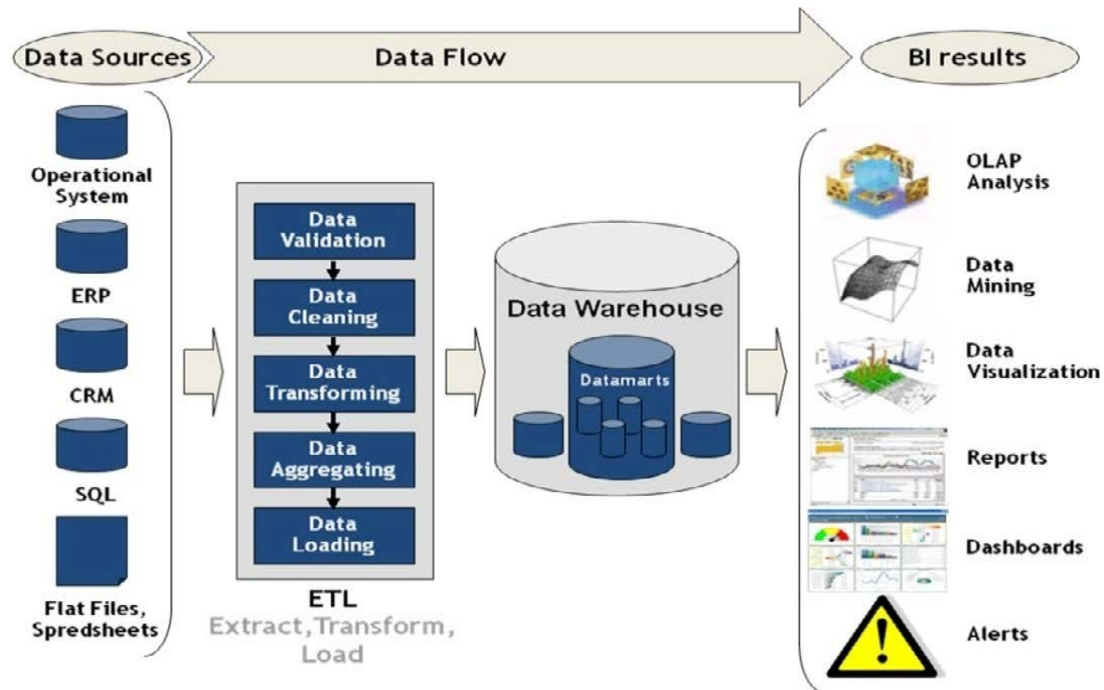


Figure 14 - Business intelligence system (BIS) architecture with key components and functions. (Ahmad et al. 2020a)

According to Ahmad et al. (2020a), Figure 4 shows the integration of Business Intelligence Systems (BIS) in the Textile and Apparel industry holds significant potential to yield numerous benefits for decision-making processes in different departments, encompassing supply chain management (SCM), customer relationship management (CRM), inventory management, manufacturing, production, distribution, marketing, and sales (Ahmad et al 2016). However, while Carvalho et al 2015 suggests understanding the effective implementation and utilization of BIS in the textile industry is crucial for maximizing its impact on business operations and overall performance, Ahmad et al (2020b) asserts that analysing the advantages, challenges, and potential risks associated with BIS integration can provide valuable insights for decision-makers in the industry, enabling them to make informed choices and capitalize on the transformative power of data-driven intelligence. Furthermore, it is confirmed by the literature that around 70–80% of BIS projects result in failure due to both technological and managerial issues and are unable to provide the expected outcomes (Boyton et al 2015; Diogu, et.al.,2014; Ain et al.2019),

Business Intelligence Systems Impact on Organizational Performance

According to Al Rashdi & Nair, (2017), the emergence of Business Intelligence (BI) systems represents a transformative approach in assisting organizations with data-driven decision-making. Extensive research has been undertaken to explore the influence of these systems on organizational performance (Wang and Byrd, 2019); Yang et al 2022) consistently revealing a positive correlation between their implementation and improved outcomes across diverse industries and sectors.

Yang et al (2022), study demonstrates a positive association between the use of BI systems and enhanced financial performance in Chinese firms. Similarly, (Wang and Byrd, 2019) research highlight the effectiveness of BI systems in improving decision-making processes and operational efficiency within healthcare organizations. Scholarly literature delves into various types of BI systems, such as dashboards, data mining, and predictive analytics. While Ghazisaeidi, et al., (2015) reveals the efficacy of dashboards in enhancing organizational performance by providing real-time insights into key performance indicators, Dwivedi, et al., (2021) indicate that data mining techniques were successful in identifying patterns and trends in customer behaviour, leading to improved marketing strategies and increased sales. Collectively, these studies underscore the significant impact of BI systems on organizational performance, emphasizing their potential to facilitate data-driven decision-making and enhance operational efficiency across diverse industries (Yeoh and Popovič, 2016); (Lafferty, 2019); However, despite the emphasis placed on it by organizations, the failure rates of Business Intelligence Systems implementation and its subsequent underutilization remain notably high (Yeoh and Popovič, 2016); (García and Pinzón, 2017).

Benefits of BI System Adoption

Business Intelligence Systems offer advantages like improved decision-making, efficiency, and competitiveness (Gauzelin and Bentz, 2017). However, adopting BI systems comes with challenges, including complexity and the need for specialized skills. Resistance from employees is also possible during adoption, emphasizing the importance of change management and positive organizational culture. (Jalo and Pirkkalainen, 2024). Understanding the benefits and challenges is crucial to maximize the impact of BI systems on business performance. The following are benefits of adopting BIS into an organizations value chain process.

Improved Decision Making

The incorporation of Business Intelligence (BI) offers valuable insights that positively impact organizational decision-making, leading to improved overall performance (Olszak, 2016). This information can be effectively utilized to enhance various aspects of business operations, including services, products, innovation, and agility, as emphasized by (Diogu et al, 2014).

However, despite the availability of systematic approaches like BI, many businesses, particularly in developing countries, continue to rely on experiential and intuitive decision-making methods. Furthermore, Niu et al (2021), asserts that resistance to technology and traditional decision-making practices are prevalent factors contributing to this reliance on conventional approaches. Challenges such as user acceptance of technology, vague connections between data and organizational goals, lack of preparation, unclear objectives, inadequate data, limited risk awareness, and resource constraints further reinforce this inclination towards traditional methods. (Niu et al 2021).

As a result of this prevailing reliance on non-BI decision-making, a significant number of BI implementations fail to effectively influence the decision-making process within organizations, with a failure rate of approximately 50% (Jaradat et al 2022). This highlights the importance of integrating BI into decision-making processes to harness its full potential and drive informed, data-driven decisions for better organizational outcomes.

Increased Efficiency

BIS streamline data collection and analysis, resulting in time and resource savings for organizations (Eric, 2022). This enables businesses to allocate their efforts towards core activities and make well-informed decisions. Similarly, BI systems are crucial in the decision-making process, contributing to improved outcomes and organizational effectiveness (Caseiro and Coelho, 2019). By automating analytics processes, organizations gain valuable insights, identify trends, and prioritize strategic initiatives. Additionally, BI systems enhance efficiency, reduce costs, streamline reporting, and ensure widespread accessibility to critical information, while also mitigating bias through data-driven insights (Kubina et al 2015).

Challenges of Business Intelligence System Adoption

Data Quality

Jafari et al (2023), asserts that data quality emerges as a prominent obstacle in the adoption of Business Intelligence Systems (BIS), particularly when handling vast amounts of big data stored in various systems and formats. The distinctive attributes of big data introduce fresh complexities in upholding data accuracy and dependability. Wang and Byrd (2019), indicate the criticality of ensuring high-quality data, as it directly influences the effectiveness and reliability of BI systems. To overcome this challenge, organizations must give precedence to data quality initiatives, thereby securing the triumph of their BIS adoption endeavours. This recognition of data quality's significance manifests the need for diligent measures in maintaining the integrity and consistency of data throughout the BIS implementation process.

Cost

Yeoh and Popovič (2016), conducted an empirical study in Slovenia to investigate the implementation of Business Intelligence (BI) systems. Their research focused on 26 employees from an IT firm and reveal that adopting a BI system is a demanding and intricate process. These study alongside studies by Wang and Byrd, (2019) and Yang et al (2022), shed light on the substantial resource investment and complexity associated with the adoption of BI systems. These findings emphasize the challenges organizations face in incorporating BI technology into their operations and underscore the importance of careful planning and resource allocation during the implementation process.

Complexity of the Systems

Presently, Business Intelligence (BI) systems have experienced enhancements in user-friendliness; nevertheless, Yoon et al (2017), emphasise that complexities persist, demanding users to undergo extensive training before achieving proficient utilization. This observation underscores the necessity for addressing the intricate aspects of BI systems to ensure optimal user experience. Additionally, Ahmad et al (2016), assert that the implementation of BIS involves complexities and significant resource commitments, including specialized expertise, time, and financial investments. This finding highlights the criticality of strategic planning and resource allocation to successfully adopt and integrate BIS into the organizational framework. As such, identifying and comprehending these complexities offer crucial insights for streamlining the adoption process, enabling businesses to harness the full potential of BI systems for data-driven decision-making and operational enhancement.

Factors Influencing Business Intelligence System Adoption

The adoption of Business Intelligence Systems (BIS) plays a critical role in enhancing decision-making and organizational performance. However, in many developing countries, including Nigeria, BIS adoption remains in its early stages. Jaradat et al (2022), indicate that the adoption of BIS in these regions is still evolving, while Hou (2013) and Suša Vugec et al (2020), indicate the importance of understanding the factors that limit BIS adoption.

This aligns with the second objective of this study, which seeks to investigate the factors influencing the adoption of BIS in the Nigerian Textile and Apparel industry. By exploring these factors, this study uncovers the barriers to BIS integration and their implications for the industry's growth and competitiveness. According to Niu et al (2021), several factors can influence the adoption of BIS, including organizational culture, leadership support, and user acceptance. Organizational culture and leadership support are important in creating a supportive environment for BIS adoption, while user acceptance is critical in ensuring that the systems are used effectively. Therefore, this study explored those factors affecting the adoption of BIS within the Nigerian Textile and Apparel industry

Compatibility and Organizational Culture

Compatibility is recognized as a crucial factor affecting innovation adoption. It refers to the extent to which an innovation aligns with the existing values, past practices, and perceived needs of potential adopters (Jaklič et al 2018). In the context of BI acceptance, researchers have focused on exploring how well the technology fits the preferences and requirements of individuals and the overall organizational work environment, highlighting compatibility as a significant influential aspect.

Leadership Support

According to Wee et al (2023), business managers must possess relevant knowledge and skills to effectively lead IT adoption. In small and medium enterprises (SMEs), this responsibility usually falls on the manager. Chaubey and Sahoo (2021) emphasize that top leaders' commitment influences the assimilation of BI through acceptance and routinization. Leadership support is crucial in fostering a supportive environment for BI system adoption. Leaders should communicate the systems' importance, allocate resources, and provide training for successful implementation.

User Acceptance

User acceptance plays a crucial role in the successful adoption of Business Intelligence applications as organizations expect to reap various benefits from adopting BI (Yoon, Jeong, & Ghosh, 2017) but many implementation projects fail due to end users' resistance to using the selected BI applications. Complexity has been a significant hindrance to the adoption of innovations (Côte-Real et al 2014; Gu et al 2012). BI systems have become more user-friendly; however, they can still be challenging to use without proper training. Ensuring user involvement in the design and implementation of BI systems, along with providing adequate training and support, is vital to their effective utilization. Despite advancements in BI systems, there remains a significant lack of empirical studies addressing user acceptance within specific contexts, such as the Nigerian Textile and Apparel industry. Existing literature highlights barriers such as user resistance, inadequate training, and financial constraints, yet it fails to propose strategies tailored to these unique challenges. Furthermore, the role of organizational culture, technological compatibility, and absence of industry-specific frameworks for BIS adoption remains underexplored, leaving a critical gap in understanding how these factors impacted user acceptance and adoption in this sector. By addressing these gaps, this study seeks to explore the factors influencing BIS adoption and provide actionable insights for improving user acceptance, ultimately enhancing innovation and fostering industry growth.

Methodology

This section outlines the research methodology and methods utilized to investigate the adoption of Business Intelligence Systems (BIS) in the Nigerian Textile and Apparel

industry. The research methodology was guided by the Research Onion model proposed by Saunders et al 2009 enabling a systematic approach to the study. The utilization of the Research Onion model facilitated a systematic decision-making process. This model guided a sequence of selections, ensuring the coherence and rationalization of choices aligned with the research's aim and specific objectives. According to Saunders et al (2009), the research onion model's outer layers pertain to research philosophies and approaches, encompassing the fundamental perspectives that shape the research's underlying principles. Moving inward, the subsequent layers correspond to research strategies, outlining the overall approaches employed to conduct the study. The central layers of the onion revolve around data collection and analysis, constituting the core stages where information is gathered, examined, and interpreted.

This study adopts an Interpretivist Approach, focusing solely on qualitative research. The symbiotic interplay between the researcher epistemological stance and the chosen research philosophy of interpretivism enables a substantiated deduction regarding the factors influencing the adoption of Business Intelligence Systems within Nigeria's Textile and Apparel sector.

Data Collection

Primary data was collected through semi-structured, in-depth interviews with stakeholders from seven Textile and Apparel companies in Nigeria. The interviews were designed to be flexible, allowing for the exploration of additional topics as they arose during the conversation (Bryman and Bell, 2015); (DeJonckheere and Vaughn, 2019). as a result, detailed descriptions of each process were captured and the true essence of the phenomenon under study was obtained. Secondary data sources included textbooks, journals, textile, and apparel industry reports. Databases such as Business Source Complete and Emerald were utilized for data retrieval. When referencing Google Scholar, only peer-reviewed data was selected for research use.

Furthermore, both primary and secondary data were combined to fully address research questions and identify literature gaps. Recognizing the scarcities in literature about factors impacting the adoption of Business Intelligence Systems in the Textile and Apparel industry in developing countries, this study primarily relied on primary data collection methods to effectively achieve research aim and objectives. Existing literatures were thoroughly reviewed to identify gaps and support the primary findings of the researcher. The choice of the Nigerian Textile and Apparel industry for this study is based on both its cultural significance and economic potential for growth via BIS. Over the years, the industry has witnessed several paradigms shift as opined by (Muhammad et al 2018) from the 1980s to the present. Similarly, Tajpour, et al (2022) asserts that Nigeria, as an emerging market, exhibits characteristics of developed markets in industrialized countries but does not fully meet the criteria to be classified as a developed country.

The data collection for this study involved two stages as shown in (figure 6). The qualitative research approach was selected for its exploratory nature, which enables the researcher to

gather naturalistic and non-numerical data. This method focuses on understanding and exploring phenomena rather than explaining or manipulating variables. It emphasizes context and interpretation, with a focus on the process and patterns of development rather than the final outcomes of the research (Nassaji, 2020). This approach utilizes language to gain deeper insights into human phenomena of interest, specifically the process of BIS adoption.

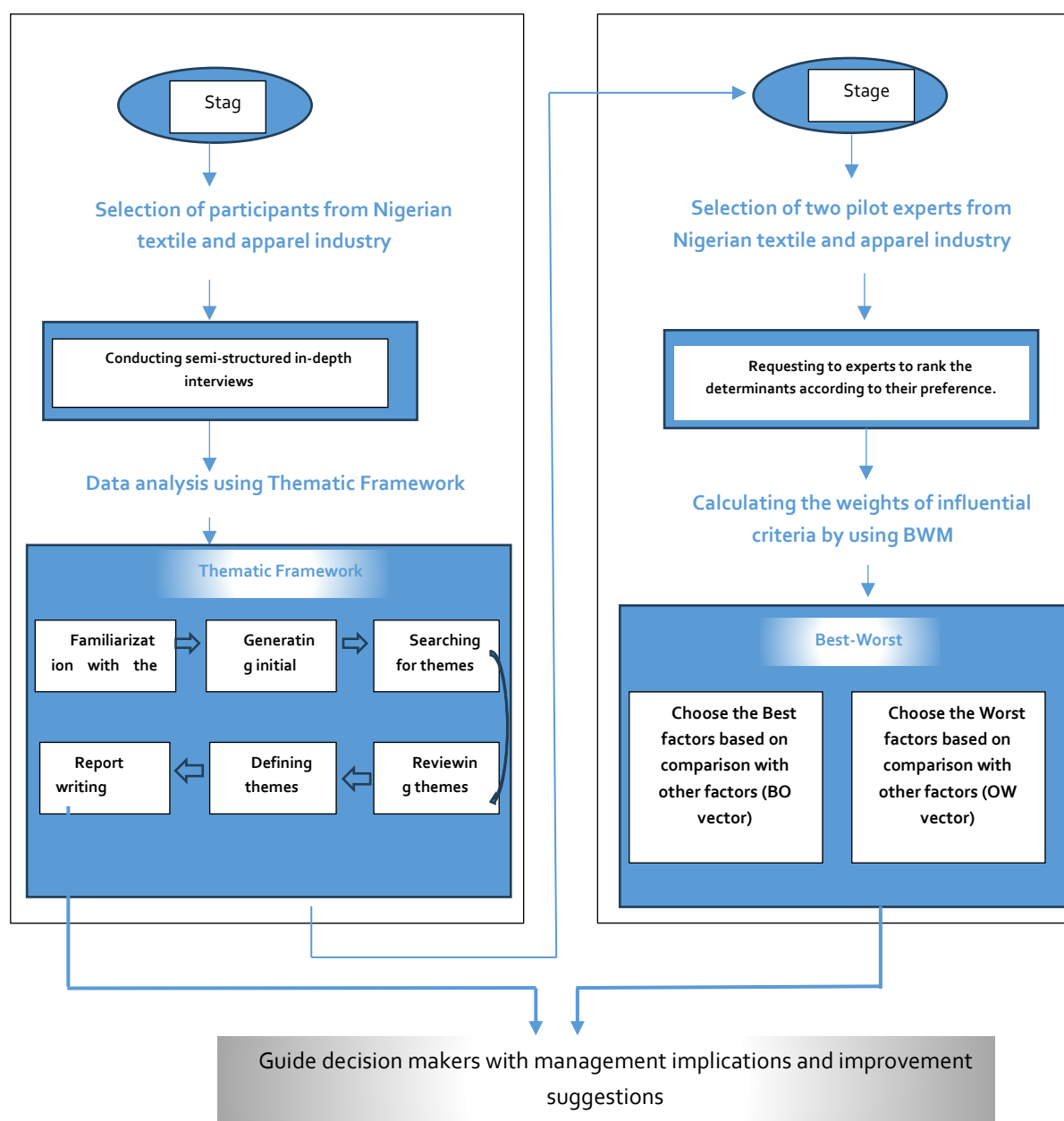


Figure 15 -: Multi-stage applied Methodology

Sampling

Choosing the appropriate sampling method was significant for the researcher because it was crucial to determine the right sample size to gather sufficient information from multiple perspectives (Bryman and Bell, 2015; Salisu et al 2021). Participants were initially identified through publicly available company directories and LinkedIn profiles, after which direct contact was made via email and WhatsApp using official business contact details. The selection of participants involved a combination of purposive sampling and snowball sampling techniques. Initially, purposive sampling was employed; however, due to some rejections from company stakeholders and a limited number of active textile industries in the Nigerian textile industry as revealed in literature, a transition was made to the snowball sampling approach. These methodologies were thoughtfully chosen for their efficacy in identifying, selecting, and engaging interviewees possessing expertise and experience.

A total of seven interviews were undertaken as shown in (Table 1), involving representatives from distinct Textile and Apparel companies as many companies in the industry have ceased trading (Muhammad et al 2018), thereby impacting attempts to boost number of participants. Initially, 11 individuals across 11 organizations were approached for interviews. However, only seven participants from seven different organizations consented to and participated in the interview process. The number of participants was deemed suitable based on recommendations from various studies that indicate reaching theoretical saturation, where the repetition of ideas or patterns becomes evident. (Saunders et al 2009). According to Ahmed et al (2020b), various studies have suggested that at least four or five participants are necessary to achieve theoretical predictability. Similarly, (Yeoh and Popovič, 2016) stated that for a comfortable knowledge of local dynamics, no more than fifteen participants should be allowed. Prior to the conclusive data collection phase, two pilot interviews were undertaken with an industry expert and academia. The purpose of these interviews was to assess the question's reliability and clarity. Each interview session spanned a duration of approximately thirty minutes to one hour. The subsequent data analysis employed a thematic analysis framework, chosen for its relevance and robustness, ensuring effective coding and interpretation of the collected data.

Table 4 - Coding of one to one interview

Participants	Gender	Age	Role	State/Nationality
CP1	Male	56	Managing Director	Ondo/Nigeria
CP2	Female	38	Business Developer	Kwara/Nigeria
CP3	Female	42	Director	Oyo/Nigeria
CP4	Female	35	Development Manager	Lagos/Nigeria
CP5	Male	44	Head of Operations	Kano/Nigeria
CP6	Male	40	Director	Kaduna/Nigeria
CP7	Female	39	Business Owner	Lagos/Nigeria

Analysing Qualitative Data Using Thematic Analysis

Thematic analysis can be approached in various ways (Alholjailan, 2012; Zarea and Javadi, 2016), leading to some confusion regarding its nature and differentiation from qualitative content analysis. This analysis involved coding both the research questions posed by the researcher and the responses provided by the participants (Bryman and Bell, 2015). This process helped to identify and emphasize the significant themes that surfaced from the answers to open-ended questions. Since all the questions were open-ended and the participant's answers lacked specificity, the process of coding responses into a limited number of themes proved to be demanding and time-intensive for the researcher (Bryman and Bell, 2015). Nevertheless, this approach facilitated a thorough analysis, allowing for a broad range of perspectives and opinions on the research topic to be explored in depth.

The analysis of the interview data led to the identification of key themes corresponding to the study's objectives of identifying the challenges facing the Nigerian Textile and Apparel industry such as power supply, cost of production, and imported goods, and the factors influencing BIS adoption, including awareness, training, cost, and technological compatibility.

The primary themes uncovered shed light on the challenges within the textile industry and the factors affecting BIS adoption by decision-makers. In the second stage, only the factors affecting BIS adoption from the stage-one research were sent to the two pilot experts and they were requested to rank them according to their preference criteria of best or worst.

Weighting Method

Rezaei, (2015), proposed the application of the Best Worst Method (BWM) as a technique for multi-criteria decision-making (MCDM). According to the BWM approach, the decision-maker initially identifies the best (e.g., most favourable, most significant) and worst (e.g., least favourable, least significant) criteria. Subsequently, pairwise comparisons are conducted between each of these two criteria (best and worst) and the remaining criteria. This process leads to the formulation and resolution of a max/min problem, which determines the weights assigned to various criteria. Similarly, the weights of alternative options in relation to different criteria are determined using the same procedure. The ultimate scores of the alternatives are calculated by aggregating the weights derived from different sets of criteria and alternatives. Based on these scores, the optimal alternative is selected. To ensure the reliability of the comparisons made, a consistency ratio is employed. Ahmad et al (2020a) asserts that in comparison to alternative multi-criteria decision-making (MCDM) techniques like decision-making trial and evaluation laboratory (DEMATEL), analytic network process (ANP), and analytic hierarchy process (AHP), this method is viewed as more appropriate. Existing literature underscores that numerous MCDM methods, predominantly rely on matrix-driven comparisons. Conversely, the Best Worst Method (BWM) ensures robust and consistent comparisons by utilizing vector-based

comparisons instead of matrices, requiring less data. As a result, the weights derived from BWM are considered more dependable in contrast to other MCDM methods.

To establish rankings for the factors, the pilot participants were requested to employ a scale ranging from 1 to 6 to indicate their preference for the most significant factor compared to the remaining factors. Additionally, they were tasked with identifying the least important factor among the others and comparing each factor against the least chosen one, as illustrated in the linear equation below:

$$\left. \begin{aligned} |Z_B - Z_j \cdot a_{Bj}| &\leq \xi, \text{ for all } j \\ |Z_j - Z_W \cdot a_{jW}| &\leq \xi, \text{ for all } j \\ \sum_j Z_j &= 1 \\ Z_j &\geq 0 \text{ for all } j \end{aligned} \right\} \text{Equation 1: BWM summation}$$

In this context, where ξ symbolizes the consistency ratio, Z_j , Z_W , and Z_B indicate the weights of the j th, worst, and best factors, and a_{Bj} and a_{jW} stand for the others-to-worst and best-to-others determinants, a formulation is derived and computed to determine the optimal weight for each factor.

Findings and Discussion

The results are structured into two parts which are focused on the objective of the study; (i). to identify the challenges faced by the Nigerian Textile and Apparel industry within the context of BIS.

CHALLENGES FACED BY THE NIGERIAN TEXTILE AND APPAREL INDUSTRY WITHIN THE CONTEXT OF BIS

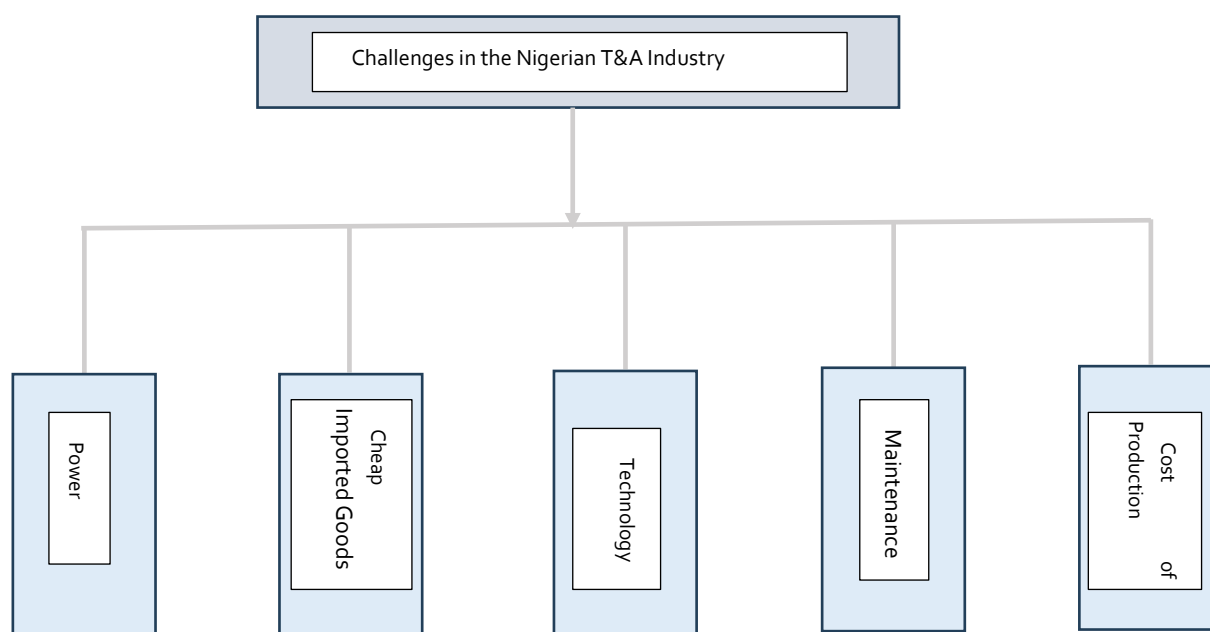


Figure 16 - Challenges in the Nigerian T&A Industry

As illustrated in Figure 6, five main challenges emerged in the Nigerian Textile and Apparel (T&A) industry: Power, Cheap Imported Goods, Technology, Maintenance, and Cost of Production. Figure 6 presents a visual hierarchy of these challenges based on thematic analysis of participant interviews, highlighting the broad categories under which specific operational difficulties were grouped. Each challenge reflects a key barrier affecting the industry's performance and its capacity to adopt Business Information Systems (BIS).” These findings elucidate the challenges faced in the Nigerian Textile and Apparel industry. The result aligns with (Fink et al 2017).

Power

Power supply remains a substantial obstacle to industrial progress in Nigeria, and its impact on the adoption of BIS in the textile sector is particularly severe. All participants identified unreliable electricity as a persistent challenge that inflates operational costs and undermines efficiency. This aligns with prior findings that link power instability to reduced industrial performance (Gado & Nmadu, 2012; Renne, 2019; Bailey, 2023).

One participant noted, “Fuel price is now over #1000/litre and that’s a big deal because power has been a big issue in Nigeria” (CP₁), pointing to how rising fuel prices aggravate the cost of managing electricity gaps. CP₃ elaborated further, stating, “No power for continuous manufacturing for those into volume production, and fuel (PMS) is on the high side, so most of the profit is being used to fuel generators.” This reflects how the inconsistent power supply creates dual burdens: frequent production interruptions and excessive spending on fuel-powered alternatives.

These issues have direct consequences for BIS adoption. BIS requires stable power to support system uptime, data processing, and integration across departments. When companies must divert revenue to cope with electricity challenges, investments in digital transformation are deprioritized—slowing progress toward data-driven operations. This finding aligns with Omar et al. (2019) and Bailey (2023), who also identify power instability as a limiting factor in BIS and technology adoption in developing contexts.

In contrast, textile industries in countries with stable infrastructure have leveraged BIS to enhance supply chain responsiveness and customer insights. The disparity underscores the urgent need for policy reforms and infrastructure investments in Nigeria. Public-private partnerships could be explored to develop decentralized energy solutions such as solar-powered hubs for textile clusters. Additionally, energy subsidies or loan schemes targeting BIS-related upgrades could ease the financial burden for businesses looking to modernize. Without such targeted interventions, the Nigerian textile industry may continue to struggle with both operational inefficiencies and digital stagnation.

Cheap Imported Goods

The influx of low-cost imported textiles poses a substantial threat to the Nigerian textile industry, eroding market share and undermining the viability of local producers. This challenge, consistently highlighted by participants, mirrors broader concerns in the literature regarding cost disparities between local and foreign manufacturers. For example, Muhammad et al. (2018) emphasize how countries with lower production costs often due to government subsidies, economies of scale, or relaxed labor regulations flood global markets with cheaper goods, making it difficult for domestic industries in developing countries to compete.

Participants in this study confirmed these concerns with tangible examples. One respondent lamented, "There are lots of importation of 'Adire' (Tye & Dye) clothing from China, and it's affecting sales. It comes cheaper, and Nigerians prefer cheap stuff" (CP5). This reflects how consumer purchasing decisions are often price-sensitive, resulting in a preference for imported textiles over locally produced ones. CP7 expressed similar frustration, noting, "Even our locally produced indigenous fabric (Aso Oke) is now being produced from China," while CP1 added that, "Lace and Ankara fabrics, most people prefer to import them." These statements underscore the growing consumer shift toward foreign alternatives, even for culturally significant fabrics.

In addition to affecting demand, the dominance of imports disrupts the local supply chain. As CP5 explained, "Most of the materials we use in weaving are also outsourced from outside the country." This dependency not only increases production costs but also exposes local businesses to global supply chain vulnerabilities. Bawalla and Adenuga (2017) argue that this trend weakens industrial resilience and calls for urgent measures to revive local competitiveness.

The implications extend beyond economics. The proliferation of foreign-produced versions of traditional Nigerian textiles may lead to the loss of cultural authenticity and artisanal

knowledge. Comparatively, in countries like India and Bangladesh, policies have been implemented to protect traditional textiles through subsidies, geographical indication (GI) tagging, and export support for local brands. Nigeria could adopt similar strategies.

To mitigate these challenges, several interventions should be considered. First, government policy could prioritize the imposition of tariffs or quotas on cheap textile imports to protect domestic producers. Second, investment in modernizing production processes, improving quality standards, and fostering design innovation would help make local products more competitive. Third, public-private partnerships could fund local textile clusters, providing technical training, access to raw materials, and marketing support. Lastly, national campaigns to encourage consumers to “buy Nigerian” could help shift consumer preference toward local goods.

Maintenance

Effective machinery maintenance is crucial for sustaining the operations of the textile industry. However, inadequate maintenance practices have led to significant disruptions and downtime, as revealed by this research. Outdated machinery and poor maintenance hinder production efficiency. One participant illustrated this issue, stating, “Outdated equipment and lack of proper maintenance have led to frequent breakdowns of our machinery and a subsequent decrease in overall productivity, significantly hindering the company's growth” (CP2). This comment emphasizes how regular and appropriate maintenance is essential for fostering growth in the sector.

To address the maintenance challenges, efforts should focus on modernizing machinery, implementing regular maintenance schedules, and providing training for personnel. While CP2 highlights the consequences of neglecting maintenance, this indicates the potential for improvement through strategic maintenance practices. By investing in these areas, the industry can enhance productivity and minimize disruptions.

Cost of Production

The cost of production in the Nigerian textile industry encompasses various factors that significantly impact operations. One participant noted, “Energy expenses, raw material costs, and labour wages are taking a lot from us, especially as we’re not making significant sales in the market” (CP7). This statement highlights how rising costs in these areas can strain financial resources, particularly in an environment where sales are insufficient to offset these expenses.

Another participant emphasized that “the cost of production is now particularly burdensome due to fluctuating currency values” (CP6). This comment reflects how economic instability can exacerbate production costs, making it more challenging for businesses to manage their budgets effectively.

Together, these findings reveal the fundamental challenges facing the Nigerian textile industry, which impede developmental growth and digitalization efforts. The rising costs

not only affect profitability but also have implications for the integration of Business Information Systems (BIS) into the industry's value chain processes. Addressing these cost-related challenges is crucial for enhancing competitiveness and fostering innovation in the sector.

Technology

Technology emerged as one of the most pressing challenges for stakeholders in the Nigerian textile industry. Participants identified technological backwardness ranging from outdated equipment to a lack of digital tools as a major barrier to competitiveness. This observation is consistent with Hamrol et al. (2018) findings, which emphasize the importance of retrofitting the digital process chain to enhance operational efficiency and innovation across manufacturing industries.

One participant articulated the industry's infrastructure challenges, stating, "A lot of our equipment is outdated and inadequate, talking about the hardware, software, and network capabilities" (CP6). This highlights how technological obsolescence undermines productivity and responsiveness. Another respondent echoed these concerns with a focus on design limitations: "We lack advanced technology to design some graphical designs sent to us" (CP4), demonstrating how the absence of modern design tools impedes product development and innovation.

Beyond hardware limitations, participants also expressed concern over the lack of integrated business tools. One noted, "We don't use all the right business tools to harness opportunities and compete with our competitors in other countries" (CP3). This broader reflection on the absence of digital strategies underscores the industry's vulnerability in global markets.

The consequences of these technological gaps are multifaceted. First, they hinder operational efficiency and increase production costs. Second, they limit the industry's ability to respond to market trends or personalize products a key demand in today's global textile economy. Third, they contribute to an innovation deficit, as companies lack the tools needed to explore new business models or creative designs.

Globally, textile industries are leveraging technologies like 3D printing, augmented reality, AI-driven forecasting, and smart manufacturing systems to gain a competitive edge. Ishaya and Folarin (2012), for instance, have called for the integration of such technologies in Nigeria to enhance design, customer engagement, and value chain transparency. Comparatively, countries like Turkey, Vietnam, and India have made deliberate efforts to modernize their textile sectors by investing in Industry 4.0 technologies, supported by government subsidies, tax incentives, and training initiatives.

To address this technology deficit, Nigeria's textile industry would benefit from a multi-pronged approach. Policy-wise, the government could establish innovation grants or technology upgrade funds to help small and medium textile enterprises acquire modern equipment. Training-wise, partnerships between technical institutions, universities, and textile associations could develop industry-specific programs focused on digital tools, CAD

design, and production automation. Public-private partnerships could also facilitate technology transfer agreements with countries that have advanced textile ecosystems, ensuring access to the latest machinery and software solutions.

Factors Affecting the Adoption of Business Intelligence Systems

The researcher identifies the factors within the T&A industry which affect the adoption of BIS. As illustrated in Figure 7, six key factors affecting the adoption of Business Intelligence Systems (BIS) in the Nigerian Textile and Apparel (T&A) industry were identified: Awareness, Lack of Data, Training, Lack of Technology Know-How, Cost of Implementation, and Compatibility. These sub-themes emerged from thematic analysis of participant interviews and represent the primary barriers influencing BIS adoption within the industry. Figure 7 presents a visual summary of these interconnected factors, illustrating how each contributes to the industry's limited uptake of BIS. Collectively, these findings highlight the complex interplay of knowledge gaps, infrastructural constraints, and financial limitations shaping BIS adoption in the Nigerian T&A sector.

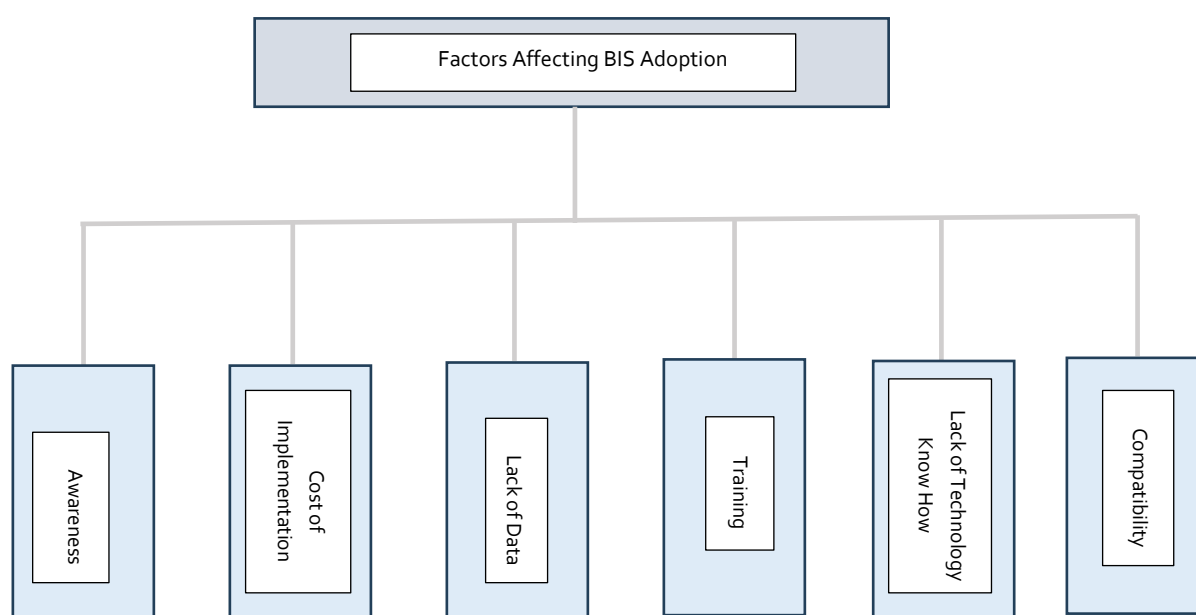


Figure 17 - Factors affecting the Adoption of Business Intelligence Systems

Awareness

Limited awareness among industry stakeholders, decision-makers, and employees about the capabilities and benefits of Business Information Systems (BIS) remains a major barrier to adoption in the Nigerian textile and apparel industry. Participant accounts illustrate this gap clearly: one noted that despite increased exposure of the Nigerian fashion scene, knowledge of BIS is still lacking (CP₃). Another was familiar with the concept but unsure how to leverage it effectively (CP₄), while a third, despite prior training, struggled to apply

it within their company's existing processes (CP2). These perspectives suggest that while some awareness exists, the practical understanding needed to implement BIS remains limited.

This challenge hinders the industry's ability to benefit from data-driven decision-making and process optimization, placing it at a disadvantage compared to more digitally mature sectors. To address this, practical interventions such as structured BIS training for stakeholders, targeted awareness campaigns within the sector, and government-backed support schemes are needed. Public-private partnerships can also play a key role in bridging the knowledge gap by offering industry-specific capacity-building programs. These actions would support a more informed, confident, and scalable approach to BIS adoption across the Nigerian textile industry.

Cost of Implementation

The findings reveal that the substantial financial investment required to adopt Business Information Systems (BIS) is a key obstacle for many firms in the Nigerian Textile and Apparel industry. Participants identified several cost-related challenges, including software acquisition, hardware installation, staff training, and ongoing maintenance. One participant (CP3) explained that accessing affordable loans, especially those with single-digit interest rates is extremely difficult. Higher interest loans, although more available, are often impractical due to the increased financial pressure they create. Another participant (CP5) emphasized not just the high upfront costs but also hidden and recurring expenses like system upgrades, technical support, and data storage. A third participant (CP7) noted the burden of training and retraining staff, which adds to the already high cost of implementation.

These perspectives reflect how cost considerations impact the industry's capacity to scale BIS adoption. While there is interest in leveraging BIS for competitive advantage, the absence of affordable financing options and the cumulative nature of BIS-related costs deter many firms from proceeding. This issue is especially acute for small and medium-sized enterprises, which operate under tighter budgets.

Addressing this barrier requires multi-level interventions. Stakeholders could benefit from industry specific funding schemes, including government-backed low-interest loans or grants targeted at digital transformation in manufacturing. Public-private partnerships may also support BIS implementation by subsidizing initial costs or offering shared digital infrastructure. Additionally, cost sharing initiatives or phased implementation strategies could help businesses adopt BIS incrementally, reducing financial strain and encouraging broader adoption across the industry.

Lack of Data

The Nigerian textile and apparel industry increasingly depends on data-driven insights to make informed decisions; however, research findings highlight significant limitations in data collection, storage, and quality assurance that hinder the successful adoption of

Business Information Systems (BIS). Participants described a reactive production approach, often manufacturing without clear market insights due to the absence of reliable data infrastructure. For instance, CP6 noted the lack of structured data storage, while CP1 and CP3 emphasized the absence of customer feedback systems, making it difficult to align production with market demand.

This stands in stark contrast to practices in more advanced economies, where BIS adoption is underpinned by robust data ecosystems. In countries such as China and Turkey, firms benefit from integrated data platforms that connect sales, production, and customer insights enabling real-time decision-making and operational efficiency. In comparison, Nigerian firms often lack even basic data integration, which significantly constrains BIS functionality.

Wang and Byrd (2019) argue that the quality, timeliness, and completeness of data directly affect BIS reliability and effectiveness. Without this foundation, BIS implementations are likely to deliver limited value, leading to suboptimal outcomes and reduced competitive advantage.

To scale BIS adoption, targeted interventions are necessary. Policymakers could support the development of industry-wide data standards and offer incentives for firms to invest in digital infrastructure. Training programmes, both technical and managerial, would help build capacity for data governance and BIS use. Moreover, public-private partnerships could facilitate pilot projects and resource sharing models particularly among SMEs to lower adoption barriers. These steps are crucial if the Nigerian textile and apparel sector is to transition towards more intelligent, data-driven operations.

Training

The successful adoption of BIS within the textile industry is closely linked to employee competence in using these systems effectively. Research findings reveal that a shortage of trained personnel is a major obstacle, resulting in underutilization of BIS and diminished organisational performance. For instance, CP6 suggested that while the Nigerian Export Promotion Council (NEPC) offers capacity-building initiatives, more targeted BIS-focused training would be highly beneficial. CP4 and CP2 also highlighted the general lack of BIS expertise, noting the need for intensive employee development to bridge the skills gap.

This challenge is not unique to Nigeria. In many developing economies, BIS implementation struggles due to limited technical expertise, whereas in countries with successful BIS integration, such as Germany or South Korea, employee training is embedded within broader digital transformation strategies. These countries often invest in long-term workforce development through vocational programmes and collaboration between government, academia, and industry.

In line with Wang and Byrd's (2019) assertion that user capability is critical to BIS effectiveness, improving employee proficiency will be pivotal for unlocking the full

potential of BIS. Without sufficient training, even the most advanced systems risk being underutilised, undermining efforts to modernise the textile industry.

Lack of Technology-Know-How (Expertise)

The complexity of BIS requires specialised skills in data analytics, systems operations, and digital process management. However, findings reveal a widespread shortage of personnel with the technical know-how to implement and sustain BIS in the Nigerian textile industry. Participants consistently pointed to this skills gap as a key factor slowing down BIS adoption. CP1 stressed the need for a technically proficient workforce, while CP3 highlighted a disconnect between job seekers and the expertise required for BIS-related roles. CP5 and CP4 both linked this deficiency to inadequate digital exposure in existing training pathways, noting that many professionals and aspiring workers lack foundational BIS knowledge. CP2 added that youth unemployment is compounded by this skills mismatch.

This challenge mirrors global findings, where successful BIS adoption is closely tied to a strong digital talent pool. For example, in advanced economies, structured technical education and public-private partnerships have been used to build pipelines of BIS ready professionals. In Nigeria, however, this kind of support remains limited. As Jaklič et al. (2018) observed, aligning BIS capabilities with organisational needs requires both technical readiness and cultural adaptation both of which are lacking when expertise is scarce.

To scale BIS adoption, the Nigerian textile sector must prioritise targeted interventions, such as national BIS focused training programs, technical certifications, and curriculum updates in vocational institutions. Policymakers and industry leaders could also collaborate with private technology providers to launch initiatives that upskill unemployed youth in digital tools relevant to the fashion and textile sectors. These steps would not only reduce the current expertise gap but also enhance the sector's ability to innovate and remain competitive in a global marketplace.

Compatibility

Integrating Business Intelligence Systems (BIS) into the Nigerian textile industry faces notable compatibility challenges, particularly regarding alignment with existing technologies and organizational culture. Participants highlighted that many firms still rely on manual processes, which complicates BIS implementation (CP7). Additionally, a shift in organizational mindset was deemed necessary by CP6, who emphasized that behavioural and attitudinal changes are required to support digital transformation.

This reflects Ahmad et al.'s (2020b) findings that seamless integration with current IT infrastructure is critical to avoiding disruptions during BIS adoption. Moreover, Jaklič et al. (2018) stress that cultural alignment is equally important, as resistance can emerge if BIS practices conflict with established workplace norms.

In contrast, industries in countries with high BIS maturity often invest in change management strategies and phased system rollouts to reduce friction. These approaches

supported by clear communication, training, and pilot testing help ensure smoother transitions. For the Nigerian context, similar practices could be introduced through structured implementation frameworks supported by industry bodies or government initiatives.

Strategic interventions, such as technical audits and readiness assessments, could help companies evaluate their compatibility before adoption. Additionally, fostering a digital culture through leadership engagement and employee involvement can ease the shift from manual to data-driven processes. These steps would improve the industry's capacity to scale BIS effectively, ensuring that both technological and cultural dimensions are addressed during integration.

Ranking the Factors According to Their Importance

The findings from the initial stage of research were utilized to identify key criteria for the second phase. In the second round of research, a total of six factors were considered for the factors affecting the adoption of BIS in the textile industry. Six key factors, labelled as F1 to F6 comprising Awareness, Cost of Implementation, Lack of Data, Training, Lack of Technology-Know-How (Expertise), and Compatibility, were identified in the findings as significant influencers in the adoption of BIS within the Textile and Apparel industry. The corresponding calculated weights for these factors are also presented in (Table 2). These analyses and weight values are based on the input and recommendations of the two pilot experts from the Textile and Apparel industry and academia.

	Factors	Weight	Rank
F1	Awareness	0.11	6
F2	Cost of Implementation	0.36	1
F3	Lack of Data	0.15	5
F4	Training	0.31	2
F5	Lack of Technology-Know-How (Expertise)	0.23	3
F6	Compatibility	0.21	4

Figure 18 - Key Factors influencing the Adoption of BIS with Weights and Rankings

The analysis of the results highlights that the cost of production is the most important factor, followed by training and the lack of technological expertise. On the other hand, compatibility, lack of data, and awareness are considered as comparatively less significant. Interestingly, there's a disparity between the opinions of the industry expert and academia compared to the views of the participants. While all participants emphasize the importance of awareness, industry expert and academia rank awareness as the least crucial factor. Instead, they consider the cost of implementation, particularly within existing systems, to be a major obstacle in the adoption of BIS in the Nigerian Textile and Apparel industry, as illustrated in (Figure 9).

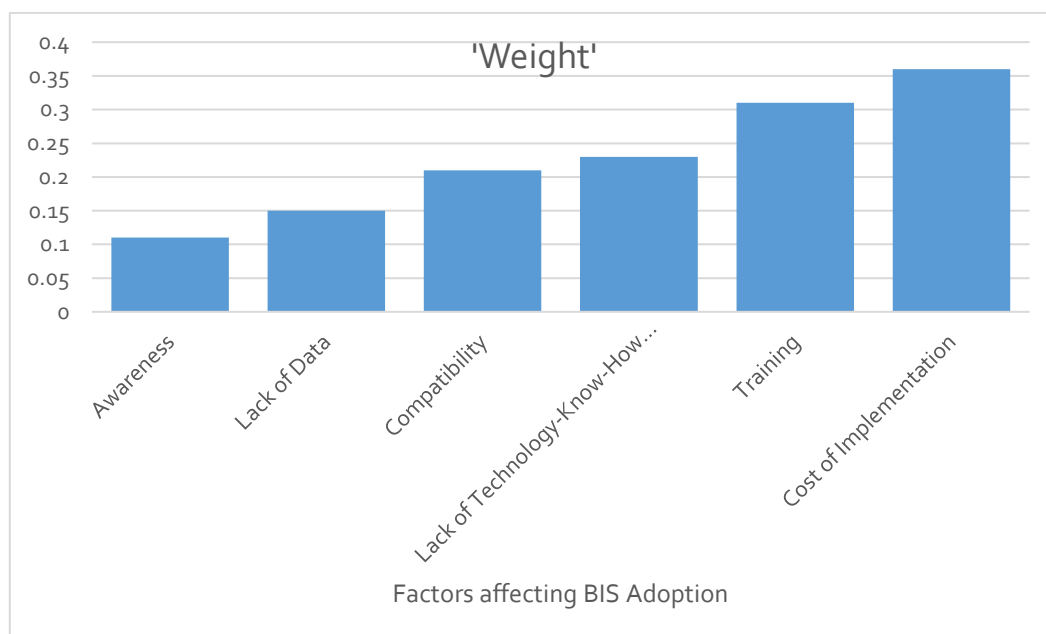


Figure 19 - Ranking the Factors according to weights

Conclusion

This study reveals critical insights into the challenges and BIS adoption factors in the Nigerian Textile and Apparel industry. Thematic analysis of in-depth interviews identified five major industry challenges: unreliable power supply, influx of cheap imported goods, outdated technology, poor maintenance culture, and high production costs. In relation to BIS adoption, six influencing factors were uncovered: cost of implementation, lack of awareness, insufficient data, limited training, lack of technical expertise, and system compatibility.

A key finding challenges the traditional conflation of BIS adoption with implementation. This research highlights that adoption decisions particularly in developing contexts like Nigeria are shaped by foundational factors that must be addressed before implementation can succeed. Using the Best Worst Method (BWM), we found that cost of implementation, training, and expertise were ranked as the most influential adoption barriers.

LIMITATIONS AND FUTURE WORK

As a small-scale exploratory study, the findings are based on a limited number of participants, which may affect generalizability. Future research should expand the sample size across different regions and organizational sizes to validate and deepen these findings. Further studies could also explore how BIS implementation influences operational efficiency, innovation, and competitiveness in the T&A sector, and examine additional BIS capabilities that support successful adoption.

Statements and Declarations

Ethical Considerations

Ethical approval was not required for this study, as it did not involve human participants, human data, or human tissue.

Consent to Participate

Not applicable.

Consent for Publication

Not applicable.

Declaration of Conflicting Interest

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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Data Availability

No datasets were generated or analyzed during the current study. All data supporting this research are derived from publicly available sources and properly cited within the manuscript.

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Appendix

Research Questions:

1. How do stakeholders in the Nigerian textile and apparel industry perceive the current state of Business Intelligence Systems (BIS) adoption?
2. What key challenges are currently confronting the Nigerian textile and apparel industry?
3. In what ways do these operational challenges hinder the adoption of BIS within the value chain processes of textile firms?
4. What industry-specific factors influence the adoption of BIS in the Nigerian textile and apparel sector?
5. How is BIS integration perceived in terms of enhancing competitiveness and developmental outcomes in the industry?
6. What potential benefits do industry experts associate with BIS adoption, particularly in decision-making, supply chain management, marketing, and overall organizational performance?

7. What is the perceived role of leadership support in the successful adoption of BIS, and how can it be fostered and maintained?
8. What best practices or strategic guidelines are recommended to facilitate effective BIS adoption and implementation in the Nigerian textile and apparel industry?