Proposal for the implementation of a ferry service through Public Private Partnerships (PPP's) in the Eastern Caribbean Region

Background

Transport networks are an essential element for the economic and social development of any country and are frequently part of national and regional development strategies. The efficiency and sustainability of such systems, however, are often hampered by many factors, including insufficient or

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inadequate infrastructure, long distance from major markets, cumbersome transit procedures, poor security, among others. Such challenges often translate into higher transport costs. For this reason, better connectivity and regional integration are crucial to overcome development bottlenecks, notably for developing and middle-income countries.

In the Caribbean region, ferry services are an important alternative to improve connectivity, but the options currently offered are usually operated over short distances and between islands of the same country or its neighbors, with very few exceptions such as the route between Puerto Rico and the Dominican Republic. The Organization of Eastern Caribbean States (OECS) and the Caribbean Community (CARICOM), aware of this reality, have contracted several studies to evaluate the implementation of regional ferry services, and private initiatives have also been presented. The project faces great challenges, among which are inefficiency in processes, technology, customs, migration and regulatory issues, the lack of a common policy, small volumes of traffic, obsolete and inadequate infrastructure, and very limited availability of data to analyze the efficiency of the services provided, among others.

According to information obtained from BlueWater (Lugo and others, 2022), there are 90 regular maritime transport line services in the Caribbean region, of which 74% have weekly services and 7% operate every two weeks. 69% of the ships are regular line services (container ships), 12% are multipurpose ships, 18% can transport rolling cargo (Ro-Ro), and 1% are refrigerated ships. 49% of the services are provided by regional operators, mainly shipping lines from the United States, 48% are offered by global shipping lines and 3% by European lines serving the region. 44% of the ships have less than 1,500 TEUs of capacity (Lugo and others, 2022).

Of the 90 maritime transport lines in the region, 61 (almost 68%) are local; that is, services that originate in the continental Caribbean and serve the insular Caribbean. Only fifteen (15) of these regional services serve the islands that are part of the Eastern Caribbean. The ports with the highest frequency of regular container line services in the region are Point Lisas and Port of Spain, in Trinidad and Tobago, *Pointe-à-Pitre*, in Guadeloupe, Georgetown, in the Cayman Islands, and Bridgetown, in Barbados (Lugo and others, 2022).

As for the ferry lines currently available in the region, internet information and data from the Central American Maritime Transport Commission (COCATRAM) identified 43 intra-regional services (Lugo and others, 2022). Most of the ferries carry passengers exclusively, by catamaran or high-speed vessels. In very few cases, services are provided on Ro-Ro type ferries which have the capacity to transport also private and commercial vehicles, as well as passengers. Only six companies that offer this type of transport were identified (Lugo and others, 2022).

On the contrary, air transport is well established in the region and is essential for handling cargo, generally transported in passenger planes. However, this option is 10 to 12 times more expensive than maritime transport. Even so, it has been used regularly by the Caribbean islands, and between 2016 and 2018 it increased by 50% (World Bank, 2020).

Air transportation services in the Caribbean are expensive, mainly impacted by the small and fragmented size of the market, with high costs, low frequency, and inconvenient itineraries, being a barrier to regional connectivity. The average airline revenue per passenger and per kilometer is much higher than the global average (see figure 1). Moreover, intra-regional figures are generally even higher than the extra-regional revenue. Taxes, fees, and charges in the region are also high and represent approximately 35% of the cost of a one-way airfare, much higher that the worldwide average of approximately 15% (CDB, 2018).

Figure 1
Average revenue per passenger, per kilometer, by country, 2016
(In dollars)
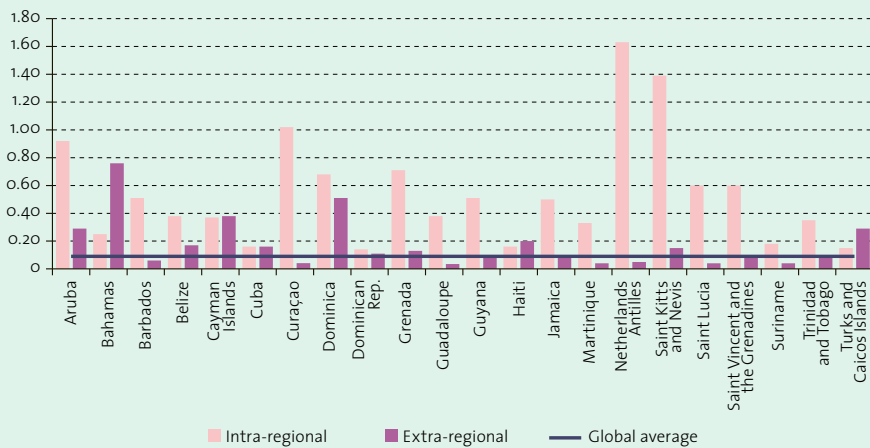
Source: Visual interpretation by the author, based on Air Transport Competitiveness and Connectivity Study 2018, Caribbean Development Bank (CDB, 2018).

To assess the implementation of a ferry service that could improve connectivity in the Eastern Caribbean, the first part of this bulletin provides a technical proposal of four different routes, with the evaluation of its possible economic benefits, impacts, and limitations. The selection of such routes, presented in this FAL Bulletin according to the author's own interpretation and translation, was made in the main study: "*Evaluación preliminar técnica, económica e institucional para la implementación de un servicio de ferris en el Caribe Oriental*", conducted by Eduardo Lugo, Alberto Undurraga, Ricardo J. Sánchez, and Jorge A. Lupano (cited in this FAL Bulletin as Lugo and others, 2022).

The second part of the study considers that both the current port infrastructure and the connectivity services available in the region are not adequate and would require investments to be able to handle the higher volumes of passengers and cargo. This part analyses the possibility of private sector participation in the development of such a system, through Public-Private Partnerships (PPPs) or even government subsidies for the financing and operation of ferry routes and ports. Moreover, two successful examples of maritime transport implementation are presented: the "Motorways of the Sea" program in Europe and the subsidy system for maritime, river and lake transportation in southern Chile. This part also includes a decision tree to guide investment possibilities.

Additionally, it is important to consider the possibility of using the "People-First" approach to PPPs for investments in ferries in the region, placing the projects under the umbrella of the Sustainable Development Goals (SDGs). Such instruments ensure that out of all stakeholders, 'people' are on the top (UNECE, 2022), improving the quality of life of the communities involved.

The analysis is then concluded with the consideration of potential risks and challenges such as financing needs, possible alternatives and the institutional requirements involved. It is suggested to approach the proposal of a ferry system in the Caribbean with contractual arrangements through multilateral entities instead of by each country individually. Thus, the participation of multilateral banks is recommended since it generates the framework of both resources and trust necessary for the development of such a project.

I. Technical and economic analysis

According to a survey carried out by the World Bank with leading active tourism operators and residents of the islands, there is apparent demand for intra-regional travel through a regional ferry system. A ferry that makes it easier for tourists to travel from one island to another would have a positive impact on tourism trends in the region (World Bank, 2015), potentially increasing passenger flows. It would also improve trade and internal connectivity between the islands.

Additionally, it is important to remark that the Eastern Caribbean islands do not have open skies policies (bilateral or multilateral agreements that consolidate different regulations into a framework for commercial air service). Although some progress has already been made to increase competition, Leeward Island Air Transport (LIAT) remains as the region's main airline, and its fares are high.[1] In 2018, a Multilateral Air Service Agreement (MASA) was signed between members of CARICOM, which may expand opportunities for airlines in the region. Its full implementation would be an alternative for the liberalization of open skies agreements.

The current regulatory framework in the region is not harmonized, so the complexity of complying with different laws, regulations and practices impose additional costs on airlines. On many occasions, this is a limitation for the provision of the services. As a reference, the average air travel rate from LIAT between the OECS islands in 2014 was 1.50 dollars per mile, over 102% higher than the average of 0.74 dollars per mile charged by the same airline for traveling from Trinidad and Tobago or Barbados to Miami, in the United States (Lugo and others, 2022).[2]

A. Assumptions considered in the study

Transportation costs per mile are also influenced by further issues such as travel distance, port charges, payments to government agencies, ship speed and capacity, as well as administrative costs. To provide an economic evaluation of the ferry service possibilities, the exercise conducted in this study considered twenty ports in different countries in the region (Lugo and others, 2022). Due to geographical characteristics, Trinidad and Tobago (Port of Spain port) was defined as the main connection point for the routes analyzed and Saint Lucia (Castries port) as a secondary hub.

The rates used to estimate passenger transport revenues were obtained from a study from the World Bank, being 1.06 dollars per nautical mile the average rate in the Eastern Caribbean region (World Bank, 2015). This represents approximately 2/3 of the 1.50 dollars per mile average for air transportation from LIAT between the OECS islands, as mentioned in the previous section. The rate for high-speed ferry services is 2.71 dollars per nautical mile, and 0.99 dollars per nautical mile for Ro-Ro ferry services in Trinidad and Tobago (OECS, 2009). The rate used to estimate revenues from cargo transport was 47.50 dollars per ton, which corresponds to the average between the formal and informal sectors in the region (OECS, 2009).

The selected countries were distributed in four routes according to their geographical location (see map 1). Since the vessels do not have overnight accommodations, the distances were intended to comprise a maximum range of 1,600 nautical miles. It was assumed that passengers will not travel more than 24 hours on the ship, so that in each docking port they carry out loading and unloading operations for passengers and cargo.

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[1] On 27 June 2020, the company was announced to be liquidated following increased financial difficulties and the economic impact of the COVID-19 pandemic (source: https://simpleflying.com). LIAT (1974) Ltd. is under Administration as of 24th July 2020 (source: https://www.liat.com), and has since been operating with a limited number of aircraft, reduced schedule and limited workforce (source: https://antiguaobserver.com), adding further pressure to intra-regional transport options.
[2] Current rates may vary significantly due to different economic circumstances or changing market conditions. Therefore, this initial assessment requires regular updating.
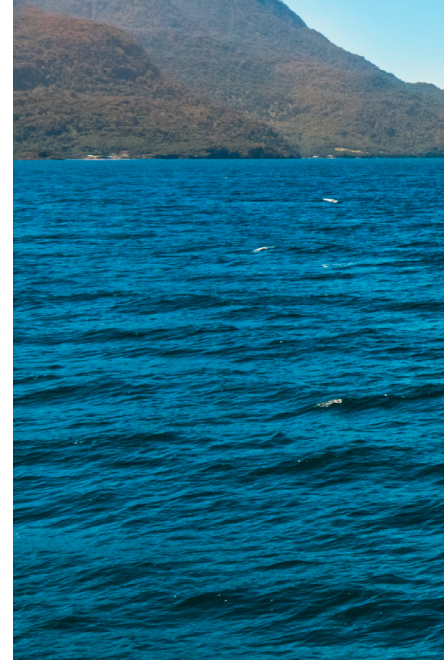
Journey rotation times and associated costs were calculated for each route based on distance and speed of the selected ship. It was defined that the time of stay in each port, for all the routes presented, is 6 hours, which corresponds to one hour for docking or undocking maneuver and two hours in the reception/loading/unloading operations of the vessel.

Four vessel types were considered, depending on their speed and cargo capacity: one cargo landing craft with average speed of 10 knots (AMT2255), a passenger ferry with average speed of 20 knots (Mexico V), and two RO-PAX ferries (an acronym for ships that transport rolling cargo and passengers) with average speed of 37 and 39.5 knots (APT James and Bucco Reef, respectively). These ships already operate in the Caribbean and the information on costs and technical specifications was provided by an operator of a Trans Caribbean company in Mexico, as well as on-island contacts and ship manufacturer websites (Lugo and others, 2022). The port charges and fees considered were obtained from the study "Short Sea Shipping Network and Finance Model for the Caribbean" (IDB, 2018). See figure 2.

Figure 2
Analyzed Vessels

The income estimates provided assume that the ships sail at 50% capacity for both passengers and cargo. The first simulation considers the average rate in the Eastern Caribbean region of 1.06 dollars per nautical mile (World Bank, 2015) as general rate for all four vessels. Another simulation maintained this rate for the slower vessels (AMT2255 and Mexico V) but considered the rate of 2.71 dollars per nautical mile, the average for high-speed ferry services, as more realistic rates for the vessels APT James and Bucco Reef. A third and final simulation was then carried out considering 60% capacity for vessels Mexico V, APT James and Bucco Reef.

All these assumptions are provided in detail in the annex of this report. It is also considered that the regional demand for international freight and passenger transport services is highly sensitive to price, frequency and reliability. Therefore, if services can be established at reasonable prices, consumers in the region would use them.

Finally, it is important to highlight that any disruptions in the assumptions, such as delays due to weather conditions or port inefficiencies, would directly affect the results.

B. Ferry service proposal

In this proposal, it is recommended that the most distant ports with higher cargo volumes are connected through already existing lines in the region, forming a rotation through the existing ports between Puerto Rico and Trinidad and Tobago. Possible integrating ports of smaller Caribbean islands would be Caucedo, located in the Dominican Republic, and Port of Spain, in Trinidad and Tobago. As already mentioned, it is suggested to use the port of Castries, in Saint Lucia, as a minor hub, taking advantage of the connectivity it has with the nearby islands (see map 1).

Map 1
Eastern Caribbean region: four proposed routes for ferry services
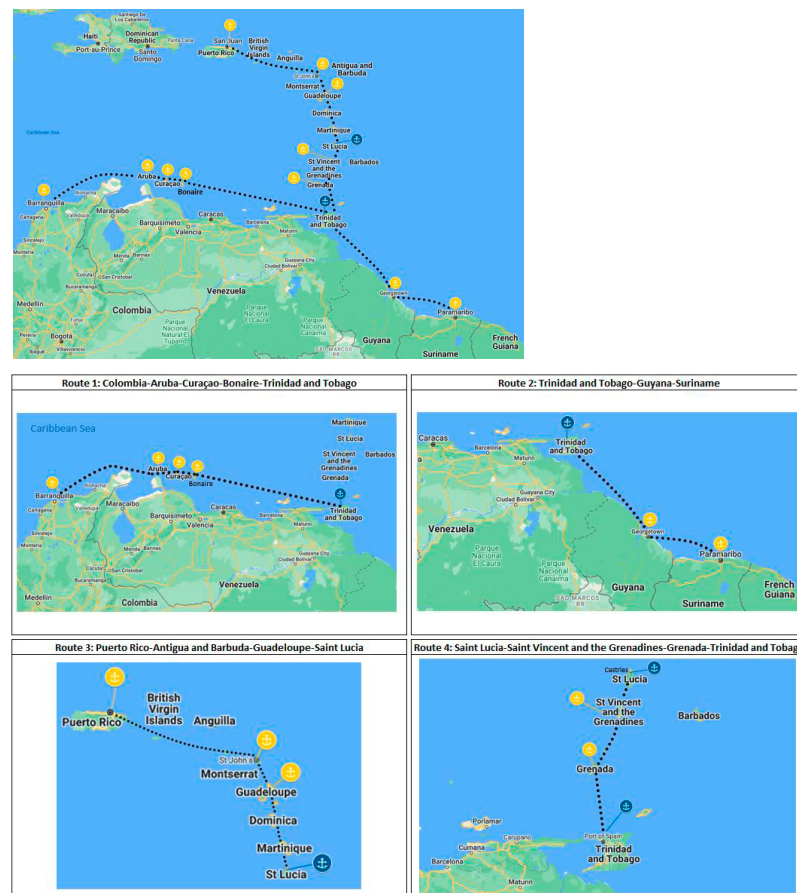
Source: Google Maps and Lugo and others (2022).

Proposed Routes:

- **Route 1**: Colombia, Aruba, Bonaire, Curaçao, Trinidad and Tobago.
- **Route 2**: Trinidad and Tobago, Guyana and Suriname.
- **Route 3**: Puerto Rico, Antigua y Barbuda, Guadalupe and Saint Lucia.
- **Route 4**: Saint Lucia, Saint Vincent, Granada and Trinidad and Tobago.

The first and second rotations would use Port of Spain, in Trinidad and Tobago, as main hub to integrate Colombia, Aruba, Curaçao and Bonaire in one direction (Route 1), with Suriname and Guyana in the other (Route 2). The third and fourth rotations use the port of Castries, in Saint Lucia, as secondary hub. To the north, it would connect Puerto Rico through Antigua and Barbuda and Guadalupe (Route 3). To the south, through Granada and St. Vincent and Grenadines to Port of Spain, in Trinidad and Tobago, it integrates these islands into the rotation of the main line. This service proposal was based on the maritime trade already in place in the year 2019 between each location (Lugo and others, 2022).

The study considers only the private profitability of each route per vessel as economic results of the implementation of the ferry service, without adding public benefits or any positive externalities for the impacted population. In this sense, it is important to point out that the initiative would also involve further social benefits and environmental impacts. The assessment of such potential could improve the results of implementation and economically justify the granting of explicit public subsidies to ferry services offered.

C.   Results and recommendations

The results provided in the study indicate that the AMT2255 and the Mexico V ferries present better economic results than the high-speed vessels. This seems natural and expected, since the operating costs for the faster ships are high, above all, due to the extra fuel needed to reach the higher average speed of navigation. However, such vessels have the necessary capacity to carry trucks, with which inter-modality could be implemented. Also, due to time and comfort factors, passengers tend to prefer shorter trips and less than one day of navigation, for which a high-speed ferry would be a better option. Additionally, it would be important to consider ships with better performance and more environment friendly options.

At 50% capacity utilization levels both for passengers and cargo, slower vessels are economically profitable on all four routes with the passenger rates of 1.06 dollars per mile, the average in the Eastern Caribbean region. One exception is the Mexico V ship, which is not a high-speed vessel, and requires its capacity utilization levels to be maintained at 60% to be economically profitable on Route 4. The price of 1.06 dollars per mile is considered very competitive because it is almost 30% lower than the average rate for the use of air transportation in the Caribbean, calculated at 1.50 dollars per mile, as shown previously. The high-speed vessels, however, require passenger rates of 2.71 dollars per mile to be profitable. This is almost 81% more expensive than the average rate for air transportation, and therefore could restrain the implementation of the service.

The detailed financial results of the study are provided in the annex of this report. For the four routes analyzed, the implementation of the service is possible, and the evaluation of the main results draw the following conclusions:

- Route 2 (Trinidad and Tobago, Guyana and Suriname) leaves the best profit margins for the service. According to the main study, for a frequency of two departures per week, it would need one vessel both in the case of a passenger ferry option (Mexico V) or for the two options of high-speed ferries (APT James and Bucco Reef).
- As a second option, the implementation of Route 4 would be recommended to improve connectivity in the region. To be profitable, it would require a higher passenger transport capacity of at least 60% for the entire route and higher minimum rates of 2.71 dollars per nautical mile for the high-speed vessels.

- The third option recommended is Route 3, connecting Saint Lucia with Guadeloupe, Antigua and Barbuda, and Puerto Rico. It is in this case that Saint Lucia becomes the secondary hub for the ferry service, keeping Trinidad and Tobago as the main hub.
- Route 1 is not recommended in a first stage of implementation (pilot project) due to the long trajectory that it represents and its large time duration to be completed.

Further political integration would be critical to ensure the success of the ferry service implementation. First, the Chaguramas Treaty, which established the Caribbean Community and the Common Market (CARICOM), should be revisited to identify opportunities for improvement, facilitating the entry of work vehicles (cargo trucks, etc.) and ensuring free transit in the countries where the service would operate. Similarly, customs and immigration regulations for the flow of goods and people should be reviewed and improved to speed up the process and reduce transaction costs.

Port capacity is another key success factor, so that the time needed for the ships to remain in ports is as short as possible for better operation efficiency. This study considered similar operation times for all ports throughout the rotations established so that the proposed itineraries can be fulfilled.

The lack of updated and available data in the Caribbean is a limitation for this type of exercise and for larger simulations. The estimates presented in this document are based on information available from secondary sources and studies, often dating back many years. Moreover, as the identification of intra-regional flows of both passengers and cargo is limited and could represent inconsistencies, the analysis of revenue and costs was based instead on the capacity utilization levels of the selected vessels. To overcome such challenges, a possible solution would be to propose a second stage of this study, collecting primary data on the intra-regional flows to obtain precise demand estimates and to carry out first-hand inspections which could accurately describe the infrastructure situation of the selected ports.

The Caribbean region, despite being an attractive market with many countries, has great challenges in terms of intra-regional logistics integration due to the large number of islands that comprise it, which undermines the possible economies of scale from a single market. This is a limitation to establishing independent transport services that could promote greater regional integration, as well as economic and social development in the region, especially to improve the post-pandemic economic recovery.

Another limitation for the implementation of the ferry service in the Caribbean is the lack of efficiency in port infrastructure, measured in terms of availability of port equipment, labor, information systems, fluidity of the processing of ship arrival information and registration of passengers and merchandise.

II. Analysis of the private sector participation in the development of a ferry system in the Caribbean region

The possible development of the routes presented previously is subject to the fleet frequencies, availability, expected demand, and other practical aspects in the region. Moreover, it is estimated that except for the port of Trinidad and Tobago, the other ports mentioned require investments in port facilities and services to allow ferry transportation. The current infrastructure and the connectivity services available in such ports show that even when docks for rolling cargo are available, the conditions for the higher volumes that a ferry system would require are not adequate. Therefore, the second part of this report analyzes possible solutions in the form of Public Private Partnerships (PPPs) for the financing of infrastructure and operation of routes, ports and connectivity services in the Caribbean.

A. Conceptual aspects of Public-Private Partnerships (PPPs) and other forms of private participation in the provision of public goods

Prior to the application of financing instruments such as PPPs, it is important that political consensus is established between the parties involved. As the ferry network involves operations in different countries, it translates into a regional integration initiative and, therefore, a political project, which requires concrete political association agreements. For it to succeed, it would be necessary to identify in advance what are the adequate levels of engagement, development and integration expected from each participating country, considering the inclusion and social welfare that such a service would provide.

With this consensus in place, States can choose to invest individually through its national budgets (public investments) or combine such investments with private partnerships, through PPP contracts to build the necessary economic foundations to improve port infrastructure and connectivity services. Even though there is no consistent, international standard for naming and describing different types of PPP contracts (World Bank, 2022), the model of private participation can be specified as institutional or contractual. Such models may also involve public subsidies to private operators, most of which are usually intended to enable or foster the participation of private organizations in the projects.

Institutional PPPs happen when the contracting government authority associates with a private partner and jointly own shares in a legal entity to deliver the specified infrastructure and/or services. In this case, risks are shared between the public and private actors. In a contractual PPP, however, risks are transferred to the private sector according to the different contract arrangements that can be established. The most frequently used models from similar experiences are contractual PPPs (Lugo and others, 2022).

Moreover, the PPPs involve not only the different sharing of responsibilities between public and private entities but also some further aspects of the contractual arrangements to be implemented. A few examples of these are mentioned below:

- Definition of the type of structure and/or service affected by the PPP:

  Clear definition of the full scope of the project.

- Location of the PPP:

  In some countries, PPP contracts may delegate to the private sector the responsibility not only for the provision of the infrastructure and/or services itself, but also for the adjacent infrastructure as part of the obligations; in other countries, only the infrastructure in a specific location may be considered.

- Required investments (usually at the beginning of the contract):

  In some cases, during the contractual period, this is subject to certain assumptions. The obligation to raise the necessary financing in this case is usually a responsibility of the private sector participant.

- Quality standards for the provision of services:

  Should be specific. In some contracts, however, this may constitute a risk for the participants, if mentioned too broadly or vaguely.

- Net payment for the investments and/or services needed from the participants:

  This may include user fees or different types of subsidies to be received as income by the private participant for a certain period, as well as possible payments to the State or granting public institution as an expense. There are different types of rates and payments, basically being fixed, floating with a maximum limit, or totally floating.

- Contract terms and discount rates:

  When the term is fixed and the PPP is defined in a competition scheme between different bidders (open bidding), the discount interest rate is determined by each party and is not contractually binding. When the term is variable, based on the level of income or investments, the discount interest rate is relevant and should be included in the contracts terms.

- Distribution of risks between the State and the concessionaire:

  These include possible changes on the expected demand and further operational risks, exposure to land expropriation or disposal, design and construction risks, environmental and social risks, need for additional investment risk, exposure to early termination of the contract, income and financing risks, macroeconomic risks such as inflation, interest rate or exchange rate fluctuations, political and regulatory risks, and exposure to operating cost overruns. Each of these risks have different means of being addressed for PPP contracts in general and for port contracts in particular, varying from country to country.

- Sanctions in the case of not fulfilling the obligations of the contract:

  Sanctions and/or penalties may vary according to contract structures and participants involved, also varying from country to country.

- Appropriate definition of investments at the end of the concession period:

  In Chile, for instance, the concept of residual value of the PPP is incorporated into port contracts, which allow for reimbursement of investments that by the end of the contract term are not fully amortized.

When the PPPs are combined with subsidies, these could be associated with demand and are often conceived temporarily to stimulate private engagement. As a public initiative, it aims to develop a specific market prior to its maturity, to encourage the provision of a service or stimulate a specific segment. One of the possible challenges in this case would be to effectively control the demand for passengers and cargo to ensure that the implemented subsidies are efficient. An alternative would be to apply subsidies not associated with transported volumes. This model, however, despite being easier to control, may result on over or underestimated subsidy amounts. In both cases, the characteristics of the service, fleet, frequencies of transport, and in many cases the final prices to end users may be determined by the public authorities, depending on each contract terms. Subsidy schemes also allow services to be more stable, less subject to demand seasonality.

Despite the possibility of subsidies, both institutional or contractual PPPs involve potential risks. These may be exogenous, when originate externally, with little possibility of control; endogenous, when based on the dynamics of each country; or mixed, combining characteristics from both. Concrete challenges that may arise from such risks are horizontal or vertical integration, discontinuity of investments and operations, operational limitations to absorb increases in demand and even land ownership issues near port concession areas. Such aspects are thoroughly analyzed in the main study that this Bulletin refers to (Lugo and others, 2022).

B.   Similar experiences as those proposed for the Eastern Caribbean routes

Following the theoretical suitability analysis of PPPs, it is important to illustrate the mentioned concepts with examples, to demonstrate possible solutions in practice. This study indicates two transport initiatives with experiences that could be applied in the Caribbean: the "Motorways of the Sea" (MoS) program in Europe and a subsidy system for maritime, river and lake transportation in southern Chile.

1. Case Study 01: "Motorways of the Sea" (MoS) program in Europe

The first example, like the ferry routes proposal for the Eastern Caribbean shown previously, was introduced in Europe also as four maritime transport corridors. The program aims to provide new intermodal maritime-based logistics chains that would improve transport organization and represent a more sustainable and commercially efficient alternative to road transport (European Commission, 2022), reducing congestion, pollution, and promoting more reliable and efficient transportation of goods.

The concept of the project was introduced in the framework of the European Union in 2001, and its importance was reinforced in the "2011 Transport White Paper-Roadmap for a single European transport". A European coordinator was designated to facilitate

the dialogue between member States, evaluating the program's progress and making recommendations for its effectiveness, development, and implementation. Progress reports were established to be submitted on an annual basis, fostering monitoring and engagement to the project.

It is important to highlight that the establishment of the coordinator was essential for the governance of the Motorways of the Sea projects, facilitating support, supervision, and coordination itself of both general and specific compliance terms. This should also be considered in the development of a Caribbean Ferry system.

In 2006, five working groups were created, covering each of the four program regions (the Baltic Sea, the North Sea, the Atlantic, the Eastern Mediterranean and the Western Mediterranean Sea), to further facilitate implementation. These institutions strengthened even more the coordination mechanisms so that member states could identify and evaluate proposals for joint initiatives, as well as plan and develop projects in their specific regions and prepare master plans that could include specific projects through calls for proposals.

The financing sources for the program were diversified, considering both public and private, national or supranational funds. Strong governance and the support of the international banking system enabled that, over the years, the program had access to multiple sources of financing, including from the European Union's programs Marco Polo I and II, the Trans-European Transport Network (TEN-T) framework, structural and cohesion funds from territorial cooperation programs (Interreg), and support from member States to maritime transport as well as training and education for all workers involved in the multimodal freight and passenger transport chain.

For this to happen, the evaluation and authorization of projects had to be carried out efficiently and transparently, to limit their duration, costs and degree of uncertainty. Moreover, new financial instruments, such as the "EU Project Bonds" initiative, could support the financing of public-private partnerships (PPPs) on a larger scale. Therefore, this example confirms that strong governance and the support of international banking are essential to turn projects into reality. The MoS implementation is currently ongoing.

2. Case Study 02: subsidy system for maritime, river and lake transportation in southern Chile

The southern zone of Chile, in the extreme south of the American continent, has very special characteristics regarding its geography, with a significant maritime influence, intense glacial action and extreme weather conditions with strong rainfall and temperature variations. These attributes makes it the largest area of the country in terms of territory covered and yet, the one with the lowest concentration of population, with large areas that are very difficult and even impossible to access by road.

With the aim of improving the connectivity of the people who live in these areas, providing opportunities and economic development, the Chilean government has implemented policies to provide connectivity and access to services in the region (ITF, 2021). In 2009, the country implemented the National Public Transport Subsidy Law 20.378, which ensures the provision of public transport subsidies for isolated areas. Although these are defined by law, it is sought that they would tend to be extinguished in the medium and long-term due to an increase in demand, with the cost coverage being progressively associated with the service itself, to be paid by the users (Lugo and others, 2022).

Today, more than 350 thousand Chileans benefit from 724 transport services in isolated areas, covering land, water and air modes. Due to their location, small population and socio-economic characteristics, these communities do not generate sufficient demand for transport services to encourage private operators to offer them. In other cases, despite the presence of a private transport service, the population is not able to afford it due to their low level of income. Both situations require subsidies on the supply or demand side to ensure minimum levels of access (ITF, 2021).

The allocation of subsidies in the country is done through a call for a public tender. Once the service is designed, the bidding terms are generated with operation requirements,

characteristics of vehicles, contract terms, as well as the maximum subsidy amount available. Fines are also established for possible breaches and other administrative aspects related to the contracts. To allow for a comparison of bids, evaluation criteria are established with associated scores, differentiating the bids, and emphasizing the most relevant aspects for the provision of the service. Criteria such as capacity and/or age of the vehicles used and requested amount of subsidies are taken into account. The contracted operator is also required to provide statistics on passengers, cargo and vehicles transported to analyze demand and estimate occupancy rates and revenue for the next contract periods (ITF, 2021).

In general, the use of subsidies to ensure connectivity in these areas has been evaluated as positive, since it provided a service that would probably not be possible if left exclusively to market conditions. However, the main difference between this case and the possible ferry network in the Caribbean is that the service offered in Chile was provided within a single country, so that everything was regulated under a single institutional framework. For this reason, there was no need for integration of customs procedures for the mobilization of people or cargo. The main difficulties identified for the subsidy system to succeed were the lack of competition in the market, income imbalance due to seasonality, and difficulties to target the effective demand. Such issues would probably present similar challenges for the case of the ferry network in the Eastern Caribbean proposed.

C. Financing alternatives and the challenge of institutional development: the importance of multilateral banking systems

In the case of the private sector participation to establish a ferry network in the Caribbean, two main challenges must be taken into consideration: the alternatives for the financing and operation of shipping routes and ports, and the institutional development needs and possible ways forward for each State or at a multilateral level.

1. Financing and operation alternatives for shipping routes and ports

Regarding the financing possibilities, the first alternative consists of a separate bidding process, with independent investments in ferry lines and in port infrastructure. In this case, it is possible to tender each one of the routes separately or, to assign one or more routes together per bidder. Details as the characteristics of the service (place of origin and destination, frequency, security aspects, transfer times, rates to be charged by type of transport, among others), and ships to be used (number and types of ships, year of construction, passenger, and vehicle transport capacity) should be clear, for which it is important to have demand estimates to define fleet sizes and vessel types. As mentioned previously, such precise estimates are a limitation of this study, which requires a possible second stage with a detailed analysis of primary data on the intra-regional flows of both passengers and cargo and first-hand inspections on the current infrastructure situation of the selected ports.

Additionally, each bidding process should consider improvements in ports to allow both the operation of ferries and the connection with the internal transportation modes and routes of the countries. Contractual terms should be established between shipping companies and ports, also enabling more than one alliance per route, to avoid verticalization. There is also an alternative of bidding per port or multiple bidding, with assignment options for one or more ports per bidder.

The main advantages of separating tenders are that it allows the participation of different experts depending on the type of operation (ports and shipping companies) and promotes greater operational control between ports and shipping companies, as well as greater competition. On the other hand, the implementation in this case would require more bidding processes and there could be disputes during the operation that would require arbitration by the authority in charge.

The second alternative consists of joint tenders combining the operation of the shipping

routes with the investments in ports. In this case, a separate process for each route is suggested, to include the improvements for the ports used in each operation. In this case, vertical integration would be inherent to the process and could pose difficulties for other uses of the port infrastructure in the future. Therefore, further regulation with clear standards of services and prices is recommended.

Joint bidding processes, however, have the benefit of simplifying operations, since ports and shipping lines would belong to the same administration, with only one tender per route. However, a possible lower market penetration of the bids itself would be a disadvantage, given the need to bring together shipping companies and port operators in the same offer. This would probably attract only larger and more verticalized companies and alliances, with less space for the participation of smaller businesses.

The third alternative is a mixed solution: a joint tender for investments but separate, independent bidding only for operations. This would promote the investments required for each route according to ships and ports in a coordinated approach (in a single tender), facilitating the process of starting and maintaining the operation of ferries and ports separately. This has a potential to improve the market penetration of the bids and still guarantee an efficient level of operational control. However, the disadvantages in this case are that shipping companies are required to subcontract to port builders, and port investments could only be paid with the ferry rates (or subsidies), which may be conceptually correct, but reduces the flexibility of income sources.

A key issue to determine which alternative to follow (separate bidding, joint bidding or mixed solution) is to establish a process of institutional consultations with various maritime and port actors previously, with the purpose of contrasting the theory with the reality of the possible actors involved in it. This is crucial for operational details (routes, types of vessels, type of terminals, etc.), as well as for issues related to the financing or possible business models to implement. Moreover, operations must remain independent, with limits on the shareholding composition of operators and ports, which apply for the separate bidding or mixed solution alternatives. This is because further merger processes and alliances in other latitudes could pose a risk for both the definition of public policies and higher vertical integration.

Traditional PPP initiatives for the provision and financing of infrastructure services have demonstrated multiple successful examples, although eventually resulting in contrasting perceptions of their performance and the services they have provided. To mobilize private sector participants on behalf of the public interest for infrastructure investments is a challenge already due to the nature of the initiatives itself, which involve large financial disbursements, long periods for recovery and multiple risk factors. For this to happen, another alternative to increase mobilization would be to rely on people-first PPP models to provide a long-term balance between the public and private interest. Such instruments take the "people's interest" as a priority, to create "value for people" from start to finish.

The projects executed through the new people-first approach should promote the general interest within a comprehensive national infrastructure plan, so that they are not focused on solving individual problems for specific sectors, but instead are associated with the social and economic transformations needed to fulfil the SDGs (Sánchez and Lardé, 2020). In this sense, they represent an improved approach that should overcome some of the weaknesses of the traditional PPP models and could contribute to reduce the financing gap of initiatives such as the implementation of a ferry service in the Caribbean.

2. Institutional development and the importance of multilateral banking systems

Notwithstanding the above, a project for a ferry network in the Caribbean also requires significant institutional strengthening. For the development of PPPs or other forms of private participation, clear and permanent regulations are necessary over time to enable and sustain a regulatory framework for long-term contracts and its management. Such a high-level institutional framework should be able to address the strategic, operational and fiscal aspects of PPPs and other forms of private participation and provide a resolution mechanism to handle disputes.

Without such high level of institutional development, the implementation of the initiative would lack providing the necessary confidence for companies to make long-term bids and could generate unwanted spaces of missing transparency and risk of corruption. Moreover, according to the practical experiences mentioned previously, it is important to have a coordination mechanism for the ferry network to face its institutional challenges. The definition of a coordination entity such as the Association of Caribbean States (ACS-AEC) or multilateral banks would be crucial to support the sustainability of the program's implementation, as well as to supervise its operations.

At each State level, a first alternative for institutional strengthening is to rely on individual contracts with shipping companies and port operators by country. This is relatively possible to implement in countries where there is an institutional framework for subsidies and specific laws for PPPs or similar instruments. It allows taking advantage of the institutional framework already in place, with contracts being based on specific countries with direct monitoring and control. However, countries that lack strong institutions would need further support. Likewise, it is possible that the country risk of each of the participating States is different, which could generate two situations, both undesired: inhibition of participants by not trusting the long-term commitment of any of the countries or crossed subsidies between them. In such cases, regional agreements are even more important.

At a multilateral level, another alternative to enable the ferry service initiative would be based on the engagement of the region's existing multilateral entities. This solution facilitates the relationship with providers, as the principal implementing agent is concentrated instead of scattered across different countries, as well as it standardizes the services of each route and country. Still, the multilateral entities require the support of each participating country to be credible in their bids and commitments, which could affect the risk matrix of the project.

The solution both at State and multilateral levels to the problems associated with the risks that investors consider is to have the backing of a multilateral bank to support the project, without prejudice to private participation for specific contracts. This effort would ensure long-term financing for each individual country, eliminating or minimizing country risk; provide internationally bound and even interest rates, eliminating possible cross subsidies of risks between countries; offer technical assistance for the project's implementation; support the bidding processes and offer transparency and fair competition standards.

This initiative requires an effort of integration between the Caribbean countries also in terms of customs facilities for the transit of people and cargo. It will also be necessary to consider the capacity of the internal routes of each country, as well as the improvements needed. Finally, it is important to evaluate the availability of human capital, as many workers would have to be trained for the new functions related to the ferry services provided.

III. Suggested decision tree for investment

- Definition of multilateral bank to support the project:
  – Yes, it is required.

  – No, it is not required.

  It is suggested to rely on a multilateral bank to support the development of the project through technical cooperation and further financial support.

- Governance aspects:
  – With ad-hoc governance.

  – Without ad-hoc governance.

  It is suggested to define a general coordination mechanism for the project, and thus consider a holistic approach, with its different impacts.

- Definition of routes, types, and number of ships:
  – With pilot project.
  – Without pilot project.

  Prior to this definition, it is suggested to open an institutional process of consultations with private sector representatives (both shipping companies and ports). From this it is suggested to start with a pilot project.

- Definition of bidders:
  – Per each individual country.
  – Joint bidding through association of States.

  It is suggested to adopt a joint bidding process through the association of States, led by the ad-hoc coordination of the project. If not defined earlier, multilateral banking is required at this stage (which may be prior to the entire process).

- Definition of type of tender:
  – Separation between shipping lines and ports:

    Bidding for routes.

    Multiple tender.

    Tender per ports.

  – Joint bidding of ports with shipping companies:

    Bidding for routes.

    Multiple tender.

  – Mixed bidding:

    Bidding for routes.

    Multiple tender.

IV.   Final remarks

The four possible ferry routes presented in the first part of this report, as well as the practical examples of the Motorways of the Sea program in Europe, and the subsidies system implemented in southern Chile reinforce the fact that more integration and the implementation of a ferry network is possible for the Caribbean. However, for such an initiative to succeed, the current challenges of connectivity and integration between countries and territories in the region should be addressed.

To do so, State support is required, at least initially, for investments and operations, as well as to support the Caribbean States in terms of financing and technical assistance. Therefore, working with a multilateral bank would be a very positive alternative. Moreover, ports would need further infrastructure improvements and the characteristics of the ships used should be thoroughly considered. As shown in this study, the projected demand, and other variables such as operational costs, prices, time and capacity for each route may change depending on the vessel used.

In this context, it would be desirable to have an institutional consultation process with private sector representatives to specify the possible types of ships available, routes and port improvements needed, as well as financing mechanisms. Transport operations and port improvements are projects of a different nature, so it is also important to define if the network would rely on a single or different operators for each initiative. If the operators are different, it is possible to simplify the investment process in port improvements by incorporating them into individual contracts through public tenders that would allow

more competition and better conditions for the participating countries.

Another important definition is whether the tenders would be specific for each route and port or multiple. Both alternatives have advantages and disadvantages, and a pilot project should be implemented to test and learn from each possibility. A further challenge to be resolved is the institutional framework that would support the ferry network in the Caribbean. This study considers it essential to define a general coordinator to lead the implementation, as set in the Motorways of the Sea case in Europe.

This is an initial study that requires further specific collection of data and analysis, as well as a definitive political decision to continue exploring the project. It is recommended that the countries evaluate the proposal of four possible routes for the operation of the ferry network in the Eastern Caribbean region and suggest a pilot program through a process of consultation with the different market players involved. Moreover, the possibilities of PPPs should be considered, associated with the benefits and risks mentioned in this report.

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VI. Annex
Summary tables per route and type of vessel

Table A1

Comparative summary of ferry line options and vessels at passenger rate of $1.06 per nautical mile for all vessels

	AMT2255	Mexico V	APT James	Bucco Reef
Speed-knots	10	20	37	39.5
Vessel Capacity				
Passengers	310	286	926	995
Cargo	650	132	593	720
Frequency (*days*) or 2 journeys per week	3.5	3.5	3.5	3.5
Route 1: Colombia, Aruba, Curaçao, Bonaire and Trinidad and Tobago				
	AMT2255	Mexico V	APT James	Bucco Reef
Total journeys/year per vessel	41.6	67.7	95.3	98.2
Number of required Vessels	3	2	2	2
Annual Service Capacity				
Passengers (*seats*)	38 684	38 753	176 446	195 508
Cargo (*tons*)	81 111	17 886	112 994	141 473
Nautical miles used	1 626	1 626	1 626	1 626
Number of ports	9	9	9	9
Total transit time includes port-days (*days*)	8.8	5.4	3.8	3.7
Estimated income at 50% utilization (*dollars*)	282 589	249 604	812 092	874 571
Estimated costs at 50% utilization (*dollars*)	241 007	215 343	1 060 803	1 087 454
Utility/loss per journey (*dollars*)	41 583	34 261	-248 711	-212 883
Margin (*utility or loss/estimated income*)	14.7%	13.7%	-30.6%	-24.3%
Route 2: Trinidad and Tobago, Guyana and Suriname				
	AMT2255	Mexico V	APT James	Bucco Reef
Total journeys/year per vessel	65.4	110.9	163.0	169.0
Number of required Vessels	2	1	1	1
Annual Service Capacity				
Passengers (*seats*)	40 531	31 713	150 973	168 110
Cargo (*tons*)	84 985	14 637	96 682	121 648
Nautical miles used	1 100	1 100	1 100	1 100
Number of ports	5	5	5	5
Total transit time includes port-days	5.6	3.3	2.2	2.2
Estimated income at 50% utilization(*dollars*)	196 168	169 873	553 942	597 185
Estimated costs at 50% utilization(*dollars*)	112 912	103 273	610 156	624 851
Utility/loss per journey (*dollars*)	83 255	66 600	-56 215	-27 666
Margin (*utility or loss/estimated income*)	42.4%	39.2%	-10.1%	-4.6%
Route 3: Puerto Rico, Antigua and Barbuda, Guadeloupe and Saint Lucia				
	AMT2255	Mexico V	APT James	Bucco Reef
Total journeys/year per vessel	63.0	100.1	137.2	141.1
Number of required vessels	2	2	1	1
Annual Service Capacity				
Passengers (*seats*)	39 073	57 265	127 068	140 412
Cargo (*tons*)	81 928	26 430	81 373	101 605

Table A1 (concluded)

Route 3: Puerto Rico, Antigua and Barbuda, Guadeloupe and Saint Lucia				
	AMT2255	**Mexico V**	**APT James**	**Bucco Reef**
Nautical miles used	1 030	1 030	1 030	1 030
Number of ports	7	7	7	7
Total transit time includes port-days	5.8	3.6	2.7	2.6
Estimated income at 50% utilization (*dollars*)	184 667	159 262	519 587	560 271
Estimated costs at 50% utilization (*dollars*)	116 206	115 210	781 071	800 615
Utility/loss per journey (*dollars*)	68 460	44 053	-261 483	-240 345
Margin (*utility or loss/estimated income*)	37.1%	27.7%	-50.3%	-42.9%
Route 4: Saint Lucia, Saint Vincent, Grenada and Trinidad and Tobago				
	AMT2255	**Mexico V**	**APT James**	**Bucco Reef**
Total journeys/year per vessel	103.5	145.3	178.3	181.4
Number of required vessels	2	1	1	1
Annual Service Capacity				
Passengers (*seats*)	64 199	41 548	165 091	180 445
Cargo (*tons*)	134 610	19 176	105 722	130 574
Nautical miles used	486	486	486	486
Number of ports	7	7	7	7
Total transit time includes port-days	3.5	2.5	2.0	2.0
Estimated income at 50% utilization (*dollars*)	95 287	76 803	252 603	273 392
Estimated costs at 50% utilization (*dollars*)	72 380	83 003	741 455	760 563
Utility/loss per journey (*dollars*)	22 907	-6 200	-488 852	-487 171
Margin (*utility or loss/estimated income*)	24.0%	-8.1%	-193.5%	-178.2%

Source: Free translation from Lugo and others (2022).

Table A2
Comparative summary of options and vessels at passenger rate of $1.06 per nautical mile for vessels AMT2255 and Mexico V, and $2.71 per nautical mile for vessels APT James and Bucco Reef

Route 1: Colombia, Aruba, Curaçao, Bonaire and Trinidad and Tobago				
	AMT2255	**Mexico V**	**APT James**	**Bucco Reef**
Total journeys/year per vessel	41.6	67.7	95.3	98.2
Number of required vessels	3	2	2	2
Annual Service Capacity				
Passengers (*seats*)	38 684	38 753	176 446	195 508
Cargo (*tons*)	81 111	17 886	112 994	141 473
Nautical miles used	1 626	1 626	1 626	1 626
Number of ports	9	9	9	9
Total transit time includes port-days	8.8	5.4	3.8	3.7
Estimated income at 50% utilization (*dollars*)	282 589	249 604	2 054 275	2 209 314
Estimated costs at 50% utilization (*dollars*)	241 007	215 343	1 060 803	1 087 454
Utility/loss per journey (*dollars*)	41 583	34 261	993 471	1 121 859
Margin (*utility or loss/estimated income*)	14.7%	13.7%	48.4%	50.8%
Route 2: Trinidad and Tobago, Guyana and Suriname				
	AMT2255	**Mexico V**	**APT James**	**Bucco Reef**
Total journeys/year per vessel	65.4	110.9	163.0	169.0
Number of required vessels	2	1	1	1
Annual Service Capacity				

Table A2 (concluded)

Route 2: Trinidad and Tobago, Guyana and Suriname				
	AMT2255	**Mexico V**	**APT James**	**Bucco Reef**
Passengers (*seats*)	40 531	31 713	150 973	168 110
Cargo (*tons*)	84 985	14 637	96 682	121 648
Nautical miles used	1 100	1 100	1 100	1 100
Number of ports	5	5	5	5
Total transit time includes port-days	5.6	3.3	2.2	2.2
Estimated income at 50% utilization (*dollars*)	196 168	169 873	1 394 287	1 500 148
Estimated costs at 50% utilization (*dollars*)	112 912	103 273	610 156	624 851
Utility/loss per journey (*dollars*)	83 255	66 600	784 130	875 297
Margin (*utility or loss/estimated income*)	42.4%	39.2%	56.2%	58.3%
Route 3: Puerto Rico, Antigua and Barbuda, Guadeloupe and Saint Lucia				
	AMT2255	**Mexico V**	**APT James**	**Bucco Reef**
Total journeys/year per vessel	63.0	100.1	137.2	141.1
Number of required vessels	2	2	1	1
Annual Service Capacity				
Passengers (*seats*)	39 073	57 265	127 068	140 412
Cargo (*tons*)	81 928	26 430	81 373	101 605
Nautical miles used	1030	1030	1030	1030
Number of ports	7	7	7	7
Total transit time includes port-days	5.8	3.6	2.7	2.6
Estimated income at 50% utilization (*dollars*)	184 667	159 262	1 306 456	1 405 772
Estimated costs at 50% utilization (*dollars*)	116 206	115 210	781 071	800 615
Utility/loss per journey (*dollars*)	68 460	44 053	525 385	605 156
Margin (*utility or loss/estimated income*)	37.1%	27.7%	40.2%	43.0%
Route 4: Saint Lucia, Saint Vincent, Grenada and Trinidad and Tobago				
	AMT2255	**Mexico V**	**APT James**	**Bucco Reef**
Total journeys/year per vessel	103.5	145.3	178.3	181.4
Number of required Vessels	2	1	1	1
Annual Service Capacity				
Passengers (*seats*)	64 199	41 548	165 091	180 445
Cargo (*tons*)	134 610	19 176	105 722	130 574
Nautical miles used	486	486	486	486
Number of ports	7	7	7	7
Total transit time includes port-days	3.5	2.5	2.0	2.0
Estimated income at 50% utilization (*dollars*)	95 287	76 803	623 883	672 337
Estimated costs at 50% utilization (*dollars*)	72 380	83 003	741 455	760 563
Utility/loss per journey (*dollars*)	22 907	-6 200	-117 572	-88 225
Margin (*utility or loss/estimated income*)	24.0%	-8.1%	-18.8%	-13.1%

Source: Free translation from Lugo and others (2022).

Table A3
Comparative summary of options and vessels at passenger rate of $1.06 per nautical mile for vessels AMT2255 and Mexico V, and $2.71 per nautical mile for vessels APT James and Bucco Reef; considering increase in capacity utilization of Mexico V, APT James and Bucco Reef vessels for passengers at 60%

Route 4: Saint Lucia, Saint Vincent, Grenada and Trinidad and Tobago				
	AMT2255	**Mexico V**	**APT James**	**Bucco Reef**
Total journeys/year per vessel	103.5	145.3	178.3	181.4
Number of required vessels	2	1	1	1
Annual Service Capacity				
Passengers (*seats*)	64 199	41 548	165 091	180 445
Cargo (*tons*)	134 610	19 176	105 722	130 574
Nautical miles used	486	486	486	486
Number of ports	7	7	7	7
Total transit time includes port-days	3.5	2.5	2.0	2.0
Estimated income (*dollars*)	95 287	91 536	745 842	803 385
Estimated costs (*dollars*)	72 380	83 003	741 455	760 563
Utility/loss per journey (*dollars*)	22 907	8 533	4 388	42 822
Utility Margin (utility or loss/estimated income)	24.0%	9.3%	0.6%	5.3%

Source: Free translation from Lugo and others (2022).

VII. Publications of interest

FAL Bulletin No. 373

CO$_2$ emissions in Latin American maritime imports and revised export calculations

Eliana Barleta
Silvana Sánchez
Ricardo J. Sánchez

FAL Bulletin 373 published in January 2020, documented the first results of a rapid assessment methodology for calculating CO$_2$ emissions generated by the maritime transport of the region's exports.

Continuing on from that earlier research, this study aims to apply that methodology to imports by the countries that were examined in the previous publication. Similarly, in consideration of the comments received on that edition, some methodological adjustments were made and the sample was increased; thus, a revision of the export calculations is included, which now cover 82% of total Latin American and Caribbean exports.

Available in:
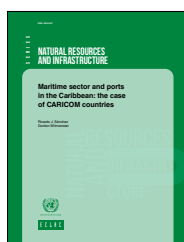
Natural Resources and Infrastructure series No. 140

Maritime sector and ports in the Caribbean: the case of CARICOM countries

Ricardo J. Sánchez
Gordon Wilmsmeier

The document assesses of the situation of the maritime sector in CARICOM and presents a series of new observations and issues. Challenges and barriers in the maritime sector, or problems created through inefficiencies in the maritime sector are analyzed for: maritime freight transport, cruise shipping, ports and yachting. Whilst the first three are part of the original structure of the study, the fourth is included to show the full extension of the maritime sector. To be able to understand the challenges and role of maritime transport in a regional and global context, it is essential to consider the physical geography of the CARICOM region; CARICOM is a "conglomerate" of states that have comparable historical development paths of colonial dependency.

Available in: