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SUPPLY CHAIN OPTIMIZATION AND PROFITABILITY OF LOGISTICS COMPANIES IN NIGERIA

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Abstract
This study examined the relationship between Supply Chain Optimization and Profitability of Logistics companies in Nigeria. A random sample of 375 respondents were drawn from selected registered 20 Logistics Companies across Nigeria, and administered copies of questionnaire. Data were analysed using the PLS-SEM. The findings revealed that a strong and significant positive relationship exist between Supply Chain Optimization evidenced by Supply Chain Integration (SCI), Environmental Management Practices (EMP) and Sustainable Supply Chain Strategy (SSCS) and Profitability of Logistics companies in Nigeria. In conclusion, investing in Supply Chain Integration (SCI), Environmental Management Practices (EMP) and Sustainable Supply Chain Strategy (SSCS) returns overwhelming profits to the Nigerian logistics companies. Thus, recommended that logistics companies in Nigeria should invest in technology solutions that will make information sharing and communication among suppliers, partners, and customers seamless. Logistics companies in Nigeria should ensure that business objectives would love the environmental, social, and economic impacts. Finally, logistics companies in Nigeria should conduct a complete analysis of Environmental Management Practices (EMP) options, choose eco-friendly methods, and emphasize sustainability measures during marketing campaigns to lower operational costs and enhance profitability.

Keywords: Supply Chain Optimization, Profitability, Performance, Environmental Management Practices, Sustainable Supply Chain Strategy, Supply Chin Integration, and Logistics.

Introduction

Logistic activities have been hampered by several infrastructural challenges in Nigeria. For instance, long delays, higher costs, and lower efficiency are invariably due to poor infrastructure – road conditions, and lack of ports. The creation of regulatory bottlenecks through bureaucracy and inconsistent policy frameworks leads to time-intensive processes, which result in additional costs and delays. Such threats include cargo theft, vandalism, and

even attacks on the cargo itself that need other protective measures. The breakdown in the supply chain with various stakeholders causes wastage of resources and high prices. A second major challenge facing the growth and competitiveness of logistics companies in Nigeria is the lack of well-trained personnel (Orji, Kusi-Sarpong, Gupta & Okwu, 2019, & Kuteyi & Winkler, 2022). Therefore, it is pertinent to note that supply chain optimization is an important aspect of the logistics industry in Nigeria as it tackles issues such as poor infrastructure penalizing bottlenecks and security concerns. It simplifies operations, minimizes the loss of resources, and improves cooperation between stakeholders. Advanced technology as well as data analytics allow identifying alternative ways, cutting down transit time and limiting costs. This automates compliance procedures, standardizes documentation, and adapts well to policy changes thereby reducing bureaucratic hurdles. It includes risk management strategies for security threats such as cargo theft and vandalism. It allows the stakeholders to work together and promotes transparency, accountability as well as synergy. Efficiency and lower pricing result from an improvement in inventory management, production scheduling, and distribution networks to reduce the wastage of resources (Olapoju, 2019).

Supply chain optimization is vital to logistics organizations in Nigeria because it increases profitability by reducing costs, generating additional revenue, and improving readiness. Through automation, eliminating wasteful processes as well as improving the effectiveness of resource utilization companies can lower operational costs and enhance profitability (Han., & Zhang, 2021). Furthermore, improved inventory management or alignment of lead time and product availability can also result in superior customer satisfaction facilitating effective order fulfilment to greater market responsiveness. In addition, proper inventory management, production planning, and distribution logistics can reduce throughput time on the one hand or increase facility utilization level and hence profitability (Marchi & Zanoni, 2017).

While different studies have shown that supply chain optimization results in profitability within the Nigerian context (Didia & Nwokah, 2015; Oyedijo, Adams & Koukpaki, 2021), the literature has failed to elucidate specific challenges or opportunities distinctive from other countries in how supply chain optimization enhances profitability. Previous literature presents general principles only but data on the consequences of supply chain optimization for logistics companies in Nigeria is insufficient.

Literature Review

Conceptual Review

Supply Chain Optimization

As per Damodaram, Reddy, Davanam & Thejasree (2022), a supply chain can be referred to as three or more organizations connected with money, products/services, and information that stream from the beginning level of production towards end-user consumption. Putting it in simple terms, the supply chain refers to a company's network or connection with its suppliers when they want to manufacture and distribute products or services (Kenton,

2021). Supply chain and operational optimisation boost a company's success and support its entrepreneurial spirit (Nair, 2022). In order to provide goods and services to clients at the lowest cost while maintaining the maximum profit margin for the company, supply chain optimisation is a broad supply chain challenge involving cost reduction and cost control (Damodaram et al., 2022). Supply chain optimisation, in the opinion of Ahmad and Kamruzzaman (2023), is a cutting-edge, practical tool that can improve performance right now and maintain the supply chain's position in the long run. Supply chain optimisation is the process of ensuring that sourcing, procurement, production, and distribution operate as efficiently as possible by the application of mathematical techniques (Damodaram et al., 2022). Given that every business has unique resources, opportunities, and constraints, supply chain optimisation aids businesses in making the best decisions. According to Encarnación (2020), a company's ability to optimise its supply chain procedures is essential to its success. In the commercially industrialised world, where different combinations of operational uncertainty and corresponding planning requirements frequently occur, a supply chain optimisation capability that could accommodate any prevailing conditions of operational uncertainty as well as that could accommodate any desired number of performance objectives would be of great interest (Cole, 2014). SCO is a crucial component of operations that comprises maximising inventory placement along the supply chain and minimising operational costs, which include costs associated with product distribution, production, and transportation (Kumar, Luthra, Mangla, & Kazançoğlu, 2022). A company's financial performance can benefit from supply chain management optimisation in addition to increasing operational efficiency (Khaeriyah, Mappisabbi & Iqbal, 2023).

Activities and process of supply chain includes planning, scheduling, executing, tracking, and adjusting. **Planning:** The planning component involves several elements such as demand forecasting, inventory control mechanisms and sourcing strategy among others besides network architecture global level of transportation. The principle to which the concept of predicting future demand for products via product utilisation such as competition analysis, market trends and historical data is known by a simple but clear name – Demand Forecasting. Using in a way to determine the ideal quantities, inventory management ensures that products are never out of stock and minimizes costs involved. The adoption of a supply strategy that is sustainable, affordable as well as ensures quality and dependability in terms ensuring proper identification of suitable suppliers. Deciding on the best location and quantity for warehouses, distribution centres, and production facilities is a crucial step in network design (Oláh, Lakner, Hollósi & Popp, 2017; Feizabadi, 2022 & Abusaq, 2023). **Scheduling:** Similar to planning, scheduling must cover all aspect of the supply chain, from distribution to procurement (Damodaram et al., 2022). It is impossible to overstate the importance of high-quality scheduling techniques in competitive production environments in today's market. Creating thorough plans for production tasks, allocating inventories, and planning order fulfilment according to client requirements, delivery windows, and available resources are all part of production scheduling. According to carrier availability, cost, and delivery specifications, shipments are scheduled for transportation (Waschneck,

Reichstaller, Belzner, Altenmüller, Bauernhansl, Knapp & Kyek, 2018). **Executing:** Effective production execution, maintaining quality control and safety procedures, accurate order fulfilment, timely goods transportation, transparent customer communication, and swift issue resolution are all part of the process (Okeagu, Reed, Sun, Colontonio, Rezayev, Ghaffar & Kaye, 2021). **Tracking:** Essentially, tracking is about measuring performance. Due to the supply chain's dynamic nature, optimisation models and data monitoring are required for continuous improvement (Dev, Shankar, Gupta & Dong, 2019). Order tracking gives customers access to information and updates, while inventory tracking enables real-time monitoring of inventory levels, orders, and shipments. Performance indicators that show areas for improvement include lead times, inventory turnover, transportation costs, and on-time delivery (Musana, Okello & Basaza-Ejiri, 2020). **Adjusting:** Throughout the supply chain management process, plans are modified in response to variations in demand in order to avoid stockouts and needless inventory accumulation. It also entails swiftly identifying substitutes in the event of supply chain disruptions caused by problems with suppliers or delayed transit. Data analysis, opportunity identification, process optimisation, and the adoption of new technologies are all components of performance improvement (Dubey, Bryde, Dwivedi, Graham, Foropon & Papadopoulos, 2023).

Supply Chain Integration: The planning, coordinating, and controlling of the raw material acquisition, production process, distribution of goods, and customer delivery are all intimately tied to supply chain integration (SCI) (Johono & Siagian, 2022). SCI is defined as the actual movement of materials and goods throughout a supply chain, as well as the flow of money and information, according to Wong, Sinnandavar & Soh, (2021). The intentional linking of supply chain participants to exchange important data about the market, goods, clients, and new markets in order to make informed strategic choices (Tian, Otchere, Coffie, Mensah & Baku, 2021). The degree to which a business strategically collaborates with its supply chain partners and manages both internal and external processes to facilitate the efficient and effective flow of information, money, goods, decisions, and services with the goal of giving its clients the best possible experience (Abdallah, Alfar & Alhyari, 2021). Qi, Huo, Wang & Yeung (2017) define an integrated supply chain as cooperative activities between manufacturers, retailers, wholesalers, suppliers, and service providers that help transform raw materials into high-quality final goods and customer-focused services. Based on the aforementioned reasoning, supply chain integration could help achieve the benefits of an interaction link between the SC and the operational OP (Basel, Hamzeh, Allahham, & Jameel, 2022). Supply chain integration capabilities were defined by Cousins, Lawson, Petersen & Fugate (2019) as a collection of supply chain management (SCM) skills, knowledge, and competencies that are occasionally developed through intricate interactions, both within the organisation and with its network partners. These interactions allow the organisation to accommodate SCM activities and allocate resources towards mutually-achieved goals.

An effective management of materials, services, information, money, and decisions can be achieved through a coordinated collaboration between the various functions within the

organisation and its external partners, suppliers, and customers (Kotzab, Bäumler, & Gerken, 2023). Intra-departmental and inter-organizational integration facilitates the efficient movement of information and resources, such as medical supplies, to ensure quality rapidly in an uncertain and dynamic environment like healthcare (Liu & Lee, 2018). Supply chain integration can be defined as the extent to which an organisation uses coordinated planning, information integration, operational coordination, and strategic alliances with supply chain partners to cooperatively manage both intra- and interorganizational activities (Kotzab et al., 2023). Joint planning, departmental cooperation, and information sharing via computerised systems are examples of activities that promote internal integration and improve performance by guaranteeing that the business can provide customers with goods and services on time (Pakurár, Haddad, Popp, Khan, & Oláh, 2019). In order to transport goods, services, and information from suppliers to ultimate customers and to raise the added value of those goods, services, and information, Haiyun, Zhixiong, Yüksel, & Dinçer (2021) claim that integrating supply chain management is a crucial business activity. According to Waschneck, Reichstaller, Belzner, Altenmüller, Bauernhansl, Knapp, & Kyek (2018), performance encompasses all of the organizationally carried out operational and strategic activity outputs. Improved supply chain performance, which results in lower costs, more agility, more dependability, improved responsiveness, and higher profitability, has been connected to effective supply chain integration (SCI). Cost reductions are the outcome of improved demand forecasting, optimised inventories, and streamlined procedures. By reducing interruptions, collaborative planning guarantees on-time delivery. Faster service fulfilment and product customisation are made possible by close customer integration. Higher profitability is the outcome of these advancements taken together for all chain participants (Munir, Jajja, Chatha, & Farooq, 2020).

Environmental Management Practices: Environmental practices that fall between the strategic and operation levels and take into account both internal and external factors are known as tactical level environmental practices. Businesses face both internal and external obstacles when attempting to implement and solve their environmental challenges through the use of EMPs. Nonetheless, the primary factor impeding development at first is internal hurdles (Amer, Ismail, Jani, Othman, & Ibrahim, 2022). Idris and Ibrahim (2022b) state that environmental management considers the diverse perspectives of governments, corporations, the public, and numerous other highly specialised players, in addition to regional and global disparities and synergies. According to Khdair and Jabbar (2022), environmental management is an essential strategy for managing problems with a country's ecology and provides a fundamental foundation for comprehending environmental repercussions. Organisations can reduce their environmental effect and run more sustainably by implementing environmental management practices, or EMPs. By reducing pollution, conserving resources, and preserving biodiversity, they seek to lessen their negative effects on the environment (Obamen, Omonona, Oni, Ohunyeye, 2021). In order to ensure compliance and prevent fines or penalties, environmental management techniques

also assist organisations in adhering to environmental laws and regulations. Additionally, they improve a company's image and reputation, since customers are becoming more interested in companies that practise environmental responsibility (Bravi, Santos, Pagano, & Murmura, 2020). In order to improve environmental performance, organisations can also benefit from environmental management practices' flexibility and support for organisational changes (Severo & De Guimarães, 2022). According to San Ong, Magsi, & Burgess (2019), integrating environmental issues into managerial and internal control processes can be achieved through the use of environmental management practices, which can enhance an organization's performance. Pollution avoidance, resource conservation, recycling and reuse, environmentally friendly product design, environmental impact assessments, and staff awareness and training are a few examples of environmental management practices. In line with Yasodara (2018), operational environmental practices refer to business operations based on environment management techniques. Lopez-Aparicio, Grythe, Thorne & Vogt, (2019) identify a variety of positive outcomes related to the adoption of environmental management practices, such as cost savings using conserving resources; improved compliance with regulations; increased brand reputation and image; along higher employee engagement and morale. By deploying EMPs, businesses can have the opportunity to reduce their environmental impact; improve environmental performance, and also attract customers

Sustainable Supply Chain Strategy: Businesses' entire sustainability performance is greatly influenced by their supply chains, and companies are realising more and more that they need to use cutting-edge strategies and tools to increase their resilience and eco-efficiency (Elf, Werner & Black, 2022). According to Salas-Navarro, Acevedo-Chedid, Caruso & Sankar (2018), a supply chain is a network of inputs, their conversion into completed goods, and the delivery of the goods to consumers; in other words, it is the connection and interdependence between the components of the product from its place of origin to its destination. According to Díaz, Municio and Delgado (2020), supply networks have considerable unpredictability, making them brittle links with breaking points where techniques to reduce risk can be devised. Sustainable supply chains focus on economic, social, and environmental aspects integration for long-term viability (Jarah, Jarrah, & Al-Zaqeba, 2022). As Fritz (2022) states, a sustainable supply chain strategy is an all-encompassing approach that embeds ethical and environmentally responsible practices throughout the entire lifecycle of a product beginning from acquiring raw materials to its final disposal as well as distribution. It takes a comprehensive strategy, taking into account factors including product lifetime, shipping, packaging, production, and sourcing. Supply chain strategy is the coordination of long-term strategic cooperation amongst decision-makers in the universal network for process development and product production, according to Jamshi and Ganeshkumar (2017). Fu, Abdul Rahman, Jiang, Abbas and Comite (2022) claim that Supply chain strategy gives businesses a competitive edge, helps them accomplish economical supply operations, enhances customer service, helps them minimise

waste, and guarantees that there is as little negative influence on the environment as possible. Thus, in order to achieve sustainable supply chains, Ababneh, Almarashdah, Jebril, Al-Zaqeba, & Assaf (2023) have emphasised the significance of sustainable methods such resource optimisation, reverse logistics, green procurement, and teamwork. Engaging suppliers, being transparent, working together, and integrating technology are all important tactics for putting a sustainable strategy into practice. In order to track progress and identify areas for improvement, suppliers should be encouraged to adopt sustainable practices. Transparency should also be implemented across the supply chain (Alzoubi, Ahmed, Al-Gasaymeh & Kurdi, 2020). Systemic change can also be pushed by cooperation with other businesses, trade associations, and non-governmental organisations. Sustainability parameters may be tracked and efficiency can be maximised with the use of technology solutions like supply chain management software and data analytics. Businesses can stay ahead of the curve and promote innovation in their processes and products by concentrating on these factors (Martínez-Peláez, Ochoa-Brust, Rivera, Félix, Ostos, Brito & Mena, 2023). After beginning to see the benefits of SCS, organisations in developing nations are incorporating it into their overall business strategy in an effort to increase stakeholder satisfaction and improve organisational performance (Adebanjo, The & Ahmed, 2017). Cost savings, enhanced brand recognition, regulatory compliance, and innovation in product design, materials, and processes are all advantages of implementing a sustainable approach (Okogwu, Agho, Adeyinka, Odulaja, Eyo-Udo, Daraojimba & Banso, 2023).

Profitability

The ability of a particular investment to generate a return on its use is the standard definition of profitability. The terms "profit" and "ability" combine to form the term profitability. There are several definitions for the term "profit," but one common one is the amount obtained by subtracting all costs from sales revenue. The ability of a business to turn a profit is reflected in the phrase (Toshniwal, 2016). A company's profitability is determined by how well it can turn a profit from the operational procedures that have been put in place to guarantee its survival in the long run (Manoppo & Arie, 2016). The following are some of the associated roles that profitability plays: a) as a gauge of how well a business performs in making money given or held in terms of capital. Both borrowed money and money that came from the business owner's fortune. b) As a periodic presenter of information about business profits that may be utilised to assess stakeholders (Caroline, Wicaksono, & Mangasi Sibuea, 2023). Profitable businesses add value, employ people, are typically more inventive and socially conscious, and they pay taxes that support the economy as a whole (Odusanya, Yinusa & Ilo, 2018). Profitability has an impact on the company's worth, which in turn encourages investors to respond favourably and raise stock prices, which in turn raises the company's perceived value (Yanti & Darmayanti, 2019). A key component of a company's financial reporting, profitability is a key indicator of its performance. It displays the company's potential to make money at a given rate of sales, asset level, and capital stock over a given time frame (Margaretha & Supartika, 2016).

Empirical Review

Relationship between Supply chain optimization and Profitability

Increased income, better customer service, increased agility, and chances for innovation can all result from optimisation. A corporation can get a competitive edge by having a simplified and economical supply chain. Finding the ideal balance between process and inventory optimisation is essential, though, since over-optimization can result in unneeded complexity or stockouts, which would offset any advantages (Errassafi, Abbar & Benabbou, 2019). Accordingly, businesses can increase their productivity and profitability by optimising supply chain management using a variety of strategies such information technology and vertical integration (Khaeriyah et al., 2023). Costs can be considerably decreased and customer service can be much enhanced by optimising supplier management, waste reduction, transportation efficiency, and inventory levels. This can be accomplished with the use of strategies like demand forecasting and just-in-time production (Grigiante, Mottes & Buratti, 2022). Transportation costs can also be decreased by selecting the most economical method of transportation, haggling for lower prices, and planning routes. Labour and material costs can be reduced by optimising quality control and streamlining procedures. Lower procurement expenses can result from developing excellent ties with suppliers (Kherbach & Mocan, 2016). According to Gupta, Mangal, Srivastava, Kumar, Gupta & Singh (2022), the use of modelling as an optimisation technique allows for the analysis and estimation of effective inventory management by hiding waste and maintaining a balanced stock level rather than a zero or excessive one.

Mwangi (2019) did a research study on the influence of supply chain optimization on the performance of manufacturing firms in Kenya. The research design used in the study was a cross-sectional survey using a descriptive methodology. The study's sample size of 222 supply chain managers from manufacturing enterprises in Nairobi, Kenya. These managers were chosen at random and stratified from a list of 499 supply chain managers from manufacturing firms in Nairobi. Data was gathered by the use of questionnaires. To analyse the data, the researcher employed regression analysis, correlation analysis, and descriptive analysis. The study's supply chain optimisation strategy was found to be a strong predictor of Kenyan manufacturing enterprises' performance. This showed that the success of Kenyan manufacturing companies is significantly positively correlated with inventory controls, supplier management, procurement cost optimisation, and supply chain automation. The study comes to the conclusion that supply chain optimisation is important for manufacturing companies' overall success.

Bwaliez (2023) examined the effects of supply chain integration and innovation dimensions on business performance of Jordanian Manufacturing Firms, Jordan. Explanatory research is what this study is classified as. This study used a simple-random selection technique to choose participants, and the sample size of 331 is appropriate for the population. For this study, a survey questionnaire is the best method of gathering data. The selected approach for analysing the gathered data was PLS-SEM. The findings for the SCI-innovation linkages showed that internal integration has a favourable impact on every aspect of innovation. But

all innovation dimensions—aside from process innovation—are positively impacted by supplier integration, and all innovation dimensions—aside from management innovation—are positively impacted by consumer integration. In summary, it is recommended that they develop enduring strategies for the integration of their internal departments and divisions, include their principal external clientele, and reevaluate their existing supplier ties.

Afrifa, Amoah, Fianko and Dzogbewu (2021) explored supply chain integration and operational performance in health institutions, Ghana. The research design used for this study was a quantitative descriptive survey. Both the basic random sample technique and the stratified sampling technique were applied. Two hundred and fifty-four (254) was the right sample size for a population of 750, according to the Kregcie and Morgan (1970) table. The instruments for gathering data were questionnaires. IBM AMOS was used to examine the collected data. Both supplier integration and operational performance have direct, positive interactions with each other as well as with internal integration. The association between operational performance and customer integration is not statistically significant. The study's conclusion urges Ghanaian healthcare facilities to implement the appropriate technology systems to improve customer integration by providing patients with access to a cutting-edge database.

Keles, Yayla, Tarinc and Keles (2023) studied the effect of environmental management practices and knowledge in strengthening responsible behaviour, Manavgat–Türkiye, Turkey. 403 hotel staff members from different hotels in the area were sampled for the survey using the stratified convenience sampling method. Questionnaires were used to help collect data. For data analysis, the acquired data were imported into the SPSS Statistics Base v23 application. The study's findings indicate that environmental management techniques are thought to be a significant factor in environmental knowledge, and that environmental knowledge has a favourable impact on the degree of responsible behaviour. Furthermore, it has been found that there is a stronger correlation between these characteristics and environmental commitment.

Iherobiem (2023) evaluated the effect of sustainable supply chain management on firm innovative performance of manufacturing firms in Nigeria. In this study, the survey design was descriptive. A deliberate sampling approach was used by the researcher to select study participants. The researcher considered 120 to be a manageable sample size. A questionnaire was used by the researcher to collect data for the investigation. Multiple regression, mean, standard deviation, and percentages were used in the study's analysis. According to the analysis, the innovative performance of manufacturing companies in Nigeria was positively impacted by sustainable supply chain management practices. This impact was found to be significant and positive across the economic, environmental, and social dimensions of sustainability. According to the study's findings, a company may maintain its profitability, inventiveness, and competitiveness by effectively integrating all of these sustainable strategies.

Theoretical Foundations

Resource-Based View (RBV) theory: The Resource-Based View (RBV) theory, which was proposed by Birger Wernerfelt in 1984 and further elaborated on by Jay Barney in 1991 argues that a firm's competitive advantage is primarily determined through its unique resource base. This theory is of particular importance while discussing supply chain optimization and logistics companies' profitability in Nigeria. RBV makes firm-specific resources such as technology, human capital, and relationships with suppliers and customers' one of the main issues. In Nigeria, there are certain problems every logistics company runs across and those issues occur due to infrastructure imperfection, regulatory bottlenecks as well threats. It is the RBV that allows identifying core competencies contributing to their competitive advantage, which act as a basis for strategic decisions and resource distribution by logistics companies. It also highlights the need for sustainable competitive advantages from resources that are valuable, rare, and not easy to imitate (Madhani, 2010). RBV allows researchers to evaluate the sustainability of supply chains and determine sources of long-term competitive advantage for logistics companies situated in Nigeria.

Methodology

A random sample of 375 respondents were drawn from selected registered 20 Logistics Companies across Nigeria, and administered questionnaire. However, only 359 out of the responses were obtained and considered valid for the analysis. Primary sources for the study include data obtained through research questionnaires, while, the secondary sources consist of information obtained from publications, journals, textbooks, bulletin boards, and the internet. For data analysis, PLS-SEM was utilised.

Hypotheses

The following research hypotheses were formulated and stated in a null form:

H_{O1} There is no significant correlation between Supply Chain Integration and Profitability of Logistics Companies in Nigeria.

H_{O2} There is no significant correlation between Environmental Management Practices and Profitability of Logistics Companies in Nigeria.

H_{O3} There is no significant correlation between Sustainable Supply Chain Strategy and Profitability of Logistics Companies in Nigeria.

Analyses

Supply Chain Optimization = SCO
Supply Chain Integration = SCI
Environmental Management Practices = EMP
Sustainable Supply Chain Strategy = SCS
Profitability = PFY

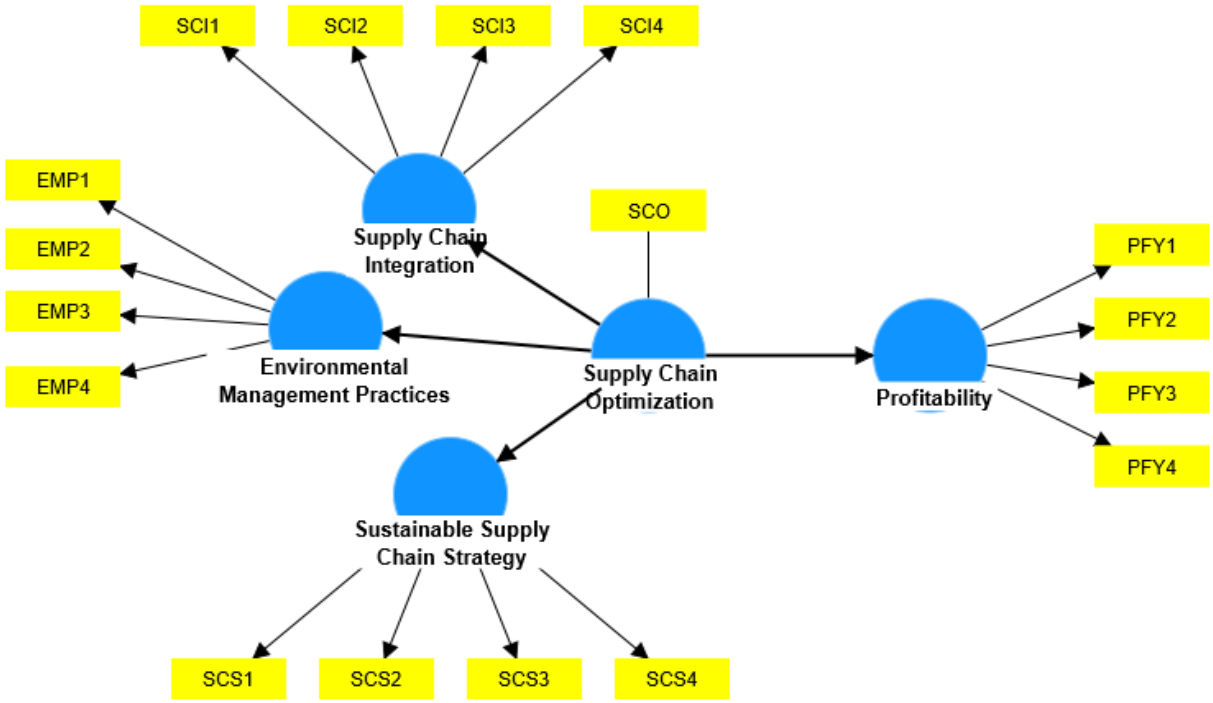

Figure 1: Research Model

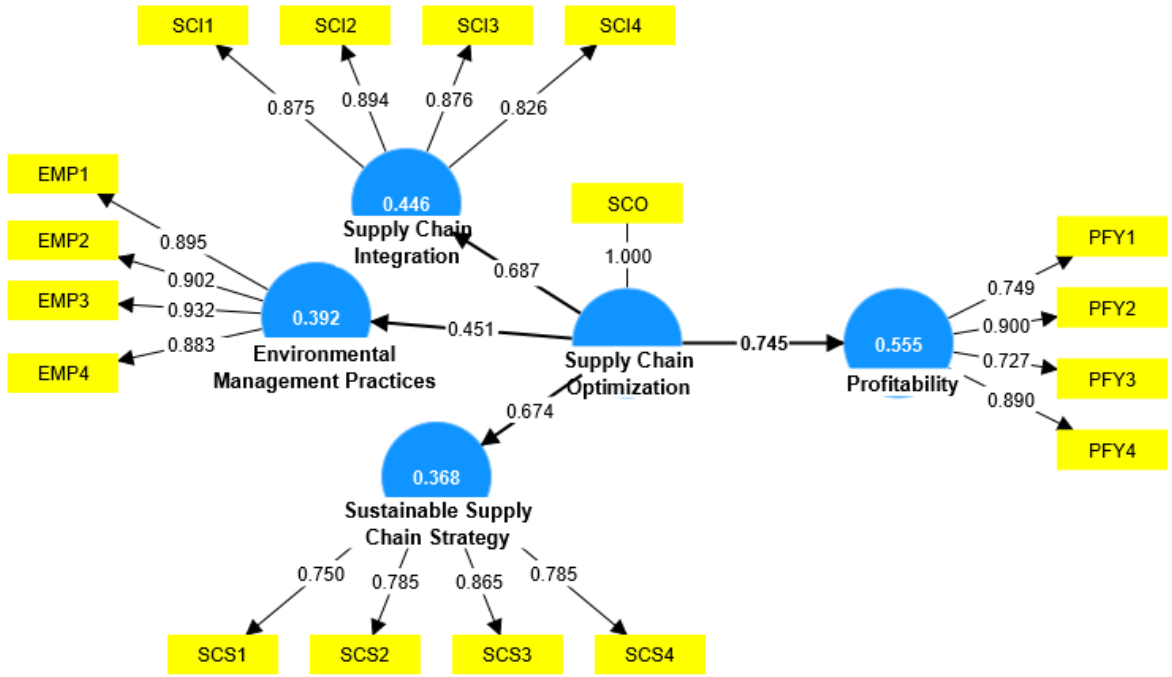

Figure 2: Output for Outer Loadings of Indicators

Figure 2 shows that all the response items for the constructs satisfied the threshold condition of 70%.

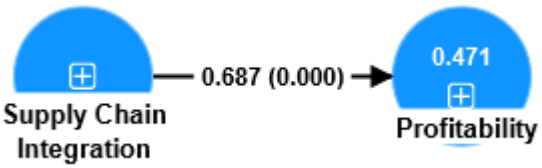

Figure 3: Hypotheses 1

The path relationship analysis presented in Figure 3 indicate that there are positive and significant paths between Supply Chain Integration and Profitability (where, β = 0.687; p = 0.000). Therefore, the null hypotheses one was rejected.

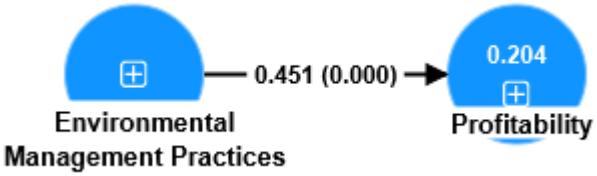

Figure 4: Hypotheses 2

The path relationship analysis presented in Figure 4 indicate that there are positive and significant paths between Environmental Management Practices and Profitability (where, β = 0.451; p = 0.000). Therefore, the null hypotheses two was rejected.

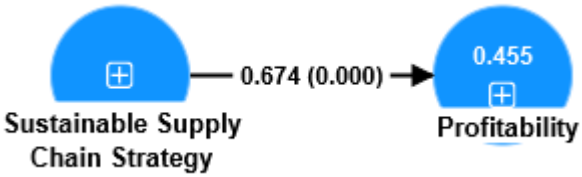

Figure 5: Hypotheses 3

The path relationship analysis presented in Figure 4 indicate that there are positive and significant paths between Sustainable Supply Chain Strategy and Profitability (where, β = 0.674; p = 0.000). Therefore, the null hypotheses three was rejected.

Table 1: Hypotheses Testing Result

Hypotheses	Path Coefficient (β)	P Values (p)	Decision
Ho_1	0.687 (Strong)	0.000 (Significant)	**Reject null hypothesis**
Ho_2	0.451 (Moderate)	0.000 (Significant)	**Reject null hypothesis**
Ho_3	0.674 (Strong)	0.000 (Significant)	**Reject null hypothesis**

Source: Research Output, 2024.

Discussions of Findings

There was a strong positive correlation between Supply Chain integration and profitability whereby the Path Coefficient (β) of=0.687 showed a high impact. The P-value of <0.001 (Significant) confirms the evidence for legitimacy between SCI and profitability; it illustrates

that enhancing levels of reliance on Supply Chain Integration practices may result in high profit increments among business practitioners in the field. The analysis of the data shows that logistics companies in Nigeria, with high levels of congruence between Supply Chain Integration (SCI), register better than those that value lower integration. This has resulted from improved efficiency, better visibility, and planning suppliers' relations becoming stronger as well in the long run producing a lethargic supply chain running through customer satisfaction. Integrated Supply Chains are characterized by improved data sharing, multi-party alliances, and integration of suppliers' screens or links into business processes; this leads to increased delivery speed with reduced inventory costs better allocation of resources along the value chain, and lower risks. It also increases visibility that helps envisions planning, forecasting as well as decision-making. It also enhances supplier partnerships, promoting cooperative problem-resolving and dependable material stream important because this leads to better-negotiated earns but more importantly greatly reduced supply disruption. In the long term, integrated systems result in customer retention and potential price premiums (Power, Sohal & Rahman, 2001; Baah, Opoku Agyeman, Acquah, Agyabeng-Mensah, Afum, Issau, & Faibil, 2022).

This study observed a moderate positive relationship between Environmental Management Practices (EMP) and performance; this is underscored by the path Coefficient, which indicates the magnitude of impact at 0.451. Nevertheless, the magnitude of the effect is less than that observed in previous analysis on Supply Chain Integration. With a P-value of 0.00 (Significant), the evidence for some correlation is even further reinforced. The more competitive logistics companies from Nigeria are those that have better Environmental Management Practices (EMP) than those that do not shine so brightly in these spheres. EMP that encompasses practices such as fuel efficiency and waste minimization allow lower operational costs and compliance with environmental requirements. It also improves brand image and reputation because eco-minded customers appreciate environmental consciousness. Deployment of the EMP can promote process optimization and resource conservancy; as such, cost reduction is attained while efficiencies increase. Second, organizations with heightened Environmental Management Practices (EMP) can avail of green finance and incentives which could be in the form of loans grants, or tax rebates offered to them by financial institutions as well as governments (Orji et al., 2019).

The Random coefficient model revealed the strong positive relationship between Sustainable Supply Chain Strategy (SSCS) and Profitability, where Sustainable Supply Chain Strategy grew on average by 0.674 units for a unit increase in profitability to take control of general product reorganizations or explains The extensive correlation among Quickening wire framework technique procurement had been found with sum disturbance adjustable rate also the association observed is similarly strong to that reported on SCI in HO3. The findings further show that Nigerian logistics firms with an established and implemented Supply Chain Strategy (SSCS) earn more profits than those without such a strategy. This is because of the amalgamation into one system owing to both Supply Chain Integration (SCI) and Environmental, Social, and Economic aspects leading to better

efficiency cost saving brand name improvement as well as financial benefits (El Baz, Laguir & Stekelorum, 2019; Oyedijo, Adams & Koukpaki, 2021). Furthermore, the introduction of innovative and green policies can help to differentiate companies thus providing an upper hand in terms of competition advantage alongside increased client loyalty.

Conclusions

Supply Chain Integration is critically valued in logistics companies and the study established a pronounced positive relationship between SCI and profitability among Nigerian logistic enterprises. At the same time, businesses with stronger SCI tend to be performing better because of increased efficiency and visibility; they have more stable supplier relations for quicker delivery speeds resulting in reduced inventory costs which lead them further toward improved allocation of resources as well greater risks saved. As part of SCI, higher level data sharing takes place followed by the formation of multidimensional partnerships and emphasis on collaborative problem solving leading to customer satisfaction that may result not only in price premium but also a competitive advantage. Environmental Management Practices (EMP) are positively but mildly associated with profitability in the Nigerian logistics sector. Operation cost reduction, building the reputation and image of the brand towards publicity inflating land resources saving land across are some benefits. The adoption of EMP involves incurring costs upon initial investment concerning technology, trained personnel, and infrastructure. It can be considered that Sustainable Supply Chain Strategy (SSCS) has a high positive correlation to profitability, in other words; bringing together the advantages of both SCI and EMP. SSCS ensures higher efficiency, cost reductions of lacks and millions annually; gives additional brand image is gained access to financial benefits such as financing terms change, etc., proposition for acquisition: can give unique innovation ground and allows differentiation via green practices. This may create competitive advantages, customer loyalty as well as long-term economic sustainability. Concurrently investing both in Supply Chain Integration (SCI) and Sustainable Supply Chain Strategy (SSCS) returns overwhelming profits to the Nigerian logistics companies. Depending on individual needs and resources, companies should accordingly prioritize investments in these sectors.

Recommendations

The following recommendations were made:

i. Logistics companies in Nigeria should invest in technology solutions that will make sharing and communication among suppliers, partners, and customers seamless. Promote open communications with strategic suppliers and partners, implement standard processes and data formats, as well as define Key Performance Indicators (KPIs) for Supply Chain Integration (SCI). Firstly, implementation must begin with a pilot program; Secondly, they need to provide employees with training, and the cooperation of technology providers is required as well. Relationships can be improved after regular performance reviews and goal setting.

ii. Logistics Companies in Nigeria should make sure that business objectives would love the environmental social, and economic impacts. Specify targets for fuel efficiency, waste reduction, and sustainable sourcing. Embraced technologies such as electric vehicles and renewable sources of energy. Work with NGOs and institutions. Adopt a sustainability audit, involve stakeholders, and incorporate them into procurement strategy operations and marketing decisions. Get certifications of sustainability standards to improve the image of the organization and gain green funds.

iii. Logistics Companies in Nigeria should conduct a complete analysis of Environmental Management Practices (EMP) options, choose eco-friendly methods, and emphasize sustainability measures during marketing campaigns to lower operational costs. Investigate financial benefits arising out of government programs that finance sustainable companies. Conduct low-cost, high-impact Environmental Management Practices (EMP) programs, and employee training events, participate in green industry networks, and often re-evaluate the cost-benefit analysis of all aforementioned. This will ensure that eco-conscious customers are attracted and the brands stands out from its competitors.

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