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The Impact of Road Transport on Supply Chain Effectiveness in Nigeria's Cement Industry

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ABSTRACT

Purpose: This study evaluates the impact of road transportation on supply chain effectiveness in Nigeria's cement industry.

Methodology: A quantitative survey design was adopted. Purposive sampling was used to select respondents based on their knowledge and experience. Data were collected using structured questionnaires and analysed using SPSS with descriptive statistics.

Findings: The study reveals that poor road infrastructure, transport policies and regulations, road congestion in Lagos, and supplier reputation are the major factors affecting road transport effectiveness in cement supply chain operations. Other key factors include transport coverage, vehicle condition, shipment tracking technologies, and reliability of logistics processes.

Contribution: The study shows that while road transport remains essential to cement supply chain performance, operational efficiency depends strongly on timely delivery, order fulfilment, inventory control, and system reliability. It recommends improvements in delivery speed, e-procurement adoption, outsourcing of logistics services, strategic planning, supplier expansion, and the use of external expertise to address emerging supply chain challenges.

Keywords: *Cement, Road Transport, Logistics, Operations, Supply Chain.*

INTRODUCTION

Cement is a key construction material produced through an energy-intensive process involving limestone, clay, and iron, and it remains essential for global infrastructure development. Nigeria has abundant mineral resources that support economic growth, while rapid urbanization and population growth continue to drive cement demand across Africa (Aigbedion and Iyayi, 2007; Zengeni and Mondliwa, 2015). Major producers such as Dangote Cement and Lafarge WAPCO dominate the market, highlighting the industry's strategic importance.

Supply chain management (SCM) in the cement industry involves coordinating procurement, production, and distribution to ensure efficient product flow to consumers (Shukla and Sharma, 2015). Due to high freight intensity and consumption levels, effective SCM is critical for competitiveness and performance. However, reliance on road transport increases distribution costs, especially over long distances and under poor infrastructure conditions. Plant location also significantly affects logistics costs and pricing structures.

Problem Statement

Cement consumption is largely dependent on efficient production and distribution systems (Ward and Kynvin, 2015). However, supply chain inefficiencies such as poor coordination, weak integration, and limited workforce capacity reduce effectiveness in developing economies. High costs, network complexity, and communication gaps further constrain performance, alongside limited technological adoption and weak institutional trust. In Nigeria, transportation costs are significantly influenced by poor road infrastructure, which increases the final price of cement. Road deficiencies, combined with uneven demand and supply conditions, hinder efficient distribution. Infrastructure investment is required to reduce logistics costs, with transport expenses strongly affected by road quality, distance, and travel time (Ali et al., 2015).

Research Objectives

This study focuses on road transportation and examines constraints affecting cement distribution in Nigeria. Specifically, it aims to:

1. Identify key factors influencing road transportation effectiveness in supply chain logistics.
2. Examine constraints affecting timely cement delivery within Lagos.
3. Assess cost implications of road-based cement transportation.
4. Evaluate the impact of market forces on supply chain effectiveness.

LITERATURE REVIEW

Transportation drives socio-economic development, supports productivity, market access, and competitiveness. It enables the movement of goods, services, and information, ensuring operational continuity and customer satisfaction. However, transport systems are increasingly affected by economic instability, fuel price volatility, regulatory weaknesses, technological

change, and labour constraints, all of which raise operational costs and complexity within supply chains (Corcoran and Gillanders, 2015). Transport mode selection is therefore influenced by cost, service quality, and market proximity. Rising competition and shorter delivery cycles have intensified the need for speed and reliability, strengthening just-in-time systems (Zhang *et al*, 2015). At the same time, rising logistics costs have encouraged firms to adopt local sourcing and demand-driven strategies to improve efficiency and stability.

Supply Chain Management

Supply chain management integrates sourcing, production, logistics, and distribution while emphasising coordination among partners. It improves competitiveness through cost reduction, efficiency, and better resource utilisation. It also relies on collaboration, information sharing, and analytical tools such as ABC analysis and SCOR models to enhance performance. Logistics focuses on physical movement, while SCM covers broader coordination across the value chain. Effective SCM enables firms to design flexible systems that enhance productivity and long-term competitiveness (Aniki et al., 2014).

Supply Chain Network Design

Supply chain network design involves structuring physical and information systems that support operations. Increasing supplier networks require advanced technologies such as ERP systems and SCM platforms to improve forecasting, inventory control, and efficiency. SCND decisions include facility location, supplier selection, routing, and inventory placement. Globalisation and technological advancement have driven firms to redesign supply chains for greater flexibility and resilience, with performance dependent on suppliers, manufacturers, and transport systems (Nagurney et al., 2015).

Cement Supply Chain

The cement supply chain consists of suppliers, manufacturers, distributors, retailers, and end users. Suppliers provide raw materials, manufacturers produce cement, while distributors and retailers ensure market access (Noche and Elhasia, 2013). This multi-tier structure increases complexity and exposes the system to vulnerabilities, particularly in transportation and distribution.

Demand and Supply Management

Market demand and supply determine pricing, though real markets often deviate from perfect competition. Firms use forecasting tools to align production with demand and improve customer satisfaction. Nigeria's cement market is characterised by high demand but constrained supply due to inefficiencies, energy costs, and infrastructure challenges. Despite increased production capacity, affordability remains limited by low purchasing power (KPMG, 2015).

Factors Affecting Demand and Supply of Cement

Cement prices are influenced by structural inefficiencies, cost disparities, and market distortions. Key drivers include urbanisation, rising demand, and high energy consumption.

Energy costs account for a large share of production expenses, while power shortages force reliance on expensive alternatives. High capital requirements, taxation, and limited use of alternative materials further increase costs. Although prices have occasionally declined due to capacity expansion, affordability remains constrained and weak regulation limits long-term stability.

Supply Chain Risk Management

Supply chains face risks from demand fluctuations, unreliable suppliers, and external disruptions such as socio-economic, legal, and political instability. Globalisation increases exposure to these risks, affecting cost and service performance. Complexity arises from multiple suppliers, stages, and geographical dispersion, increasing vulnerability to disruptions. Managing supply chains as adaptive systems improves responsiveness to risks.

Supply Chain Complexity:

Supply chain complexity refers to horizontal, vertical, and spatial dimensions, all increasing exposure to disruption (Rienkhemaniyom and Pazhani, 2015). Overreliance on foreign suppliers and single sourcing weakens resilience. Viewing supply chains as adaptive systems supports flexible planning under uncertainty.

Supply Chain Vulnerabilities

As firms expand, exposure to vulnerabilities increases. Weak risk assessment systems increase disruption risks (Szymczak, 2015). Improving resilience requires supplier compliance, monitoring, and collaboration. Transportation systems are particularly vulnerable as disruptions can halt order fulfilment (Schuh et al., 2015).

Supply Chain Responsiveness

Responsiveness refers to the ability to react quickly to demand changes (Christopher, 2013). It requires reduced lead times and real-time logistics coordination. Outsourcing is often used to enhance responsiveness. Key indicators include delivery cycle time and shipping efficiency, while reliability is measured through perfect order fulfilment. Lean and agile practices improve efficiency and flexibility.

Outbound Transport Management

Outbound transport involves moving finished goods to customers and distributors. It supports market access but is especially critical in cement due to its bulky nature. Transport mode and route selection strongly influence cost and efficiency.

Road Transportation

Road transport dominates freight movement but is constrained by poor infrastructure, congestion, and maintenance issues. These challenges increase logistics costs and reduce efficiency. Infrastructure investment improves market access and economic development.

Route Planning and Selection

Efficient route planning reduces costs, delays, and risks. Cement transportation requires consideration of road conditions and vehicle limitations. Urban congestion significantly increases travel time and operational risks. Route selection depends on road quality, regulations, and traffic conditions. Advanced routing models improve efficiency, while accurate infrastructure data is essential for effective transportation.

METHODOLOGY

This study adopts a quantitative, deductive research design to examine the role of road transportation in supply chain effectiveness within the Nigerian cement industry. It focuses on outbound logistics and forward integration in a leading cement firm in Lagos State, selected due to its significant distribution capacity and logistics operations. Lagos is an appropriate setting due to its economic importance and high level of logistics activity. A quantitative approach was used to enable objective measurement and empirical testing of supply chain concepts, with data collected through structured questionnaires to ensure consistency and validity (Hair et al., 2015). The study is grounded in positivism, which assumes that supply chain phenomena can be measured and tested through empirical analysis (Saunders et al., 2009).

A cross-sectional survey design was employed using a structured, closed-ended questionnaire covering demographic and operational variables. The study population consisted of transport and operations staff, from which 150 respondents was selected using purposive sampling to ensure relevant expertise. Survey instruments were adapted from established literature and focused on road infrastructure, regulation, fleet availability, congestion, and technology adoption. Validity and reliability were ensured through alignment with prior studies and expert review. Data were analysed using descriptive statistics and frequency distributions, with Excel used for data preparation and SPSS for statistical analysis. Ethical considerations included voluntary participation, anonymity, and confidentiality of organisational information.

FINDINGS

Table 1: Important Parameters

The following are important parameters in cement transportation by road.		
	Frequency	Percentage
Faster Transit	113	8.36%
Shipment Tracking	125	9.25%
Loss/Damage Enroute	79	5.85%
Wide Reach	131	9.70%
Claim Settlement	87	6.44%
Reliability	121	8.96%
Flexibility	94	6.96%
Information Availability	120	8.88%
Route Selection	105	7.77%
Supplier Reputation	127	9.40%
Quantity of Dispatch	119	8.81%
Type/Condition of Vehicle	130	9.62%
Total	**1351**	**100%**

The order of importance of cement transportation parameters shows that respondents prioritised wide reach, vehicle condition, supplier reputation, ICT-based tracking, transport reliability, availability of information, shipment volume, transit speed, and route selection. Overall, emphasis is placed on vehicle condition, routing, shipment capacity, and delivery speed as key drivers of reduced travel time and improved distribution efficiency.

Table 2: Plant Functions

Your cement plant functions on the basis of the following distribution channels used.		
	Frequency	Percentage
Company-owned stock and dump yard	129	25.54%
Dealerships	135	26.73%
Retailers	119	23.57%
Direct to Customers	122	24.16%
Others	0	0.00%
Total	**505**	**100**

The main distribution channels used by Cement Co. include dealerships, company-owned stock and dump yards, and direct-to-customer supply.

Table 3: Transport Factors

What factors affect road transport contribution to supply chain effectiveness of your firm?		
	Frequency	Percentage
Government Regulations	115	11.58%
Poor Road Infrastructure	134	13.49%
Low Transport Budget	87	8.76%
Activities of Competitors	92	9.26%
Poor Route Viability	81	8.16%
Poor Employee Motivation	93	9.37%
Fewer Bus and Truck Fleet	24	2.42%
Poor IT Adoption	29	2.92%
City Road Congestion	113	11.38%
Taxes and Tariffs	98	9.87%
Poor Bus/Truck Conditions	21	2.11%
Partners' Reputation	106	10.68%
Total	**993**	**100**

Respondents identified poor road infrastructure, government policies, road congestion in Lagos, and supplier reputation as the main factors affecting road transport effectiveness in Cement Co. These factors significantly influence transport efficiency and contribute to higher operating costs and increased cement prices.

Table 4: Time Factors

What factors affect your firm's timely delivery of cement by road?		
	Frequency	Percentage
Bad Roads	138	30.26%
Poor IT Adoption	37	8.11%
Poor Supply Chain Coordination	31	6.80%
Frequent Bus/Truck Breakdowns	45	9.87%
City Road Congestion	108	23.69%
Poor Road Design	97	21.27%
Total	**456**	**100**

Respondents identified bad roads, road congestion, and poor road design in Lagos State as the main factors affecting timely cement delivery by road. While IT adoption was not highly ranked, technological changes were still recognised as contributing to uncertainty and operational risks in transportation activities.

Table 5: Market Forces

What market forces impact on cost of cement in Nigeria's cement industry?		
	Frequency	Percentage
Competition	128	16.98%
Globalisation	119	15.78%
Cost of Energy	136	18.04%
Market's Poor Accessibility by Road	103	13.66%
Government Trade Policies	131	17.37%
Demand and Supply Factors	137	18.17%
Total	**754**	**100**

There was general agreement on the key forces influencing cement prices in Nigeria, including demand and supply conditions, energy costs, government trade policies, and competitive activities. Overall, these factors jointly shape pricing dynamics and contribute to cost variability in the industry.

Table 6: Supply Chain Measures

What supply chain measures taken by your firm enhances customer satisfaction?		
	Frequency	Percentage
Order Cycle Time	122	20.13%
Order Fulfilment	130	21.45%
Just-in-Time Delivery	135	22.28%
Return Policy	117	19.31%
Inventory Control	102	16.83%
Total	**606**	**100**

There was broad agreement on supply chain measures used by Cement Co. to enhance customer satisfaction, including just-in-time delivery, order fulfilment, and reduced order cycle time. Overall, these practices aim to improve delivery efficiency, align production with demand, and enhance responsiveness to customer needs despite rising transportation costs.

Table 7: Supply Chain Management

How do you manage your supply chain?		
	Frequency	Percentage
Close partnership with suppliers	135	11.78%
Close partnership with customers	137	11.95%
Just-in-time supply	132	11.52%
e-procurement	118	10.30%
Electronic Data Interchange	37	3.23%
Outsourcing	40	3.49%
Subcontracting	33	2.88%
3rd Party Logistics	27	2.36%
Plan strategically	97	8.46%
Supply Chain Benchmarking	109	9.51%
Vertical integration	56	4.89%
Few suppliers	13	1.13%
Many suppliers	124	10.82%
Use of external consultants	88	7.68%
Other, please specify…	0	0.00%
Total	**1146**	**100**

Respondents highlighted key practices in Cement Co.'s supply chain management, including partnerships with customers and suppliers, just-in-time delivery, multiple sourcing, e-procurement, and benchmarking. Overall, collaboration, timely delivery, and digital procurement are central to supply chain management, while outsourcing plays a supportive role in improving efficiency under changing industry conditions.

Table 8: Supply Chain Success

How successful do you think your company is in managing its supply chain in general?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat successful	18	12.9	12.9	12.9
	Successful	72	51.4	51.4	64.3
	Very successful	50	35.7	35.7	100.0
	Total	140	100.0	100.0	

Respondents held differing views on the success of Cement Co.'s supply chain management; however, a large majority (87.10%) strongly affirmed that the company manages its supply chain successfully.

Table 9: Logistics Department

Does your company have a separate logistics department?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	140	100.0	100.0	100.0

There was a consensus on the issues above. Respondents wholly agree that Cement Co. has a separate logistics department that manages transport and related operations.

Table 10: Logistics Plan

Does your company have a clear logistics strategic plan?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	122	87.1	87.1	87.1
	No	18	12.9	12.9	100.0
	Total	140	100.0	100.0	

12.90% of respondents believed that Cement Co. lacks a clear logistics strategic plan. A long-term plan is required to guide forecasting, implementation, and evaluation of supply chain activities in alignment with organisational goals.

Table 11: Supply Chain Collaboration

How satisfied are you with supply chain collaboration with partners in the transport sector?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Somewhat	42	30.0	30.0	30.0
	Satisfied	75	53.6	53.6	83.6
	Quite satisfied	23	16.4	16.4	100.0
	Total	140	100.0	100.0	

Respondents ranked key practices in Cement Co.'s supply chain management, highlighting partnerships with customers and suppliers, just-in-time delivery, multiple sourcing, e-procurement, and benchmarking. Overall, collaboration, timely delivery, and digital procurement dominate supply chain management, while outsourcing plays a minor supportive role in improving efficiency under changing industry conditions.

Table 12: Supply Chain Improvement

Which of the following do you think your company needs to do in order to manage its supply chain better?						
	Improve	Start Implementing	Satisfied Already	Inappropriate	Total	Missing
Close partnership with suppliers	107 (83.59%)	0	21 (16.41%)	0	128	12
Close partnership with customers	35 (25.55%)	87 (63.50%)	15 (10.95%)	0	137	3
Just-in-time supply	97 (75.78%)	13 (10.16%)	18 (14.06%)	0	128	12
E-Procurement	76 (62.81%)	33 (27.27%)	12 (9.92%)	0	121	19
Electronic Data Interchange	0	103 (78.03%)	0	29 (21.97%)	132	8
Outsourcing	86 (60.14%)	51 (35.66%)	0	0	143	3
Subcontracting	75 (58.14%)	54 (41.86%)	0	0	129	11
3rd Party Logistics	0	0	98 (74.24%)	34 (25.76%)	132	8
Plan strategically	87 (79.09%)	23 (20.91%)	0	0	110	30
Supply Chain Benchmarking	58 (46.40%)	67 (53.60%)	0	0	125	15
Vertical integration	0	0	54 (41.22%)	77 (58.78%)	131	9
Few suppliers	0	0	21 (19.09%)	89 (80.91%)	110	30
Many suppliers	57 (42.53%)	51 (38.06%)	17 (12.69%)	9 (6.72%)	134	6
Holding safety stock	0	0	51 (41.46%)	72 (58.54%)	123	17
Use of external consultants	55 (40.44%)	51 (37.50%)	23 (16.91%)	7 (5.15%)	136	4
Other (*specify*)	0	0	0	0	0	0

Respondents indicated that supplier relationships are largely unsatisfactory, with most calling for significant improvements. Key areas highlighted include faster delivery to customers, strategic planning, e-procurement, outsourcing and subcontracting of logistics, as well as expanding supplier networks and engaging external consultants. Overall, respondents emphasized the need for a more efficient and better-coordinated supply chain supported by structured performance improvement systems.

Table 13: Supply Chain Systems

What types of systems are currently in use in your company to support Supply Chain Management?					
	Custom-Made	Standard Package	Not in Use	Total	Missing
Material Requirements Planning (MRP)	37 (37.76%)	61 (62.24%)	0	98	42
Manufacturing Resources Planning (MRPII)	43 (36.44%)	75 (63.56%)	0	118	22
Enterprise Resource Planning (ERP)	47 (35.34%)	86 (64.66%)	0	133	7
Warehouse Management System (WMS)	35 (38.04%)	57 (61.96%)	0	92	48
Supply Chain Management (SCM)	20 (14.81%)	115 (85.19%)	0	135	5
Customer Relationships Management (CRM)	13 (11.82%)	97 (88.18%)	0	110	30
Supplier Relationships Management (SRM)	75 (76.53%)	0	23 (23.47%)	98	42
Advanced Planning System (APS)	67 (81.71%)	0	15 (18.29%)	82	58
Just In Time (JIT)	79 (82.29%)	0	17 (17.71%)	96	44
Theory of Constraints (TOC)	0	0	128 (100%)	128	12
E-commerce	0	0	113 (100%)	113	27
E-business	92 (74.80%)	0	31 (25.20%)	123	17
Decision support / expert system	12 (11.01%)	97 (88.99%)	0	109	31
Radio Frequency Identification (RFID)	23 (21.90%)	82 (78.10%)	0	105	35
Electronic Data Interchange (EDI)	0	0	96 (100%)	96	44
Bar coding	19 (18.10%)	86 (81.90%)	0	105	35
Other (*specify*)	0	0	0	0	0

While Cement Co. uses both custom-made and standard supply chain systems, key tools such as the theory of constraints, e-commerce platforms for customer engagement, and electronic data interchange for supplier collaboration are not yet implemented. Overall, this indicates opportunities to improve coordination, efficiency, and responsiveness to changing market conditions.

Table 14: Supply Chain Benefits

How much does your company actually benefit from using supply chain networks?							
	Not at All	Little	Average	Greatly	A lot	Don't know	Total
Better quality of information	0	5 (3.57%)	21 (15%)	47 (33.57%)	67 (47.86%)	0	140
Better quantity of information	0	11 (7.86%)	26 (18.57%)	31 (22.14%)	72 (51.43%)	0	140
Flexibility	7 (5.07%)	22 (15.94%)	34 (24.64%)	37 (26.81%)	38 (27.54%)	0	140
Reduced lead-time in production	36 (25.71%)	47 (33.57%)	25 (17.86%)	15 (10.71%)	11 (7.86%)	6 (4.29%)	140
Cost saving	0	11 (7.86%)	13 (9.29%)	45 (32.14%)	71 (50.71%)	0	140
Forecasting	0	10 (7.14%)	42 (30%)	61 (43.57%)	27 (19.29%)	0	140
Resource planning	9 (6.43%)	13 (9.29%)	25 (17.86%)	38 (27.14%)	55 (39.28%)	0	140
Better operational efficiency	3 (2.14%)	10 (7.14%)	37 (26.43%)	41 (29.29%)	49 (35%)	0	140
Reduced inventory level	9 (6.43%)	12 (8.57%)	34 (24.29%)	38 (27.14%)	47 (33.57%)	0	140
More accurate costing	37(26.43%)	49 (35%)	31 (22.14%)	14 (10%)	9 (6.43%)	0	140
Increased coordination between departments	46(32.86%)	38 (27.14%)	29 (20.71%)	16 (11.43%)	11 (7.86%)	0	140
Increased coordination with suppliers	10 (7.14%)	9 (6.43%)	20 (14.29%)	39 (27.86%)	62 (44.28%)	0	140
Increased coordination with customers	0	12 (8.57%)	32 (22.86%)	39 (27.86%)	57 (40.71%)	0	140
Increased sales	0	14 (10%)	21 (15%)	33 (23.57%)	72 (51.43%)	0	140

While some respondents declined to answer certain items, all participants acknowledged the benefits of supply chain networks at Cement Co. The majority reported improved information sharing, leading to better quality and quantity of information exchange with partners. Additional benefits identified include cost savings, increased sales, improved resource planning, enhanced operational efficiency, reduced inventory levels, and greater customer coordination. However, limited consensus on internal coordination suggests weaknesses in internal integration, despite stronger coordination with external partners.

Table 15: Supply Chain Future

What types of supply chain system(s) does your firm plan to implement in the near future (within the next 2 years)?	Custom-Made	Standard Package	Will Not implement	Total	Missing
Material Requirements Planning (MRP)	46 (40%)	55 (47.83%)	14 (12.17%)	115	25
Manufacturing Resources Planning (MRPII)	38 (33.33%)	66 (57.90%)	10 (8.77%)	114	26
Enterprise Resource Planning (ERP)	28 (20%)	105 (75%)	7 (5%)	140	0
Warehouse Management System (WMS)	30 (21.43%)	93 (66.43%)	17 (12.14%)	140	0
Supply Chain Management (SCM)	37 (26.43%)	89 (63.57%)	14 (10%)	140	0
Customer Relationships Management (CRM)	42 (34.71%)	61 (50.41%)	18 (14.88%)	121	19
Supplier Relationships Management (SRM)	66 (63.46%)	32 (30.77%)	6 (5.77%)	104	36
Advanced Planning System (APS)	57 (46.72%)	39 (31.97%)	26 (21.31%)	122	18
Just In Time (JIT)	73 (60.83%)	41 (34.17%)	6 (5%)	120	20
Theory of Constraints (TOC)	0	0	91 (100%)	91	49
E-commerce	73 (77.66%)	0	21 (22.34%)	94	46
E-business	0	83 (74.11%)	29 (25.89%)	112	28
Decision support / expert system	43 (33.08%)	69 (53.08%)	18 (13.84%)	130	10
Radio Frequency Identification (RFID)	5 (6.85%)	31 (42.47%)	37 (50.68%)	73	67
Electronic Data Interchange (EDI)	0	0	106 (100%)	106	34
Bar coding	46 (38.02%)	58 (47.93%)	17 (14.05%)	121	19
Other (*specify)*	0	0	0	0	0

Participants were divided on future supply chain systems at Cement Co., with some indicating that certain technologies are unlikely to be adopted. These include the theory of constraints and electronic data interchange systems, along with radio frequency identification to a lesser extent. Overall, the findings suggest limited intention to adopt advanced technologies that could improve tracking, coordination, and efficiency in product movement from production to consumption.

Table 16: Future Measures

How important are the following future measures for supporting your company efforts in Supply Chain and Logistics Management?							
	Not at All	Somewhat Important	Important	Quite Important	Very Important	Total	Missing
More education, e.g. formal qualification	7 (5%)	35 (25%)	42 (30%)	35 (25%)	21 (15%)	140	0
Easier access to vocational training	59 (42.14%)	39 (27.86%)	14 (10%)	18 (12.86%)	10 (7.14%)	140	0
More funding and financial support	0	4 (2.85%)	25 (17.86%)	55 (39.29%)	56 (40%)	140	0
More inter-country regional agreements	6 (4.29%)	29 (20.71%)	28 (20%)	32 (22.86%)	45 (32.14)	140	0
Better infrastructure e.g. telecommunications, road, etc	4 (3.10%)	11 (8.53%)	44 (34.10%)	38 (29.46%)	32 (24.81%)	129	11
Improved information provision	0	0	25 (17.86%)	55 (39.28%)	60 (42.86%)	140	0
Increased regional cooperation between institutions, e.g. chamber of commerce	17 (12.14%)	48 (34.29%)	39 (27.86%)	19 (13.57%)	17 (12.14%)	140	0
Closer cooperation between companies and governments	0	21 (15%)	30 (21.43%)	32 (22.86%)	57 (40.71%)	140	0
Other (specify)	0	0	0	0	0	0	0

The issue of future measures in supply chain and logistics management received broad participation, though respondents differed on priorities, with some initiatives viewed as less critical. These include vocational training, regional institutional cooperation, and additional employee education. Overall, responses reflect varying development priorities in a competitive logistics environment, where effective information sharing remains essential for competitive advantage.

CONCLUSIONS

The findings show that road transportation remains the dominant mode for cement distribution in Nigeria due to its flexibility and wide market reach. However, its effectiveness is significantly limited by poor infrastructure, congestion, and weak transport policy

enforcement. These challenges lead to frequent vehicle breakdowns, delays, and higher logistics costs. In addition, truck condition, fleet availability, and the use of outsourced logistics providers strongly influence delivery performance and customer satisfaction. Market forces also play a major role in shaping supply chain outcomes. The industry operates in a highly concentrated structure, limiting price competition and contributing to price rigidity.

External factors such as energy costs, poor road access, and government policies further increase production and distribution expenses. Internally, weaknesses in supplier integration, limited use of digital procurement systems, and underutilisation of advanced technologies constrain supply chain performance. Nevertheless, Cement Co. demonstrates moderate efficiency through improved order fulfilment, inventory control, and customer-focused delivery practices. The adoption of enterprise systems has improved coordination, although more advanced tools remain underutilised.

MANAGERIAL AND RESEARCH IMPLICATIONS

The study highlights the importance of aligning production with demand to reduce costs and improve responsiveness. Strengthening supplier integration through digital systems can enhance forecasting, inventory management, and delivery efficiency. From a policy perspective, sustained investment in road infrastructure and transport regulation is essential for improving logistics performance. Future research should extend beyond Lagos State and consider alternative transport modes such as rail and maritime systems to provide broader insights into cement supply chain optimisation in Nigeria and similar emerging economies.

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