

Relationship between Supply Chain Collaboration and Container Shipping Operational Efficiency: A Case Study of COSCO Shipping Line, Tin Can Island Port, Lagos, Nigeria

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ABSTRACT

Container shipping is the operational backbone of Nigeria's maritime trade, yet persistent inefficiencies, extended vessel turnaround times, high cargo dwell times, and recurrent port congestion, continue to undermine port performance. This study examined the relationship between supply chain collaboration on the efficiency of container shipping operations, using COSCO Shipping Line's operations at Tin Can Island Port, Lagos as a case study. Specifically, the study examines the relationship between information sharing, coordinated planning, and joint decision-making on container shipping operational efficiency; examine the relationship between supply chain collaboration, cargo dwell time performance and port congestion management; and identify the major barriers associated with effective supply chain collaboration among maritime stakeholders at Tin Can Island Port. The study adopted a descriptive survey design, with 60 respondents selected from a target population of 200 personnel across seven organisational categories involved in container shipping operations at the port. Data were collected using a structured questionnaire and analysed using descriptive statistics, Pearson Product-Moment Correlation, and multiple regression analysis. The internal consistency of the research instrument was assessed using Cronbach's Alpha, which yielded a reliability coefficient of 0.78, indicating acceptable internal consistency. Findings showed that collaboration among stakeholders was limited, particularly in joint planning and decision synchronisation; information sharing had a statistically significant positive effect on operational efficiency ($\beta = 0.375$, $p < 0.008$), joint planning and decision synchronisation shows no significant effect ($\beta = 1.678$, $p < 0.099$), collaboration was significantly correlated with cargo dwell time performance ($r = 0.380$, $p < 0.003$) and port congestion management ($r = 0.438$, $p < 0.001$); and that lack of trust among stakeholders was the most significant barrier to collaboration (mean = 3.21). There was a statistically significant positive relationship between supply chain collaboration and operational efficiency ($r = 0.563$, $p < 0.001$), accordingly, the null hypothesis was rejected, indicating that supply chain collaboration is significantly associated with container shipping operational efficiency. It was therefore concluded that supply chain collaboration significantly enhances container shipping efficiency at Tin Can Island Port, but that its full potential is constrained by weak inter-organisational trust and underdeveloped joint planning mechanisms.

Keywords: Supply Chain Collaboration, Container Shipping, Operational Efficiency, Port Congestion Management, Cargo Dwell Time Performance, Tin Can Island, Port.

INTRODUCTION

Maritime shipping carries the overwhelming majority of global trade by volume, and container shipping, built on the standardized metal box that moves seamlessly between ship, truck, and rail, is the mechanism that makes that trade possible. Modern supply chains have little tolerance for delay: when a vessel waits for a berth, or a container sits uncollected in a terminal, the resulting costs, missed delivery windows, demurrage, strained buyer-seller relationships, ripple outward through the entire chain. These pressures are felt everywhere, but weigh more heavily in developing countries, where infrastructure gaps and institutional weaknesses compound the operational challenges.

Nigeria's major ports, including Apapa, Tin Can Island, Onne, and Port Harcourt, are the primary gateway for the country's foreign trade, yet they remain characterised by well-documented inefficiencies: vessels waiting at anchorage for days or weeks, cargo handling slowed by equipment shortfalls and paper-based customs procedures, and containers sitting in terminals long after they could have been collected. These delays translate directly into higher logistics costs, reduced competitiveness for Nigerian businesses, and weaker investor confidence in the country's trade infrastructure.

Supply chain collaboration, the deliberate coordination of information sharing, joint planning, and synchronised decision-making among the many independent stakeholders who manage a container's journey, has attracted growing attention internationally as a response to these challenges. Ports such as Singapore, Rotterdam, and Hong Kong, which have invested in integrated platforms connecting shipping lines, terminal operators, customs, and freight forwarders, are routinely cited as benchmarks for the efficiency gains that follow. In Nigeria, however, progress on this front has been slow: stakeholders often operate with manual or disconnected systems, trust between agencies is limited, and the practical means of collaborating are frequently absent even where the will exists.

This study addresses this gap by examining how supply chain collaboration affects container shipping efficiency at Tin Can Island Port, using COSCO Shipping Line, one of the world's largest container carriers with a growing integrated logistics presence in Nigeria, as a case study. Specifically, the study: (i) assesses the current level and nature of collaboration among stakeholders at Tin Can Island Port; (ii) examines the relationship between information sharing, coordinated planning, and joint decision-making on container shipping operational efficiency; (iii) examine the relationship between supply chain collaboration, cargo dwell time performance and port congestion management; and (iv) identify the major barriers associated with effective supply chain collaboration among maritime stakeholders at Tin Can Island Port. The study is guided by the hypothesis that supply chain collaboration has no significant effect on container shipping operational efficiency.

LITERATURE REVIEW

Supply chain management covers the end-to-end coordination of procurement, production, logistics, and the information flows that bind these processes across legally independent organisations. In the maritime context, this coordination problem is especially acute because container shipping involves a large cast of independent actors, shipping lines, port authorities, terminal operators, customs agencies, freight forwarders, and inland transport providers, each responsible for a distinct segment of the cargo journey (Cižiūnienė et al., 2021). Supply chain collaboration is what makes this coordination work in practice: independent organisations sharing information, coordinating activities, and making decisions jointly rather than in isolation. Three dimensions recur consistently in the literature: information sharing, the precondition for almost everything else; joint planning, the collaborative development of schedules and operational plans; and decision synchronisation, the real-time alignment of operational decisions across organisations (Notteboom & Pallis, 2020; Lind et al., 2021).

Operational efficiency in container shipping is measured through several converging indicators: vessel turnaround time, cargo dwell time, and port congestion, each of which reflects how well the many actors in the chain coordinate their activities. Port infrastructure alone does not determine performance; Yue and Mangan (2023) found that container shipping reliability depends as much on the quality of coordination among stakeholders as on physical capacity. In developing economies, these coordination challenges are compounded by infrastructure deficits and manual customs procedures; Oyesiku and Adeleke (2022) found that customs inefficiencies and weak coordination between agencies significantly depressed dwell time performance at Lagos ports specifically. Digital technologies, including Port Community Systems, Electronic Data Interchange, and blockchain-based documentation, have increasingly been positioned as enablers of this coordination, making information more available, timely, and verifiable across organizations that do not fully trust one another (Wang & Wang, 2023; Tönnissen & Teuteberg, 2020).

Theoretical Discourse

The study draws on four complementary theoretical perspectives. Relational Exchange Theory holds that economic transactions between organizations rarely occur in a vacuum; they take place within ongoing

relationships whose quality, characterized by trust, commitment, and reciprocity, shapes how parties behave, often more powerfully than any formal agreement to collaborate. Ali (2020) found that the willingness of organizations in a Nigerian context to share sensitive operational data depended more on the quality of their relationship with the recipient than on contractual terms, and that weak institutional trust suppressed collaboration even where individual relationships were reasonably strong.

Supply Chain Integration Theory argues that organizations perform better when they integrate their processes, information systems, and decision-making across organizational boundaries, rather than operating as a collection of independent units each optimizing its own performance. Applied to maritime logistics, the theory points to the importance of systems that allow shipping lines, terminal operators, customs, and inland transport providers to coordinate in real time. Panayides and Song (2022) found that higher levels of integration among port stakeholders were associated with shorter turnaround times, faster cargo clearance, and higher berth utilization, and that partial integration, where one party's systems remain disconnected from the rest, limits the gains available from the system as a whole.

The Technology Acceptance Model explains why digital collaboration tools, such as Port Community Systems and Electronic Data Interchange, are adopted or resisted by the organizations asked to use them. The model identifies perceived usefulness and perceived ease of use as the two primary determinants of adoption; Attaran (2020) found that digital transformation in supply chains succeeded more consistently where organizations could clearly see the operational benefit of a new system and where implementation was supported by adequate training, and failed, or was adopted only nominally, where these conditions were absent.

Finally, Systems Theory frames the port as an interconnected network of vessels, berths, cranes, yard equipment, customs systems, and transport connections, whose performance cannot be inferred from any single component in isolation. A change in one part of the system, such as an additional berth, may not improve actual throughput if the binding constraint lies elsewhere, in yard congestion or customs clearance speed, for instance. Lind et al. (2021) found that the digital infrastructure connecting maritime stakeholders functioned most effectively as a feedback system, giving each participant timely information about the state of the network and enabling coordinated, rather than isolated, responses to disruption.

Empirical Studies

Empirical work on the level and nature of collaboration shows that its depth varies considerably across supply chains: some relationships are marked by genuine openness and joint problem-solving, while others that are nominally collaborative amount to little more than occasional information exchange. Ali (2020) found that trust and commitment, more than formal contracts or information technology, were the strongest predictors of information-sharing depth among Nigerian firms. Notteboom and Pallis (2020) found that the form collaboration takes, whether institutionalized through joint planning mechanisms or left ad hoc, has a direct bearing on port performance, while Panayides and Song (2022) constructed a reliable measure of collaboration depth and found it correlated with better service delivery and operational coordination.

On the specific dimensions of collaboration, Lind et al. (2021) examined real-time information exchange among ports, vessels, and logistics providers and found that it meaningfully reduced uncertainty and improved the quality of operational decisions. Alonge et al. (2021) found that supply chains equipped with real-time data analytic capabilities showed improvements in forecasting accuracy and coordination responsiveness. On joint planning, Ciziūnienė et al. (2021) found that the multi-segment character of container shipping supply chains made collaborative planning especially important, and its absence a significant contributor to inefficiency, while Notteboom and Pallis (2020) found that coordinated decision-making around vessel scheduling and berth allocation was among the most impactful forms of collaboration for port performance.

On operational efficiency, Oyesiku and Adeleke (2022) examined port efficiency at Lagos ports and found that inefficient customs processes and weak coordination between customs and terminal operators were dominant contributors to poor dwell time performance, not because individual processes were slow in isolation, but because they were poorly sequenced and minimally integrated. Yue and Mangan (2023) found that container shipping network reliability was shaped by infrastructure capacity and network design, but identified operational

coordination as the factor with the greatest potential for near-term improvement without major capital investment. Salawu and Ghadiri (2022) found that Nigerian ports which reduced dwell times and improved coordination showed measurable gains in trade volumes and reduced trade costs, connecting operational performance to broader economic outcomes.

On barriers, Ndalu and Okene (2024) identified limited digital infrastructure and manual processing systems as significant inhibitors of real-time information sharing in developing-economy contexts, describing a chicken-and-egg problem in which the cost of implementing collaborative systems is difficult to justify without the relationships needed to use them, while those relationships are difficult to build without the enabling infrastructure. Attaran (2020) found that resistance to digital adoption stemmed as much from cultural and organizational factors, particularly reluctance to change established ways of working, as from cost or capability constraints. Ivanov and Dolgui (2022) found that supply chains with weak coordination mechanisms were not only less efficient under normal conditions but markedly more fragile in the face of disruption, while Ghorbani et al. (2022) found that shipping alliances, though they spread fixed costs and improve route coverage, introduce coordination challenges of their own when the systems and procedures of multiple carriers must be aligned.

Collectively, these studies point to a clear gap: most empirical work on supply chain collaboration in maritime logistics comes from developed-country port settings with mature digital infrastructure and established governance systems, conditions that differ substantially from Nigeria's. Research specifically on Nigerian ports remains fragmented and has not produced an integrated account of how collaboration shapes vessel turnaround time, cargo dwell time, and port congestion together, and no existing study has examined how a major international carrier such as COSCO Shipping Line manages collaboration with port stakeholders within this specific operating environment, a gap this study addresses.

Conceptual Construct

Table 1: Conceptual Construct

Construct	variable	Measurement indicators
Supply Chain Collaboration (SCC)	Independent/explanatory construct	Information sharing; Joint planning; Decision synchronisation
Operational Efficiency (OE)	Dependent/outcome construct	Vessel turnaround time; Cargo dwell time performance; Port congestion management
Barriers to Collaboration	Descriptive/supporting variable	Lack of trust; poor communication; technological limitations; bureaucratic procedures; resistance to change

Source: Author's Computation, 2026

MATERIALS AND METHODS

The study adopted a descriptive survey research design nested within a case study approach, with COSCO Shipping Line's operations at Tin Can Island Port as the focal case. The population of the study comprised all personnel directly involved in container shipping operations across seven organizational categories: terminal operators, the Nigerian Ports Authority, COSCO Shipping Line itself, freight forwarders, Nigeria Customs Service, logistics providers, and other stakeholders, totaling approximately 60 individuals. Given the manageable size of this population, a total enumeration (census) technique was adopted rather than a probability sampling formula, meaning the entire population of 60 was engaged rather than a reduced sample.

Data were collected using a structured questionnaire comprising five sections: demographic information; level of collaboration (information sharing, joint planning, decision synchronization); operational efficiency (vessel turnaround time, cargo dwell time, port congestion); the perceived relationship between collaboration on

efficiency; and barriers to effective collaboration. Responses were measured on a five-point Likert scale (5 = Strongly Agree to 1 = Strongly Disagree). Sixty questionnaires were administered, of which 58 were correctly completed and retrieved, a response rate of 96.7%.

Data were analysed using descriptive statistics (means, frequencies, percentages), multiple regression analysis, and Pearson's Product-Moment Correlation Coefficient, consistent with the study's specific objectives. The internal consistency of the instrument was assessed using Cronbach's Alpha. The regression model tested the relationship between information sharing (IS) and joint planning/decision synchronisation (JPDS) on operational efficiency (OE), specified as:

$$OE = \beta_0 + \beta_1(IS) + \beta_2(JPDS) + \epsilon_i$$

The hypothesis tested was: H_0 : There is no significant relationship between supply chain collaboration and container shipping operational efficiency at Tin Can Island Port, Lagos.

Operationalisation And Measurement Of Variables

The study comprised two principal constructs: supply chain collaboration and container shipping operational efficiency. Supply chain collaboration was operationalised as a multidimensional construct comprising information sharing, joint planning and decision synchronisation. Information sharing refers to the extent to which relevant operational information is exchanged among stakeholders in a timely and accessible manner. Joint planning refers to the extent to which stakeholders participate in the development and coordination of operational plans and schedules. Decision synchronisation refers to the extent to which operational decisions among participating organisations are aligned and coordinated.

Container shipping operational efficiency was operationalised using three indicators: vessel turnaround time, cargo dwell time performance and port congestion management. Vessel turnaround time refers to the time associated with vessel processing and related port operations. Cargo dwell time refers to the duration for which containers remain within the port or terminal before onward movement or collection. Port congestion management refers to the perceived effectiveness of processes and coordination mechanisms used to manage congestion within the port environment.

The study also measured perceived barriers to supply chain collaboration using five indicators: lack of trust among stakeholders, poor communication, technological limitations, bureaucratic procedures and resistance to change. All measurement items were assessed using a five-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree.

RESULTS AND DISCUSSION

Demographic Characteristics of Respondents

Table 1 presents the demographic profile of the 58 respondents. Males formed the majority (62.1%), consistent with the male-dominated composition typically observed in port and terminal operations roles. By organisation type, Terminal Operator staff formed the largest group (24.1%), followed by Port Authority staff (17.2%), reflecting the multi-actor character of container shipping operations described in the literature (Ciziūnienė et al., 2021). Most respondents (62.1% combined) had between six and fifteen years of experience, indicating sufficient exposure to port operations to provide informed assessments.

Table 1: Demographic Characteristics of Respondents

Variable	Category	Frequency	Percentage
Gender	Male	36	62.1
	Female	20	34.5

	Other/Undisclosed	2	3.4
Type of Organisation	Terminal Operator	14	24.1
	Port Authority	10	17.2
	Shipping Company	9	15.5
	Freight Forwarder	9	15.5
	Customs Service	8	13.8
	Logistics Provider	6	10.3
	Other	2	3.4
Years of Experience	6–10 years	24	41.4
	0–5 years	16	27.6
	11–15 years	12	20.7
	16+ years	6	10.3

Source: Field Survey, 2026.

Level and Nature of Collaboration among Stakeholders

Collaboration among stakeholders at Tin Can Island Port was found to be limited and unevenly developed across its dimensions. Communication between stakeholders recorded the most favourable rating (mean = 2.55, SD = 0.96) and the overall perceived level of collaboration was similarly moderate (mean = 2.50, SD = 1.10). Trust among organizations (mean = 2.28) and long-term working relationships (mean = 2.34) were rated more weakly, while joint planning and decision-making recorded the lowest mean in the entire study (mean = 2.19, SD = 1.05), with 62.1% of respondents disagreeing that stakeholders engage in this practice. This pattern, in which communication is comparatively strong but joint planning and decision-making remain weak, is consistent with Ali (2020) and Notteboom and Pallis (2020), both of whom found that the institutionalization of collaboration, not merely its informal occurrence, is what drives stronger port performance.

Influence of Information Sharing, Joint Planning, and Decision Synchronisation on Operational Efficiency

Respondents rated current operational efficiency at Tin Can Island Port unfavorably across all indicators (composite mean = 2.19), yet consistently believed collaboration would improve or does improve that efficiency, with collaboration's effect on overall port performance recording the highest mean in the entire questionnaire (mean = 3.12). The multiple regression analysis indicated that information sharing was a statistically significant predictor of operational efficiency ($\beta = 0.375$, $t = 2.745$, $p = 0.008$), whereas joint planning and decision synchronisation was not statistically significant at the 5% level ($\beta = 0.229$, $t = 1.678$, $p = 0.099$). The regression model was statistically significant overall ($R^2 = 0.290$, Adjusted $R^2 = 0.264$, $F = 11.205$, $p < 0.001$), with information sharing and joint planning/decision synchronisation jointly accounting for approximately 29.0% of the observed variance in the operational efficiency measure. The findings suggest that differences in reported information-sharing practices are associated with differences in reported operational efficiency, while the association between joint planning/decision synchronisation and operational efficiency did not reach the conventional 5% significance threshold. This finding is corroborated with Lind et al. (2021) and Alonge et al. (2021), who identified information sharing and real-time data exchange as the collaboration dimension most consistently linked to improved coordination outcomes, while the weaker showing of joint planning is consistent

with Cižiūnienė et al. (2021), who found fragmented planning to be a persistent, difficult-to-resolve source of inefficiency in container shipping.

Table 2: Regression Results — Relationship between Information Sharing and Joint Planning/Decision Synchronisation on Operational Efficiency

Predictor	B	SE	B	t	Sig.
(Constant)	0.967	—	—	—	—
Information Sharing	0.324	0.118	0.375	2.745	0.008
Joint Planning & Decision Synchronisation	0.181	0.108	0.229	1.678	0.099

Table 3: Regression Model Summary

Model	R	R ²	Adjusted R ²	F	Sig.
Operational Efficiency	0.539	0.290	0.264	11.205	0.000

Source: Field Survey, 2026.

Relationship between Supply Chain Collaboration on Cargo Dwell Time Performance and Port Congestion Management

As shown in Table 4, The positive correlation indicates that higher levels of collaboration were associated with more favourable perceptions of cargo dwell-time performance. Supply chain collaboration was significantly associated with port congestion management ($r = 0.438$, $p = 0.001$) collaboration was positively and significantly correlated with cargo dwell time performance ($r = 0.380$, $p = 0.003$) and, more strongly, with port congestion management ($r = 0.438$, $p = 0.001$). The correlation between collaboration and overall operational efficiency was similarly positive and significant ($r = 0.563$, $p = 0.000$). The findings indicate that supply chain collaboration has a statistically significant positive effect on container shipping operational efficiency. Since the reported significance value (p-value) is less than the 0.05 level of significance adopted for the study, the null hypothesis stating that supply chain collaboration has no significant effect on container shipping operational efficiency is rejected. Consequently, the alternative hypothesis is accepted. This finding suggests that greater collaboration among key stakeholders in the container shipping supply chain—including shipping lines, terminal operators, freight forwarders, customs authorities, transport operators, and other relevant actors is associated with improved operational efficiency. The positive effect is attributed to the ability of collaborative relationships to facilitate timely information sharing, improve coordination of logistics activities, reduce communication gaps, and support more effective planning and decision-making. In container shipping operations, where vessel schedules, cargo documentation, terminal handling, customs procedures, inland transportation, and cargo delivery are highly interdependent, effective collaboration can help minimize delays, reduce operational bottlenecks, and enhance the smooth flow of containers across the supply chain.

Furthermore, the finding underscores the strategic importance of information and resource sharing among supply chain partners. Collaborative practices can improve visibility across logistics activities, enable stakeholders to respond more quickly to disruptions, and reduce duplication of activities. In the context of container shipping, these improvements can translate into shorter cargo dwell times, faster turnaround of vessels and containers, improved schedule reliability, and more efficient utilisation of port and transport resources. Overall, the hypothesis result demonstrates that strengthening supply chain collaboration can contribute significantly to improved operational efficiency in container shipping. These results corresponds closely with Oyesiku and Adeleke (2022), who found coordination failures to be a dominant contributor to poor dwell time performance at Lagos ports, and with Yue and Mangan (2023), who identified operational coordination as the factor most amenable to improving container shipping reliability without major capital investment.

Table 4: Correlation between Supply Chain Collaboration, Cargo Dwell Time Performance, Port Congestion Management, and Operational Efficiency

Variable 1	Variable 2	r	Sig.
Supply Chain Collaboration	Cargo Dwell Time Performace	0.380	0.003
Supply Chain Collaboration	Port Congestion Management	0.438	0.001
Supply Chain Collaboration	Operational Efficiency (Overall)	0.563	0.000

Source: Field Survey, 2026.

Barriers to Effective Supply Chain Collaboration

Lack of trust among stakeholders was rated the most significant barrier to collaboration (mean = 3.21, SD = 0.95), well ahead of poor communication (mean = 2.90), technological limitations and bureaucratic procedures (both mean = 2.79), and resistance to change (mean = 2.55). The prominence of trust as the leading barrier suggests that the limited joint planning observed above, and its comparatively weak statistical contribution to efficiency, are symptoms of a deeper relational deficit rather than simply a matter of procedure or technology. This finding is consistent with Ndalul and Okene (2024), who identified limited digital infrastructure and manual processing as key inhibitors of information sharing in developing-economy logistics contexts, and with Ali's (2020) finding that weak inter-organisational trust constrains collaboration even among parties who recognise, at least intellectually, that sharing information would benefit them.

Table 5: Barriers to Effective Supply Chain Collaboration (Mean Ranking)

Barrier	Mean	SD	Rank
Lack of trust among stakeholders	3.21	0.95	1st
Poor communication hindering coordination	2.90	1.04	2nd
Technological limitations restricting information sharing	2.79	1.09	3rd
Bureaucratic procedures slowing collaboration	2.79	1.07	3rd
Resistance to change	2.55	1.10	5th

Source: Field Survey, 2026.

CONCLUSION

This study examined the relationship between supply chain collaboration and container shipping operational efficiency at Tin Can Island Port, using COSCO Shipping Line as the case setting. The findings indicate a statistically significant positive relationship between overall supply chain collaboration and operational efficiency. Among the collaboration dimensions examined, information sharing was significantly associated with operational efficiency, whereas joint planning and decision synchronisation did not attain statistical significance at the 5% level. The findings further indicate significant relationships between supply chain collaboration and the measures of cargo dwell-time performance and port congestion management.

The results also indicate that collaboration practices are not uniformly developed across stakeholders. In particular, joint planning and decision synchronisation received relatively low ratings, while lack of trust was identified as the most prominent reported barrier to collaboration. These findings highlight the importance of examining inter-organisational coordination, information exchange and trust as relevant dimensions of container

shipping operational performance at Tin Can Island Port. Improving operational efficiency at Nigerian ports therefore depends not solely on physical infrastructure investment but equally on the quality of coordination among the organizations that share the port environment.

It is recommended that COSCO Shipping Line and the Nigerian Ports Authority prioritise structured, recurring coordination forums that give joint planning and decision synchronisation the same institutional standing currently enjoyed by informal communication; that deliberate trust-building measures, transparent performance reporting, joint problem-solving, and clear service-level agreements, be pursued as a foundation for deeper collaboration; and that investment in shared digital infrastructure, such as Port Community Systems and Electronic Data Interchange platforms connecting shipping lines, terminal operators, Customs, and freight forwarders, be accelerated, given that information sharing was the collaboration dimension most strongly and reliably linked to operational efficiency in this study. Future research could usefully extend this analysis to other Nigerian ports and shipping lines, adopt a longitudinal design to track how collaboration and efficiency evolve over time, and triangulate the self-reported measures used here with independently verified operational data.

The study was limited to COSCO limited in Tin Can Island Port, Lagos, Nigeria. In addition, the analysis was based on the questionnaires that were successfully retrieved and found usable for the study. Consequently, the availability and completeness of the retrieved questionnaires may have constrained the volume of data available for analysis and potentially limited the extent to which the findings reflect the views of the entire target population. Despite these limitations, appropriate measures were taken to ensure that the data collected were relevant, adequately analysed, and suitable for addressing the objectives of the study.

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