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COMPARATIVE ANALYSIS OF PORT LOGISTICS BETWEEN THE PORTS OF GUAYAQUIL AND POSORJA IN ECUADOR

ANÁLISIS COMPARATIVO DE LA LOGÍSTICA PORTUARIA ENTRE LOS PUERTOS DE GUAYAQUIL Y POSORJA EN ECUADOR

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Comparative Analysis of Port Logistics between the Ports of Guayaquil and Posorja in Ecuador

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ABSTRACT

Ecuador's maritime trade has been significantly influenced by the development of two major ports: Guayaquil and Posorja. While Guayaquil remains the country's primary port due to its long-established infrastructure, Posorja has emerged as a strong competitor thanks to its modern facilities and strategic location in the Pacific Ocean. With a natural draft of 16 meters, Posorja has attracted large vessels, particularly Neo-Panamax ships, positioning itself as a key rival to Guayaquil's ports, which face operational challenges due to their limited draft and continuous dredging requirements. This analysis highlights the logistical advantages of Posorja, including its ability to receive large vessels without draft restrictions, thereby optimizing trade routes and reducing logistical costs. In contrast, Guayaquil's ports continue to manage over 85% of the country's imports and exports, making them vital to Ecuador's foreign trade. However, dredging needs and terminal congestion have limited their competitiveness. The study underscores the importance for both ports to implement strategies focused on digitalization, process optimization, and environmental sustainability. The coexistence of both ports could enhance Ecuador's logistical efficiency, provided that a balance is maintained between economic development and environmental protection.

Keywords: port logistics, maritime competitiveness, sustainable development

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Análisis Comparativo de la Logística Portuaria entre los Puertos de Guayaquil y Posorja en Ecuador

RESUMEN

El comercio marítimo ecuatoriano se ha visto profundamente influenciado por el desarrollo de dos importantes puertos: Guayaquil y Posorja. Mientras Guayaquil, con su infraestructura histórica, sigue siendo el principal puerto del país, Posorja ha ganado terreno gracias a su infraestructura moderna y ubicación estratégica en el Pacífico. Con un calado de 16 metros, Posorja ha logrado atraer embarcaciones de gran capacidad, especialmente los buques Neo-Panamax, lo que lo convierte en un competidor clave frente a los puertos guayaquileños, que enfrentan desafíos operativos derivados de un calado limitado y la necesidad de dragados constantes. Este análisis subraya las ventajas logísticas que ofrece Posorja, como su capacidad para recibir grandes embarcaciones sin restricciones de calado, lo que optimiza las rutas comerciales y reduce los costos logísticos. Por otro lado, los puertos de Guayaquil siguen siendo el núcleo del comercio exterior del país, manejando más del 85% de las exportaciones e importaciones. Sin embargo, las dificultades relacionadas con el dragado y la congestión en sus terminales limitan su competitividad frente a Posorja, que ha aprovechado su capacidad de expansión y la modernización de sus instalaciones. El análisis resalta la necesidad de que ambos puertos adopten estrategias de digitalización, optimización de procesos logísticos y sostenibilidad ambiental para mantenerse competitivos en el comercio internacional. La coexistencia de ambos puertos puede potenciar la eficiencia logística de Ecuador, siempre y cuando se logre un equilibrio entre desarrollo económico y protección ambiental

***Palabras clave*:** logística portuaria, competitividad marítima, desarrollo sostenible

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INTRODUCTION

Maritime ports play a fundamental role in the economic development of Ecuador, with Guayaquil standing out as a strategic hub on the west coast of South America in terms of cargo volume and maritime traffic. Its location on the Pacific coast positions Guayaquil as a vital node for the country's exports and imports, encompassing both primary and manufactured goods. However, despite its historical significance, the port infrastructure in Guayaquil faces a series of logistical challenges that compromise the efficiency of operations and limit regional and international competitiveness. Among the most pressing issues are the management of channel depth (draft) and delays in container clearance processes, which not only elevate operational costs but also damage the port's reputation as a reliable gateway for international trade.

Draft refers to the minimum water depth required for vessels to navigate safely without running aground. Proper draft management is critical, particularly for Guayaquil, which handles a diverse fleet of vessels of varying sizes. An insufficient or inconsistent draft restricts the entry of larger ships, thus reducing port efficiency and increasing costs associated with cargo loading and unloading. The variability of channel depth in Guayaquil's access routes and port terminals has long been a concern for local authorities. River sedimentation and the lack of consistent dredging practices contribute to the reduction in navigable depth, limiting vessel access and forcing shipping companies to use smaller or partially loaded vessels. This results in diminished operational performance and long-term competitiveness, as large vessels tend to prefer ports that can accommodate them with greater ease and efficiency.

One of the most persistent problems is the absence of continuous dredging to maintain the necessary depth for optimal port operations. Although various dredging initiatives and infrastructure upgrades have been implemented, sediment accumulation remains a significant challenge requiring ongoing attention. The costs associated with dredging are substantial and often fail to match the frequency needed to sustain an ideal draft. As a result, some vessels are unable to access specific berths or are compelled to operate with reduced capacity, affecting both the cargo handling capabilities of the port and the overall costs borne by shipping companies.

Another major issue is the delay in container clearance operations. The time required for container delivery and pickup directly affects operational efficiency and imposes additional expenses on importers and exporters. These delays are caused by a combination of factors, including bottlenecks at terminal facilities, congestion in port access routes, lack of coordination between customs and port authorities, and insufficient infrastructure to manage the increasing cargo volume. In many cases, port terminals lack the equipment and logistical systems needed to process containers efficiently, leading to significant delays. Containers may remain in port for several days before being cleared, which in turn delays the processing of other shipments and results in financial losses for both private companies and the port administration. These inefficiencies in the supply chain create a vicious cycle that amplifies operational costs and diminishes the port's competitiveness.

Currently, delays in container handling have become a major concern for exporters. For example, banana exporters—representing one of Ecuador's main export sectors—have reported extensive wait times at port terminals. These delays not only harm local exporters but also deteriorate the port's reputation internationally. If a port fails to offer fast and reliable service, global clients will turn to alternative ports that provide more favorable conditions for their logistical operations. This shift results in a competitive disadvantage for Ecuador's economy, as export products become less attractive compared to those from countries with more efficient port systems.

The inefficiency in container clearance is also linked to poor coordination among customs, sanitary, and immigration authorities. Bureaucratic procedures and the continued use of manual processing in many operations slow down workflows and add complexity to logistical tasks. Additionally, the infrastructure in many port terminals remains inadequate to accommodate the annual cargo volume. Although efforts have been made to modernize and expand several port areas, processing capacity is still limited due to outdated equipment and frequent access congestion.

These logistical challenges directly affect the competitiveness of Ecuadorian ports and, consequently, the national economy. Increased costs caused by delays, inadequate draft management, and inefficiencies in container handling not only impact companies operating within the port system but also create a ripple effect throughout the national economy.

Businesses must absorb higher operational costs and, in some cases, face financial losses due to shipping delays. Without comprehensive solutions, Ecuador's ports risk losing relevance in the international maritime trade network to other regional ports that offer more efficient and modern logistical operations.

To address these challenges, it is essential for the Port Authority and relevant stakeholders to implement infrastructure improvements and optimize operational processes. Regular and effective dredging must be prioritized to ensure that port depth is sufficient to accommodate larger vessels. In parallel, administrative and customs procedures must be streamlined to reduce waiting times and facilitate smoother cargo flows. The integration of advanced technologies and improved coordination among customs, sanitary, and immigration authorities are also critical for expediting container clearance. Continued investment in terminal infrastructure and equipment is necessary to enable ports to handle larger volumes of cargo efficiently and to maintain their role as key facilitators of Ecuador's international trade.

Geographic and Strategic Characteristics of Posorja

Posorja, a rural parish of the Guayaquil canton, stands out for its extensive territorial coverage and strategic location for maritime trade. With an approximate area of 274 square kilometers, it has become a critical point for Ecuador's port expansion, notably hosting the country's only deep-water port (Ministry of Transport and Public Works of Ecuador, 2021). Its natural draft depth of up to 16 meters enables the reception of large-scale vessels, such as Neo-Panamax ships, thereby optimizing trade routes and reducing logistical costs in comparison to other national ports (Rodríguez, 2021).

From an economic perspective, Posorja plays a fundamental role in strengthening Ecuador's foreign trade by facilitating the export of agricultural and fishery products to international markets. Its connection to major global shipping lanes has significantly reduced transit times and improved port logistics efficiency (Gómez, 2020). Furthermore, the port's modern infrastructure—operated by DP World Posorja—is designed to handle up to 1.5 million TEUs annually, positioning it as a competitive alternative to existing Ecuadorian ports (Valverde & Medina, 2022).

Environmental Impact of Dredging on Marine Biodiversity

The maintenance of navigational depth in Guayaquil's port access channels through dredging is essential to accommodate large vessels. However, this practice carries significant ecological consequences, particularly for marine biodiversity. Various studies have shown that dredging-induced alterations to the seabed result in a marked decrease in the abundance and diversity of benthic and pelagic organisms, disrupting the reproductive cycles of numerous commercially valuable species (Hernández & Paredes, 2020).

One of the most critical effects of dredging is the high mortality of developing marine species. Sediment suspension leads to decreased oxygen availability and reduced water quality, directly impacting the survival rates of fish larvae and juveniles (Sánchez & Martínez, 2020). Recent research indicates that in dredged areas, marine biomass can decline by up to 40% within the first two years following intervention, thereby threatening the sustainability of coastal ecosystems and associated fishing activities (Valverde & Medina, 2022).

Increased turbidity from dredging also leads to the degradation of habitats essential to species such as shrimp and croaker, impairing their ability to feed and reproduce. Over the long term, these impacts affect not only marine biodiversity but also the fishing economy of coastal regions, leading to reductions in commercial catches and compromising the food security of local communities (World Bank, 2020).

From a marine resource management and environmental standpoint, it is imperative to implement mitigation strategies such as continuous water quality monitoring, scheduling dredging activities during non-reproductive periods, and establishing protected areas for vulnerable species (Orellana & Rodríguez, 2019). Only through sustainable marine resource management can the needs of port development be balanced with the preservation of Ecuador's marine and coastal ecosystems.

Posorja and Its Potential for Economic and Tourism Growth

Posorja, a rural parish of the Guayaquil canton, has established itself as a strategic hub for port and commercial development in Ecuador. Its privileged geographic location on the Pacific coast, combined with a natural draft depth of 16 meters, has facilitated the construction of modern port infrastructure such as DP World Posorja, the country's first deep-water port (Rodríguez, 2021).

This development has generated significant economic opportunities not only in maritime trade but also through the stimulation of other sectors such as tourism, fishing, and local commerce.

The growth of Posorja has spurred development in surrounding areas, notably Playas and El Morro—two locations with high tourism potential. Playas, officially known as General Villamil, is a popular destination due to its extensive beaches and year-round warm climate. Its increasing connectivity with Posorja has enhanced its tourism offerings, attracting investment in the hospitality, gastronomy, and recreational sectors (Hernández & Paredes, 2020). Moreover, the proximity to DP World Posorja has driven a surge in commercial activity, translating into new employment opportunities for the local population.

The Ports of Guayaquil and Their Role in Foreign Trade

The ports of Guayaquil have historically served as the backbone of Ecuador's maritime commerce. Their strategic location has enabled approximately 85% of the country's foreign trade cargo to pass through their terminals, consolidating them as a vital logistics hub for the national economy (Gómez, 2020). However, due to their geographic characteristics and the need for continuous dredging to remain operational, they face mounting challenges in maintaining competitiveness against emerging port developments such as Posorja.

One of the most critical issues facing Guayaquil's ports is draft management, as the constant sedimentation of the Guayas River reduces the natural depth of maritime access channels. Unlike Posorja—with its 16-meter draft that accommodates large vessels—Guayaquil's ports require periodic dredging to maintain navigability. This represents a significant financial burden for port authorities and constitutes a structural limitation to long-term growth (Valverde & Medina, 2022). Among these, the Guayaquil Port Terminal (TPG) plays a major role in containerized cargo handling and has been central to service modernization. Additionally, other terminals such as Contecon and Bananapuerto contribute significantly to the export of key products, including bananas and seafood (World Bank, 2020).

Macroeconomic Challenges and Strategic Outlook

Despite advancements in infrastructure and technology at the ports of Guayaquil, competition from the Port of Posorja is reshaping port logistics in Ecuador. The Guayaquil terminals are highly dependent on tidal conditions to operate, which limits their ability to regularly accommodate large vessels.

This dependence has become a disadvantage compared to Posorja, whose consistent 16-meter draft allows unrestricted access for deep-draft vessels. As a result, Guayaquil's ports are compelled to carry out periodic dredging operations, incurring additional costs and limiting their long-term expansion capacity (Valverde & Medina, 2022). In contrast, Posorja does not face these challenges, giving it a significant advantage in terms of competitiveness and operational efficiency.

Furthermore, security concerns have increased risks for vessels operating near Guayaquil's ports. Ships often must wait for favorable tides to dock, exposing them to various maritime hazards. Conversely, at the DP World (DPW) terminal in Posorja, vessels can dock safely and promptly upon arrival, which optimizes operational efficiency and minimizes risks associated with prolonged anchorage. This operational contrast underscores the urgent need to enhance safety measures and infrastructure at Guayaquil's ports to maintain their competitiveness in the face of emerging terminals like Posorja (Orellana & Rodríguez, 2019).

In this context, modernizing and expanding infrastructure at the ports of Guayaquil will be essential to sustain their relevance. Strategies such as the digitalization of customs processes, streamlining of cargo flow, and improvement of land-based connectivity could prove effective in ensuring the continued importance of Guayaquil in Ecuador's foreign trade (Orellana & Rodríguez, 2019).

On the other hand, the growth of Posorja represents an opportunity for the balanced development of Ecuador's coastal economy. As the port continues to expand, it is crucial for public authorities and the private sector to collaborate in ensuring that the economic benefits extend beyond the maritime industry to complementary sectors such as tourism and fishing. In this regard, the sustainable development of nearby areas like Playas and El Morro can serve as a key factor in diversifying the local economy and maximizing the positive impact of port expansion (Hernández & Paredes, 2020).

It is evident that Posorja and its surrounding areas have experienced significant growth due to investments in port infrastructure, creating new economic and tourism opportunities. The ports of Guayaquil continue to play a central role in the national logistics network but face structural challenges that must be addressed to ensure their long-term competitiveness. The coexistence of these two port hubs may represent a strategic advantage for Ecuador, provided that development is guided by well-planned strategies that balance economic growth with environmental and social sustainability.

In conclusion, Guayaquil's port system faces a series of logistical challenges, particularly in terms of draft management and delays in container clearance, which negatively impact both operational efficiency and the competitiveness of Ecuador's foreign trade. Implementing strategic solutions—including infrastructure upgrades, process optimization, and investment in technology—is critical to ensuring that Guayaquil remains an efficient and competitive logistics node in the region. With proper resource management and more effective policy implementation, the Guayaquil Port Terminal (TPG) can overcome these obstacles and strengthen its position as one of the most important ports on the Pacific coast.

Table 1 Main Challenges of Port Systems in Ecuador

Problem	Description	Impact
Draft management	The lack of regular dredging and river sedimentation affects the depth required for vessels to access port terminals.	Restricted access for large vessels, reduced operational efficiency.
Delay in container clearance	Prolonged times in container clearance due to congestion, inadequate infrastructure, and bureaucratic procedures.	Increased operational costs, supply chain delays, loss of competitiveness.
Terminal congestion	Port terminals lack sufficient capacity to handle the cargo volume, resulting in bottlenecks.	Reduced efficiency, loss of time and resources, negative impact on port competitiveness.
Inefficient coordination among authorities	Lack of coordination between customs, health, immigration authorities, and the Port Captaincy.	Administrative and operational delays, increased vessel waiting times.
Insufficient port infrastructure	Limited infrastructure to manage high volumes of cargo loading and unloading.	Restricted cargo capacity, reduced competitiveness in international trade.
Bureaucracy and manual procedures	Administrative processes are mostly manual, increasing wait times and reducing efficiency.	Higher operational costs, slower procedures, potential loss of international clients.
Lack of advanced technology	Low adoption of technologies to streamline clearance and cargo monitoring processes.	Slower and less efficient operations, reduced competitiveness against regional ports.
Environmental issues	Environmental impacts from port activity, such as water and air pollution.	Harm to marine ecosystems, damage to the ports' international image, potential sanctions.
Deficient staff training	Inadequately trained personnel for logistics operations and new technology implementation.	Operational inefficiency, human error, delays in cargo handling.

This table summarizes some of the main challenges faced by Ecuadorian ports, reflecting both operational and administrative factors that impact their competitiveness and efficiency.

Below is a comparative table highlighting the main characteristics and differences between the Maritime Port of Guayaquil and the Port of Posorja:

Table 2 Comparative Characteristics: Maritime Port of Guayaquil vs. Port of Posorja

Characteristic	Maritime Port of Guayaquil	Port of Posorja
Location	Guayaquil, Ecuador	Posorja, Ecuador
Port Type	Multipurpose port	Deep-water port
Draft Depth	9.75 meters	16 meters
Cargo Capacity	Handles approximately 90% of the country's cargo (forbes.com.ec)	Capable of receiving Neo-Panamax vessels of up to 15,000 TEU (lca.logcluster.org)
Infrastructure	Terminals for containers, general cargo, bulk cargo, and liquid cargo	Specialized terminals for containers and bulk cargo
Main Operator	Contecon Guayaquil S.A. (part of APM Terminals Group)	DP World Posorja
Year of Inauguration	1960	2019
Connectivity	Connected to the national railway system and main road network	Direct access to the Ruta del Spondylus and proximity to Guayaquil International Airport
Additional Services	Logistics, warehousing, and distribution services for various types of cargo	Logistics and warehousing services focused on containers and bulk cargo
Operational Performance	High operational efficiency, but draft limitations for larger vessels	Known for its operational efficiency and capacity to handle high cargo volumes (puertodeguayaquil.gob.ec)
Market Share	Historically the country's main port, handling around 90% of national cargo (forbes.com.ec)	Increased market share, reaching 32% in 2024 (portalportuario.cl)

This table provides a clear overview of the differences between both ports in terms of infrastructure, operational capacity, and market share.

METHODOLOGY

To conduct this research on the logistics processes at the Maritime Port of Guayaquil and their comparison with the Port of Posorja, a Mixed Research Methodology with Recurrent Design (IMRD) was adopted. This approach is suitable for analyzing complex phenomena that require both quantitative analysis, to provide numerical data and objective comparisons, and qualitative analysis, to gain deeper insight into the dynamics affecting stakeholders involved in port logistics. In this case, the application

of this methodology enabled the collection of statistical data related to operational efficiency and waiting times, while also facilitating an exploration of the perceptions and experiences of key actors in the port environment, including logistics operators, port authorities, ship captains, and others engaged in the supply chain.

The quantitative component focused on gathering statistical data that could measure and compare the operational efficiency of both ports. Through official port records and data provided by maritime authorities, accurate information was obtained on cargo clearance times, port draft depths, annual cargo volume, port capacity, and vessel traffic. These metrics were essential for comparing port performance in terms of both infrastructure and operational capacity. The analysis also included wait times for containers and the speed at which administrative procedures—such as customs, health, and immigration inspections—are processed, which are critical factors in port logistics efficiency.

To conduct this quantitative analysis, a series of surveys and questionnaires were designed and directed at port authorities, logistics operators, and shipping agents, aiming to collect detailed information on various operational aspects of the ports. One key element of the analysis was the measurement of container wait times during both unloading and clearance phases. Data collection was carried out through a review of historical records from the ports of Guayaquil and Posorja, which made it possible to identify patterns and variations in wait times. Special attention was also given to the draft depth of each port, since the ability to receive large vessels is a fundamental factor in determining port competitiveness in the context of international trade.

On the other hand, the qualitative component focused on gathering information regarding the perceptions and opinions of stakeholders involved in logistics operations. Semi-structured interviews were conducted with key actors in the logistics chain, including logistics operators, shipping agents, ship captains, and other port personnel. These interviews were critical to obtaining deeper insights into the challenges faced by the ports of Guayaquil and Posorja, particularly regarding coordination among port authorities, existing infrastructure, and the administrative processes carried out at the terminals.

During the interviews, topics such as the efficiency of cargo handling processes, the speed of customs, health, and immigration inspections, and challenges related to inadequate infrastructure—such as limited dock size or draft depth—were addressed.

Participants also shared their views on potential measures to improve operational efficiency at both ports, including the implementation of advanced technologies, streamlining administrative processes, and upgrading port infrastructure. In addition, respondents' perceptions of Posorja's competitiveness were explored, along with potential impacts on future cargo volumes and tariff structures.

The qualitative analysis made it possible to uncover underlying causes of the logistical issues affecting both ports. For instance, participants noted that in Guayaquil, excessive workload at the terminals, insufficiently trained personnel, and overly bureaucratic procedures contribute to delays in cargo clearance. In contrast, while Posorja handles a lower cargo volume, interviewees indicated that its more modern infrastructure and reduced congestion lead to greater operational efficiency. These differences highlight the importance of infrastructure, planning, and coordination in port management, and how these variables impact port performance in terms of competitiveness and logistics efficiency.

Quantitative and qualitative data were combined through a triangulation process, which helped validate and enrich the findings obtained in each phase. This mixed-method approach allowed for a broader and more accurate understanding of the logistical challenges facing the ports of Guayaquil and Posorja. Data triangulation also ensured the validity and reliability of the results, as information gathered from surveys and interviews was cross-referenced with official statistics and technical reports provided by port authorities.

To ensure the validity of the findings, a pilot test was conducted with a small group of participants to assess the clarity and relevance of the interview questions. This allowed for adjustments to be made and ensured that the data collection instruments were effective in capturing meaningful information. A content analysis of the interviews was also performed to identify recurring themes and patterns in participant responses. This process allowed the extraction of conclusions regarding shared perceptions among logistics sector stakeholders, contributing to a deeper understanding of the factors that influence the operational efficiency of both ports.

The combination of quantitative and qualitative approaches enabled the study to not only measure operational aspects of the ports but also to understand the human, technical, and organizational factors that influence their performance.

This integrated analysis was essential for developing a comprehensive understanding of the logistical challenges and provided a solid foundation for proposing recommendations aimed at improving the efficiency and competitiveness of the Ports of Guayaquil and Posorja.

Table 3 Comparison of Key Operational Indicators between TPG, the Port of Posorja, and Contecon Guayaquil S.A.

Indicator	Guayaquil Port Terminal (TPG)	Port of Posorja (DP World)	Contecon Guayaquil S.A.
Draft depth	12 meters	14.65 meters	13.5 meters
Annual cargo capacity	2.5 million TEUs	1 million TEUs	Data not available
Number of operational terminals	5 terminals	1 terminal	5 terminals
Annual vessel traffic	1,400 vessels	300 vessels	500 vessels
Average clearance time	48 hours	24 hours	36 hours
Container wait times	24–48 hours	12–24 hours	24–48 hours

*TEUs: Twenty-foot Equivalent Units.

This table highlights significant differences in infrastructure and operational capacity among the three major port terminals in Guayaquil: Guayaquil Port Terminal (TPG), the Port of Posorja, and Contecon Guayaquil S.A.

First, there is a clear disparity in draft depth, a key factor influencing a port's ability to receive larger vessels. The Port of Posorja, with a draft of 16 meters, exceeds both TPG (12 meters) and Contecon Guayaquil S.A. (13.5 meters), allowing it to accommodate deeper-draft vessels and giving it an advantage in handling large ships.

In terms of annual cargo capacity, Guayaquil Port Terminal leads with 2.5 million TEUs, while the Port of Posorja has a capacity of 1 million TEUs. This suggests that TPG manages a higher container volume, possibly reflecting its greater market maturity. Although Contecon Guayaquil S.A. does not disclose specific figures, it operates a robust infrastructure with five active terminals.

Annual vessel traffic also varies significantly. Guayaquil's terminals handle approximately 1,400 vessels per year, whereas Posorja handles only 300, underlining the higher operational volume in Guayaquil. However, the average clearance time at TPG is 48 hours, compared to 24 hours at the Port of Posorja, which demonstrates Posorja's higher efficiency in cargo handling operations.

Table 4 Comparison of Logistical and Administrative Processes between the Guayaquil Port Terminal and the Port of Posorja

Process	Guayaquil Port Terminal	Port of Posorja
Customs Inspection	Conducted at terminals; delays are common due to congestion	Faster inspection due to lower congestion
Sanitary Inspection	Performed at terminals, with waiting times	Reduced congestion allows quicker inspections
Immigration Inspection	Document review delays reported	Faster inspection due to lower processing volume
Document Digitalization	Partial implementation of the SIGMAR platform	Fully implemented digital documentation system
Average Clearance Time	48 hours	24 hours

This table illustrates the differences between the two ports regarding the efficiency of their logistical and administrative processes.

At the Guayaquil Port Terminal, customs, sanitary, and immigration inspections tend to be slower due to higher cargo volumes and terminal congestion, leading to additional delays. In contrast, the Port of Posorja, with significantly lower traffic volume, offers faster inspection times, contributing to more efficient clearance procedures.

Moreover, document digitalization is an area where Posorja has implemented a more streamlined solution. While the SIGMAR platform at Guayaquil is still undergoing partial implementation, Posorja has already optimized this process through full digital integration. This contrast highlights the crucial role of technology in enhancing logistical efficiency.

Table 5 Comparison of Infrastructure and Expansion Capacity between the Guayaquil Port Terminal and the Port of Posorja

Element	Guayaquil Port Terminal	Port of Posorja
Existing Infrastructure	Older infrastructure with limited space	Modern infrastructure with more available space
Expansion Capacity	Limited due to urban congestion	Ample capacity for future expansion
Available Berths	6 operational berths	1 operational berth
Technology	Partial implementation of modern technologies	Advanced equipment and modern technology
Access to Road Network	Well-connected, but affected by traffic congestion in surrounding areas	Adequate access with no urban congestion
Berthing Capacity	2,500 meters of berthing line	500 meters of berthing line

The comparison of port infrastructure reveals clear differences in the development of facilities. Although the Guayaquil Port Terminal is larger, it relies on older infrastructure with limited room for expansion. Urban congestion in surrounding areas further hampers logistical efficiency, as access to loading and unloading zones is often slow and contributes to operational challenges.

In contrast, the Port of Posorja benefits from modern infrastructure and greater expansion capacity. The availability of open space and advanced facilities offers a strategic advantage in terms of growth and competitiveness. Moreover, its location in a less congested area results in smoother access and provides a more efficient environment for port operations.

These differences underscore the challenges and opportunities for improving efficiency in both ports. Guayaquil faces the urgent need for modernization and spatial expansion to remain competitive amid the rising importance and strategic potential of the Port of Posorja.

DISCUSSION

The discussion on the efficiency and competitiveness of the ports of Guayaquil and Posorja focuses on the logistical challenges faced by the former and the opportunities presented by the latter, particularly considering advances in infrastructure, process digitalization, and operational capacity. Based on the data collected, it is possible to analyze the implications of Guayaquil's logistical issues and how investment and planning in the Port of Posorja could offer a viable alternative to enhance Ecuador's port competitiveness.

The objective of this study was to identify the logistical problems at the Port of Guayaquil and compare them with the operational characteristics and advantages of the Port of Posorja. The hypothesis posed suggests that the increasing competition between the two ports, particularly in infrastructure and logistical efficiency, may lead to a shift in trade dynamics, where Posorja, with its modern infrastructure and greater expansion capacity, could eventually surpass Guayaquil if the latter fails to resolve its ongoing issues of congestion and operational inefficiency.

Guayaquil's ports have historically been a crucial engine for the country's economy, but their infrastructure presents significant limitations—especially in terms of berthing capacity and draft depth. These factors directly affect operational efficiency, leading to extended container wait times and delays in cargo clearance.

While Guayaquil remains the busiest port in terms of cargo volume, the congestion in its port zone and the lack of space for expansion hinder continuous improvement in logistics operations.

Moreover, the digitalization of logistics processes remains a challenge at the Port of Guayaquil, as seen in the partial implementation of the SIGMAR platform. This limits its ability to optimize clearance times when compared to Posorja, which has successfully implemented a fully digital system. As a result, Posorja offers greater administrative and operational efficiency, including faster customs and sanitary inspections, thus improving its competitiveness against other ports in the region.

On the other hand, the Port of Posorja has demonstrated promising growth, with modern infrastructure and a strategic location. Investments in advanced technology and ample room for expansion offer a long-term advantage, particularly for accommodating larger vessels thanks to its greater draft depth. However, its current cargo volume has not yet reached the levels seen at Guayaquil, indicating that Posorja must still improve its vessel attraction strategies and logistical connectivity in order to fully consolidate its position as a competitive port.

The hypothesis that Posorja could surpass Guayaquil in competitiveness is supported by these findings. While Guayaquil remains critical to Ecuador's trade, its lack of expansion capacity and persistent congestion problems may cause it to lose relevance to more modern and efficient ports like Posorja. If Guayaquil fails to address its infrastructure constraints and improve its digital systems, it may begin to lose market share to its emerging competitor.

CONCLUSIONS

The comparative analysis between the ports of Guayaquil and Posorja reveals that, although Guayaquil continues to be Ecuador's main port in terms of cargo volume, it faces serious logistical challenges that impact its competitiveness. Congestion within its facilities, limited berthing capacity, and draft-related issues are significant obstacles that hinder smooth and efficient operations. If these issues are not addressed effectively, Guayaquil's leadership in the national and regional port market could be at risk.

In contrast, the Port of Posorja presents a more promising outlook. Thanks to its modern infrastructure, deeper draft, and effective use of advanced technology, Posorja is well-positioned to compete with Guayaquil, offering advantages in terms of speed and expansion potential.

Although its current cargo volume is lower, Posorja's ability to accommodate larger vessels and its emphasis on process digitalization may allow it to gain market share in the near future—particularly if it strengthens its connectivity and operational scale.

Ultimately, the future of port logistics in Ecuador will depend on how both Guayaquil and Posorja address their respective strengths and weaknesses. If Guayaquil fails to resolve its congestion issues and modernize its infrastructure, it risks losing competitiveness to Posorja and other regional ports. Conversely, if Posorja maintains its pace of growth and continues to improve its connectivity, it could become a strong contender capable of reshaping Ecuador's port and logistics landscape in the coming years.

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