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REGIONAL

STUDY FOR THE ESTABLISHMENT OF A MARITIME SERVICE TO IMPROVE AGRIFOOD TRADE AND FOOD SECURITY BETWEEN GUYANA, TRINIDAD AND TOBAGO, GRENADA AND BARBADOS

PHASE 1 REPORT

FAO/CARIBBEAN DEVELOPMENT BANK COOPERATIVE PROGRAMME

Contents

Figures

Tables

ABBREVIATIONS

BPI	Barbados Port Inc.
CARICOM	Caribbean Community
CARIFTA	Caribbean Free Trade Association
CDB	Caribbean Development Bank
CIF	cost, insurance and freight
CII	Carbon Intensity Indicator
COTED	Council for Trade and Economic Development
CSME	CARICOM Single Market and Economy
GDP	gross domestic product
GT	gross tonnage
HoReCa	hotel, restaurant and catering
IDB	Inter-American Development Bank
ISPS	International Ship and Port Security Code
IT	information technology
LCL	less than container load
LPI	Logistics Performance Index
NAMDEVCO	National Agricultural Marketing and Development Corporation
NGMC	New Guyana Marketing Corporation
NVOCC	non-vessel operating common carrier
OECS	Organisation of Eastern Caribbean States
RCA	revealed comparative advantage
TEU	Twenty-foot Equivalent Unit
WFM	wholesale food market
WTO	World Trade Organization

Executive Summary

The overall objective of the study is to provide the beneficiary governments and the Caribbean Development Bank (CDB) with the necessary knowledge and analysis of measures to create an enabling environment for agrifood trade, improve food security, and inform financing needs for agri- cargo services between Barbados, Grenada, Guyana, and Trinidad and Tobago.

During the early stages of the assignment, the scope of the study changed. The two vessels intended for deployment by the Government of Guyana and Trinidad and Tobago in the short to medium term to pilot the operations of a service for the movement of agricultural products, were not available for this purpose. Subsequently, the study approached two phases with a broader perspective:

i) The first phase will focus on analysing the current situation (including a literary review of past ferry studies) of the agriculture trade and maritime transport among the focus countries, assessing the maritime routes, port logistics and minimum requirement of vessels to transport agriculture products among participating countries; and modelling the transport of agrifood products with scenarios for consideration based on their greatest potential for implementation, and calculate the financial aspects of the scenarios.

ii) the second phase will focus on policy and a regulatory framework for transport and logistics to identify gaps and propose policy interventions, broaden the geographical coverage, and deepen the understating in specific areas arising from the Phase 1 results.

The methodology used was a combination of a desk review of the trends in agriculture trade within the countries included in the study, and the rest of the Caribbean Community (CARICOM) and the world, enhanced with information from field visits to the port infrastructures to identify key patterns in terms of strengths, weaknesses, opportunities, and constraints. This was followed by an analysis of the maritime routes, port facilities and related infrastructures, and a pilot modelling to test different transport scenarios.

The analysis of agrifood trade between the focus countries in the Caribbean region revealed several key insights and trends: i) the importance of agrifood trade which plays a crucial role in the economic development and regional integration efforts of CARICOM countries; ii) the potential for intra-regional trade within CARICOM to strengthen economic ties and regional food security; iii) the proximity among member states that reduces transportation costs and promotes timely product delivery; iv) the regulatory framework – CARICOM countries have established agreements and frameworks such as the CARICOM Single Market and Economy (CSME), to promote and regulate agricultural trade. These mechanisms aim to create a unified economic space for the free movement of goods and services.

Despite the potential benefits, agriculture trade within CARICOM faces challenges. Non-tariff barriers like sanitary and phytosanitary regulations and technical standards hinder the smooth flow of agricultural products. Furthermore, disparities in productivity and capacity among member states affect competitiveness. External factors such as global market dynamics, climate change, and natural disasters significantly impact agriculture trade. Fluctuations in international commodity prices, extreme weather events, and climate-related risks require adaptive strategies and resilient agricultural practices.

The Caribbean maritime transport sector can be categorized into structured and unstructured groupings. Structured groups consist of multinational liner trade companies, while unstructured groups include intraregional schooner trade operators. Liner trade companies such as Tropical Shipping, CMA-CGM, and King Ocean play a significant role in providing access between Caribbean

countries, the United States of America, Europe, and regional hubs. The schooner sector operates smaller vessels on regular or charter trading routes. These vessels are often converted fishing boats or roll-on/roll-off (ro-ro) ships with limited cargo capacities. Notably, the schooner sector faces challenges related to the age of the vessels, maintenance issues, and limited refrigeration capacities. In contrast, liner vessels are larger and transport primarily containerized cargo with defined routes and schedules.

The current state of the shipping networks in the Southeastern Caribbean suggests that there is sufficient capacity and therefore no need for additional maritime transport capacity. A large number of containers en route from Guyana including reefer containers are empty. These empty containers could be used to increase the flow of agrifood from Guyana to the other focus countries, extending to CARICOM countries.

The informal shipping networks (inter-island schooners) continue to play a vital role in offering cost- effective means for transport of agricultural goods and may offer important lessons for building new inter-island networks. The first step to understanding the cost-effectiveness of small-scale local shipping was to conduct a thorough inventory of both the activity of the shippers themselves and the ships available, including the CARICOM wharves facilities available to them and the upgrading required.

The infrastructure analysis of the four main ports of the focus countries revealed a varied picture. The port of Port of Spain is relatively well-developed and serves as a central hub for trade in the Caribbean region. Port of Georgetown in Guyana has been undergoing significant expansion and modernization efforts to accommodate the country's growing trade demands, with investments in new facilities and equipment. Bridgetown, Barbados has a well-established port with good infrastructure, however there were occasional discussions about potential upgrades to enhance capacity and efficiency. St. George's, Grenada has a smaller but functional port, mainly used for regional trade and tourism.

Inter-island cargo movements vary widely from live animals to fresh fruits and vegetables, and from individual consignments of manufactured goods to processed foods. The main elements are general cargo, typically construction materials, manufactured goods for retailers and small-scale industrial products from Trinidad, exported to Grenada and northwards reaching the various islands, some going as far as St. Maarten. The vessels then return from the islands with cargoes typically consisting of fresh fruit, vegetables and other ground provisions for Trinidad and Barbados.

The synergy and complementarity between cargo liners and schooners contribute to the Caribbean's maritime trade ecosystem resilience. Cargo liners ensure the efficient flow of goods between major economic centres, underpinning industries, and international trade agreements. Meanwhile, schooners fill the gaps in the network, delivering cargo to remote islands, supplying essentials to coastal communities, and connecting people. This dynamic interplay between large-scale efficiency and localized adaptability can be supported with dedicated action by both players.

The infrastructure analysis touched upon the “CARICOM Wharves" which refers to wharves or docks that are part of the CARICOM infrastructure. CARICOM Wharves are essentially ports or harbours within CARICOM member countries that play a significant role in facilitating trade and maritime transportation among CARICOM nations. These wharves serve as critical points of entry and exit for goods and cargo moving within the region, contributing to the economic activities and regional integration objectives of CARICOM. Both Trinidad and Tobago and Grenada have dedicated wharves while Barbados has an area dedicated to CARICOM trade, and Guyana has no CARICOM wharves facilities. The analysis highlighted the potential role for these wharves to be used by schooner trade operators, which would increase and simplify intra-regional trade. However, investments are needed

in order to comply with the requirements for refrigerated transport and increased volume of agrifood products.

The Carbon Intensity Indicator (CII) has emerged as a critical tool in the global effort to reduce carbon emissions in the maritime industry. This indicator provides a standardized metric for measuring and reporting the carbon intensity of shipping operations. In the context of the Caribbean, where maritime trade plays a central role in economic development and environmental stewardship, the adoption and implementation of the CII can have a significant impact. However, there is no evidence or recent studies on the subject, and it will affect only the liner services since the CII applies to vessels of tonnage greater than 400.

While developing the maritime transport modelling, three different transport options have been considered in the analysis:

- container liner transport: transport in containers using the existing container liner services;
- schooner transport: transport in small consignments (palletized) using the existing schooner services;
- a new service: transport in containers on chassis using a potential ro-ro service, which combines regularity and reliability of the container liner service with the low-cost approach and accessibility of the schooner trade.

The following conclusions can be drawn from the transport chain cost comparisons:

- The transport chain costs for each of the three options that have been compared are not very different.
- Transport costs for perishable goods that need to be transported in reefer containers are higher than for goods that can be transported in dry containers. The costs per tonne of product are about 40 percent higher in reefer containers than in dry containers. This difference applies to imports from within CARICOM as well as imports from outside CARICOM.
- When compared to products sourced from outside CARICOM, landed costs in Barbados for products sourced from Guyana are about 35 percent to 45 percent lower, even without accounting for the fact that the product itself may be less expensive when sourced from Guyana compared to sources outside CARICOM. The 35 percent to 45 percent range is based purely on the absence of a trade tariff for intra-CARICOM trade, and comparably lower transport costs if sourced from Guyana. This means that there is room for reducing the food import bill if products sourced from outside CARICOM originate from Guyana in the future.

The report highlights a series of enabling environment actions to promote agrifood trade, which include a blend of physical investments and trade facilitation measures. However, the effectiveness of these private sector facilitation mechanisms relies on collaboration between various stakeholders, including government agencies, port authorities, and industry players. Public-private partnerships can be instrumental in creating an enabling environment for maritime trade, fostering economic growth and international commerce.

Introduction

1. Food and nutrition security have been a concern for the Caribbean countries, particularly given the background of high food import levels, which are now trending towards USD 6 billion annually. Policy makers in CARICOM have posited that intra-regional agricultural trade could play a key role in achieving food and nutrition security in its member countries, and could also balance food deficits and surpluses, contribute to price stability, and increase the diversity of food supply.

2. The COVID-19 pandemic and associated global supply chain disruptions have dramatically altered the standard of living across the Caribbean. Recent surveys conducted by the CARICOM Secretariat and the World Food Programme (WFP) to assess the impact of COVID-19 on food security and livelihoods in the Caribbean, found that by February 2022 an estimated 2.8 million persons in the English-speaking Caribbean were food insecure. This is the equivalent of one million additional persons since the start of the pandemic.

3. Immediately following the pandemic, the Russian/Ukraine war triggered the fear of instability in global food markets. According to the Food and Agriculture Organization (FAO), Russia and Ukraine are among the most important producers of agricultural commodities in the world. Both countries are net exporters of agricultural products, and furthermore play a leading role in the supply of foodstuffs and fertilizers to global markets. Supply disruptions in those markets will have global impacts.

4. A key commitment emanating from the Thirty-third Inter-Sessional Meeting of the Conference of Heads of Government of the Caribbean Community (CARICOM) to meet the needs for reducing dependence on food imports from non-regional sources, was reiterated at the Agri-Investment Forum in May 2022. Consistent with this objective, the heads of government adopted a proposal by the CARICOM private sector to reduce the region's food import bill by 25 percent by the year 2025 (25 by 2025), with a focus on the implementation of measures to increase regional agricultural production, processing and intra-regional trade in agrifood products. The heads of government further identified the lack of adequate regional transportation as a major obstacle to the movement of agricultural products within the region.

5. Improving intra-regional trade in agriculture will require interventions across the ecosystem. A Caribbean Development Bank (CDB)/FAO Study (2019) highlighted several factors which have hindered the development of the agricultural sector in the region. These include low production and productivity, weak market linkages, and high susceptibility to climate events. As such, building a sustainable agricultural business sector will require addressing vertical and horizontal linkages in the value chain, to create an integrated agriculture-based backbone of wealth creation.

6. One of the immediate actions identified at the Agri-Investment Forum was the need to establish adequate and sustainable regional transportation for bulk cargo, and the movement of perishable agriculture goods across member states to meet existing and emerging market needs to support the 25 by 2025 agenda. It was proposed that CDB collaborate with the governments on an actionable plan with an initial focus on Barbados, Grenada, Guyana and Trinidad and Tobago. Accordingly, CDB requested the support of the FAO Investment Centre to develop a study that examines the marine transportation issue in the region with a focus on the countries mentioned, while emphasizing the urgency to consider transportation as an integral part of the agricultural development and food security in the sub-region.

Literature Review

7. The majority of countries in the Caribbean region have transitioned structurally away from agriculture as a primary source of economic activity and employment. Agriculture comprises 1.5 percent of the gross domestic product (GDP) in Barbados and 1 percent in Trinidad and Tobago – both measures have remained relatively constant since 2000. In Grenada, agriculture represents 5.3 percent of the GDP, buoyed by high-value specialty products. Guyana remains an exception in the past and present, as it has been undergoing a significant transformation since 2000. Agriculture as a share of the GDP fell from 30 percent to 13.5 percent during that time, nonetheless it is still an important part of the country's economy. It employs over 15 percent of the labour force, primarily for the cultivation of fruits, vegetables, legumes, and oil crops. The value of agricultural trade between these countries represents a small share of their total agricultural imports and exports. An exception is exports (or re-exports) from Trinidad and Tobago, which acts as a hub for exporting food to Barbados (providing 13 percent of the total value of agricultural imports in 2021), Grenada (21 percent) and Guyana (18 percent).

8. The competitiveness of agricultural trade among these countries is related to the changing structures of their agricultural economies. Lorde *et al.* (2010) have used revealed comparative advantage (RCA) indices as a basis to confirm that within the Organisation of Eastern Caribbean States (OECS), moderate trade competitiveness exists for fruits (primarily banana), vegetables, and spices (primarily pepper and nutmeg). Furthermore, this was reconfirmed by FAO (2019) that found that Guyana, for instance, enjoys a moderately comparative advantage with cereals and sugar products. FAO stated that since 2000, gradual erosion of the comparative advantages, driven by changes in preferential access agreements with the European Union and the reduction of domestic subsidies of fruit and sugar, had occurred for many states in the Eastern Caribbean. Apart from Guyana, Eastern Caribbean states have consequently shifted patterns of production towards high value specialty crops and processed foods, remaining net importers of key staples.

9. Patterns of trade, competitiveness, and connectivity are closely linked with concerns over food security. For Barbados, Grenada, and Trinidad and Tobago, reliance on staple food imports represents a critical vulnerability in the context of inefficiencies in maritime connectivity, the COVID-19 pandemic, and climate change. Each of these countries exhibits a cereal import dependency ratio of 100 percent. For Barbados and Grenada, food imports add up to 77 percent and 242 percent of the total merchandise exports, respectively. As a net cereal exporter whose food imports represent only 13 percent of the total merchandise exports, Guyana faces the least exposure to global risk when buying from the global food market, and exhibits the greatest potential for improved competitiveness.

Barriers to agricultural trade in port-centric supply chains

10. Keeping in mind the concerns over food security and self-sufficiency, a subset of literature examines the policy-based and logistical barriers to trade that may appear along the agrifood supply chains in the Caribbean. Several recent studies suggest that non-tariff measures and technical barriers to trade play a key role in driving up intra- and extra-regional trade costs in agricultural products for Eastern Caribbean states. On the one hand, compliance with technical certifications and phytosanitary standards leads to increased competitiveness on the world market. A feasibility study by the United Nations Forum on Sustainability Standards (2021) found a large degree of unmet potential in the export of standard-compliant food products from the CARICOM region to the European Union. Similarly, a trade gravity analysis by Alleye and Lorde (2014) identifies regulated markets in high- income countries as prime drivers of trade growth for CARICOM states, despite higher costs of trade.

11. In practical terms, however, these measures represent important barriers to trade in the global market because CARICOM countries often lack centralized, cost-effective coordinating entities that can facilitate compliance. Analyses by Mcdonnell (2016) and FAO (2019) have found that the costs of compliance with certifications and standards contribute directly to high costs of trade for CARICOM exporters, negatively impacting competitiveness. A study prepared by the Bajaj Financial Securities Limited (BFSL, 2017) found a number of cases where CARICOM affirms to have knowingly implemented stringent technical requirements (such as phytosanitary standards, inspections, and licensing) in the absence of facilities, institutions and effective cost structures to implement them. In certain cases, they found that these measures may have been used for protectionist purposes in the absence of other policy levers such as tariffs. As a result, many producers and processors are unable to access export markets, with few cost-effective avenues for technical support. The authors estimate that eliminating these Non Tariffs Barriers s would lead to an 18 percent increase in intra-CARICOM trade within a 5- year period.

12. Guyana presents an interesting case study of one of the more competitive agricultural exporters in the Eastern Caribbean. A series of studies from DaSilva (2010), Dasilva and Bynoe (2015), DaSilva and Hosein (2016) examine the implications of phytosanitary standards and other regulatory mechanisms on agricultural export growth in the country. They found that when supply chains adapt to the introduction of regulations in export markets (as Guyanese fish exporters did during the early 2000s), then exports experience significant growth; furthermore, the costs for implementing these standards along the supply chain were not prohibitive in this case, and may have induced positive spillovers to other products.

13. For the other three countries of interest, there is a gap in the literature *vis-à-vis* identifying opportunities and constraints to overcome technical barriers to trade. More analytical work is needed to understand the role that regional regulatory bodies and improved logistical infrastructure could play in facilitating compliance with phytosanitary standards and certifications for key agricultural products.

14. Finally, recent studies have also identified logistical constraints that affect transport costs and profits for actors along the supply chain, beyond the infrastructure needed to overcome technical barriers to trade. At the start of the supply chain, Cortbaoui and Ngadi (2016) find significant and persistent post-harvest losses for farmers in Guyana and several Southeastern Caribbean islands. These losses stem from inappropriate on-farm handling and in the retail sector, and contribute to farmers' preference to sell their produce at farm gate – an observation that holds true in particular for smallholders.

15. In the context of port efficiency, Lucenti (2014), BFSL (2016), Deambrosi *et al*. (2018) conducted stakeholder interviews to understand the primary constraints to shipping products from local markets in the Southeastern Caribbean. A majority of respondents identified high or opaque freight costs, lengthy customs regulations, and the reliability of freight schedules as key impediments to exporting products shipped from the hinterland. As discussed earlier, these signs of logistical inefficiency have their roots in infrastructural and institutional deficiencies on the parts of both port operators and shipping companies. The perceptions and experiences of local exporters correlate strongly with broader measures of port performance and overall connectivity.

Shipping in the Caribbean

16. Recent studies on maritime shipping networks and port performance in the Caribbean reflect a range of institutional actors and development goals. While a handful of academic papers use the region to explore specific research questions, the majority of broader thematic studies on maritime trade have been commissioned by regional coordinating actors (such as CARICOM) and international

financing institutions such as World Bank, the Inter-American Development Bank (IDB), and the CDB.

17. The structure and dynamics of maritime shipping in the Caribbean comes to light primarily through mapping and feasibility studies conducted by governments and multilateral development banks. These include a fast ferry proposal funded by the Council for Trade and Economic Development (COTED) in 2010, a regional action plan commissioned by IDB in 2014, a connectivity assessment commissioned by the World Bank in 2015, and a shipping model published by IDB in 2018.

18. These studies characterize the maritime trade economy of the Caribbean as a series of overlapping "hub and spoke" models of transshipment and distribution. Cubas *et al.* have found three main categories of freight passage within this model: i) transshipment of goods through the hubs to destinations outside the Caribbean; ii) transshipment of goods to the hubs for intra-regional distribution; and iii) smaller routes that ship from the hubs to nearby islands within the shipping "catchment area." They define a hub-and-spoke model within the Southeastern Caribbean that centres on Trinidad and Tobago, servicing the OECS region, Guyana, and Suriname. In 2018, the IDB noted that Port of Spain ranked fourth behind Kingston, Freeport, and Caucedo in the annual volume of Caribbean container traffic. Nonetheless, it represents an important nexus of trade for the region, and the principal partner in the flow of traffic to and from Antigua, Barbados, Granada, and Guyana. A fundamental characteristic of this system is the uneven and unequal distribution of port infrastructure and logistics services between hub and feeder ports.

19. Several other important trends in shipping operations – both global and regional – help to characterize the challenges and opportunities for improving shipping operations in Southeastern Caribbean.

20. **First**, the formal shipping sector is undergoing a process of firm consolidation and coordination. Barleta and Sanchez (2022) state that the past decade has seen an intense horizontal and vertical integration of the Caribbean formal shipping market. Horizontally, shipping liners have consolidated themselves into a handful of global alliances: between 2012 and 2021, the number of independent shipping alliances dropped from 12 to 3, which now control over 80 percent of the global market. Vertically, these three alliances share strong ties with global terminal operators, and own approximately 40 percent of them globally. Within the Caribbean, however, sub-regional variations exist. Cubas *et al.* found that the largest hub-level ports (Kingston, Freeport, Caucedo, and Port of Spain) exhibit higher levels of competition and lower levels of concentration, while smaller island states within the hub-and-spoke system were serviced by fewer liners.

21. **Second**, the consolidation of the formal shipping sector is a result of the pressures to increase the efficiency and agility of operations. Efforts towards maximizing efficiency reflect the economies of scale that define shipping activity, as well as the demand to coordinate services within different nodes of a shipping network. This can the most clearly be detected in the dramatic increase in ship size. Lucenti (2014) and Barleta and Sanchez (2022) observe that it is driven by a perceived need to improve per-container cost. They estimate that by early 2022, 15 percent of the global shipping fleet will comprise vessels that can carry over 17 000 TEU (twenty equivalent unit); this may grow to 33 percent by the end of 2023. While a lag period of 2–3 years may result before the largest of these vessels reaches the Caribbean, they will demand larger and more sophisticated port facilities. There is also evidence that increases in the size of the largest container ships has led to a "cascading effect" in total fleet size, so the next-largest ships replace smaller ones in new services, and the process repeats.

22. **Third**, there is evidence that containerized shipping capacity in the Caribbean is greater than the demand, despite a recent impetus towards efficiency and agility. This has been the trend since the feasibility was commissioned by COTED in 2009; Beharry (2014) found that new containership

deliveries to the global shipping fleet outpaced deletions by three to one; in the Caribbean, the capacity of Caribbean ports exceeded demand by 31 percent. Barleta and Sanchez (2022) state that between 2010 and 2019, the growth of containerized shipping supply outstripped the growth in demand in every year but one; this trend was closely tied to the drastic increases in ship size.

23. **Fourth**, the formal shipping sector in the Caribbean is subject to both upwards and downwards pressures on freight rates, which might follow from the unequal distribution of port infrastructure and services in the region. On the one hand, firm concentration in shipping does not inherently translate to abusive market power and oligopolistic pricing. Barleta and Sanchez note that the indivisibility of large port infrastructure in the Caribbean (as all shipping lines must use the same ports and services) means that the shipping market could remain contestable and open to new entrants, and the larger Caribbean ports are incentivized to adopt lower prices for key services. On the other hand, a steady increase in global freight rates since 2019, combined with a fall in annual shipping volumes, implies that the major shipping firms may be colluding in an oligopolistic manner to set rates. An earlier study by Wilmsmeier and Hoffman (2008) finds an enormous variation in freight rates in the Caribbean that relate strongly to the parallel existence of large, inter-connected hub ports and small, highly concentrated feeder ones that may set higher prices. There is a need to update this analysis to better understand the relationships between port capacities, shipping connectivity, and pricing power.

24. **Fifth**, higher-than-average shipping costs in the Caribbean suggest problems with operational efficiency and connectivity, particularly in the context of firm consolidation, excess supply, and efforts towards shipping efficiency. Deamborsi *et al.* (2018) conducted interviews with major shipping companies in the CARICOM region. They noted that high port costs, the taxation of trade, and price setting in smaller ports meant that shipping rates between Guyana and China were on par with those between Guyana and smaller islands in the Eastern Caribbean. Luncenti (2014) and Cubas *et al.* (2015) have confirmed this finding, and observed that inter-island freight rates in the OECS region far outpaced rates when shipping towards other major hub ports.

25. **Finally**, informal shipping networks remain an important but under-studied component of inter-island and feeder traffic between the hub and its spokes. Informal shippers (schooners) in the OECS region carry break-bulk rather than containerized cargo, and in the 2010s, accounted for almost all small-scale, inter-island shipping. Cubas *et al.* found over 40 informal vessels operating out of the OECS region, with many of them specialized in shipping agricultural products. Furthermore, they suggest that informal shippers may be declining in their share of the shipping market. However, given disparities in the available infrastructure between hub and feeder ports, they may continue to play an important role in plying the feeder routes that formal shippers have not deemed profitable. Additional evidence from a study compiled by BFSL (2017) suggests that schooners offer competitive, efficient rates in island-to-island transport, but that doing so requires a reliance on full vessel utilization, resulting in substantial losses in agrifood products. There are no recent and systematic analyses of the distribution, organization, and efficiency of the informal shipping fleet in the OECS region, representing a critical gap in the available literature.

Ports in the Southeastern Caribbean

26. Ports play a critical role in determining the efficiency and feasibility of maritime trade between the countries of this study. In fact, they serve as points of connection that contain two key interfaces: the interface between ships and the port, and the interface between the port and the hinterland. Each interface requires significant investments in physical and human capital, governing institutions, and a range of third-party services in procurement, construction and maintenance, and waste disposal. The challenges and opportunities for ports in in the four countries of interest based on recent information on volume and operational efficiency can be summarized as follows:

- **Volume**: shipping volumes vary immensely across the principal ports of Barbados, Grenada, Guyana, and Trinidad and Tobago. As the primary hub port, Trinidad and Tobago saw the highest containerized throughput in 2020, at approximately 250 000 Twenty-foot Equivalent Unit (TEU); this was followed by Bridgetown (approx. 90 000 TEU), Georgetown (approx. 68 000 TEU), and Saint George's (approx. 19 000 TEU). Port of Spain and Bridgetown have experienced recent declines in annual throughput – in particular, Port of Spain's current performance has declined from a high of almost 400 000 TEU in 2015.
- **Efficiency**: Port efficiency is traditionally measured as the time it takes for a ship to complete its call in a port; a process that results from the performance of physical capital, human capital, and institutional governance. A study conducted by the CDB (2016) , information technology (IT) constructed an efficiency score measured by berth and labour productivity, infrastructure quality, accessibility, equipment, IT, and operator autonomy. They found that Port of Spain scored among the highest among the four countries of interest, followed by Barbados, Grenada, and Guyana. Port of Spain exhibited high performance in labour productivity, equipment, and nautical accessibility, but it converged with the other countries in measures of berths-per-hour. This holistic measurement of efficiency developed by the CBS correlates heavily with United Nations Conference on Trade and Development's Liner Shipping Connectivity Index, which ranks these four countries in the same manner. The convergence in berths-per-hour was reconfirmed by the Container Port Performance Index, spearheaded by the World Bank. Using 2020 data on port hours per ship call, they find that both Guyana and Port of Spain exhibit similar index values that are lower than the overall average, despite differing infrastructural and human capacities.
- **Infrastructure and equipment**: variations in throughput in efficiency reflect a high degree of heterogeneity in physical and digital infrastructure:
    i) the port of Port of Spain: at the main port, the port of Port of Spain has a marginal wharf with a total continuous berth length of 1745 m previously divided in to eight berths (Berths 1-8). With the construction of the Hyatt Hotel and associated facilities, two of the berths are no longer available for port operations. This has resulted in a reduction of the available berth length to 1395 m (Berths 3–8). Of the 1395 m, approximately 505 m comprises the dedicated container terminal (Berths 6A and 7), the remaining 890 m covers berths 3–6 and berth 8, resulting in an average berth length of 178 m for these berths. The approach channel and part of the basin at berths 6A and 7 is dredged to -12 m while the other berths are dredged to -9.0 cm . Schooner trade is facilitated at a separate facility – the Caricom wharves with a total berth length of 315 m. The water depth is advertised as - 6.5 m;
    ii) Port of Bridgetown, Barbados: there are three berths used for container vessels and general cargo at the POB (Berths 3, 4 and 5) with a continuous berth length of 517 m. The water depth alongside the berths is advertised as -11.0 m. Schooner trade is facilitated at the Shallow Draught berth with a berth length of 156 m and a water depth alongside advertised as -6.8 m.
    iii) Port of St. Georges, Grenada: the main port area at the port of St. George and Grenada has a total berth length of 335 m for the larger cargo vessels with a water depth alongside ranging from - 8.0 to -9.1 m. The Caricom wharves area is used to service schooner vessels and has a berth length of 82.5 m with a water depth alongside of -5.0 m.
    iv) Port of Georgetown, Guyana: it is located on the east bank of the Demerara River. The ships channel is 170 m wide and the average water depth is -5.5 m at low tide. There are five independent terminals operating at the Port, with a total berth length of 986 m. The individual berth length at the terminal varies from 140 m (Demerara Shipping Company) to a maximum of 290 m (Guyana National Shipping Corporation).

- **Institutions and management**: the ports of these four countries are managed primarily under a public service model, overseen by government authorities. Trinidad and Tobago and Grenada both operate their ports under statutory bodies within their respective governments. Bridgetown is managed by a corporatized port authority under the government, but it also engages in partnerships with private companies to contract labour. Georgetown remains an exception, in that there is no overarching port authority; piers are managed by a mixture of independent public and private corporations; private companies compete for stevedoring labour contracts. Recent literature suggests that the port performance is closely tied to the right balance of public and private operations; Caldeirinha *et al.* (2018) suggest that public ownership of land and assets, combined with private management of operations, is associated with better port performance. Locally, there is evidence that public ownership of port operations – particularly concerning labour – has led to inefficiency in operations for Bridgetown and St. George's. Conversely, the absence of a unified public or private authority – as is the case in Guyana – severely hinders master planning. Regardless of the public-private mixture of authority, the CDB identifies autonomy in decision-making for owners and operators as an important factor for efficiency.
- **Labour**: labour arrangements in these four ports reflect difficulties in the shift from breakbulk to containerized trade; as mentioned above, they often present issues for managerial authorities. Historically, labour unions and contracting firms developed when the process of unloading breakbulk cargo was much more labour-intensive. In the Eastern Caribbean, labour representatives have resisted innovations that would improve productivity and reduce the total workforce. However, the relationships between labour representatives and port authorities vary across each port of interest. Port of Spain, St. George's and Bridgetown all possess strongly unionized labour forces, while in Georgetown, all individual operators have their own labour pools. Labour's share of operational costs subsequently varies from a high of 75 percent in Port of Spain to a low of 58 percent in Georgetown. The CDB (2016) has found that labour disputes have played a significant role in reducing efficiency in St. George's and Bridgetown. Across all countries, authorities have expressed the need to improve training and capacity building and to streamline these activities into future port master plans.

Pattern of agrifood trade between the focus countries

27. Agrifood trade plays a vital role in the economic development and regional integration efforts of the CARICOM countries. The 25 by 2025 initiative[1] gives more emphasis to the role of national production and CARICOM inter-regional trade.

28. CARICOM countries are endowed with diverse agricultural resources, including fertile lands, favourable climates, and a rich agricultural heritage. This enables them to cultivate a wide range of crops and engage in livestock production. The agriculture sector contributes significantly to the economies of many CARICOM nations, providing employment opportunities and serving as a source of foreign exchange earnings.

29. Intra-regional agricultural trade within CARICOM holds immense potential for strengthening economic ties and fostering regional food security. The close proximity of member states facilitates the exchange of agricultural products, reducing transportation costs and promoting timely delivery. Additionally, the diversity of agricultural production across CARICOM countries allows for complementary trade relationships, as nations specialize in specific crops and commodities based on their comparative advantage.

30. The agriculture trade between CARICOM countries is guided by several agreements and frameworks established by the regional organization. The CARICOM Single Market and Economy (CSME) aims to create a unified economic space, facilitating the free movement of goods, services, capital, and skilled labour. Through the CSME, CARICOM member states have developed mechanisms to promote and regulate agriculture trade, including the Harmonized System of trade and the Caribbean Agricultural Health and Food Safety System.

31. Despite the potential benefits, agriculture trade within CARICOM is facing certain challenges, one significant challenge being the existence of non-tariff barriers such as sanitary and phytosanitary regulations, technical standards, and administrative procedures. These barriers can hinder the smooth flow of agricultural products among member states, impeding market access and increasing transaction costs for producers.

32. Another challenge is the need to address disparities in agricultural productivity and capacity among CARICOM countries. Variations in resource availability, technology adoption, and investment levels can result in uneven competitiveness, affecting the balance of trade within the region. Efforts are being made to bridge these gaps through capacity-building programmes, knowledge sharing, and technology transfer initiatives.

33. Furthermore, external factors such as global market dynamics, climate change, and natural disasters can significantly impact agriculture trade between CARICOM countries. Fluctuations in international commodity prices, extreme weather events, and the vulnerability of small-scale farmers to climate-related risks require adaptive strategies and resilient agricultural practices to safeguard trade relationships and food security.

34. The trade analysis shows that agriculture trade between CARICOM countries has immense potential for regional economic integration, food security, and sustainable development. While challenges exist, efforts are underway to address trade barriers, enhance agricultural productivity, and

1 http://thecpso.org/service/25x5-initiative/

promote collaboration among member states.

35. Within the four countries, Guyana and Trinidad and Tobago hold the lion's share of the agrifood trade with Guyana focusing on primary production, while Trinidad and Tobago concentrate on processed products exports.

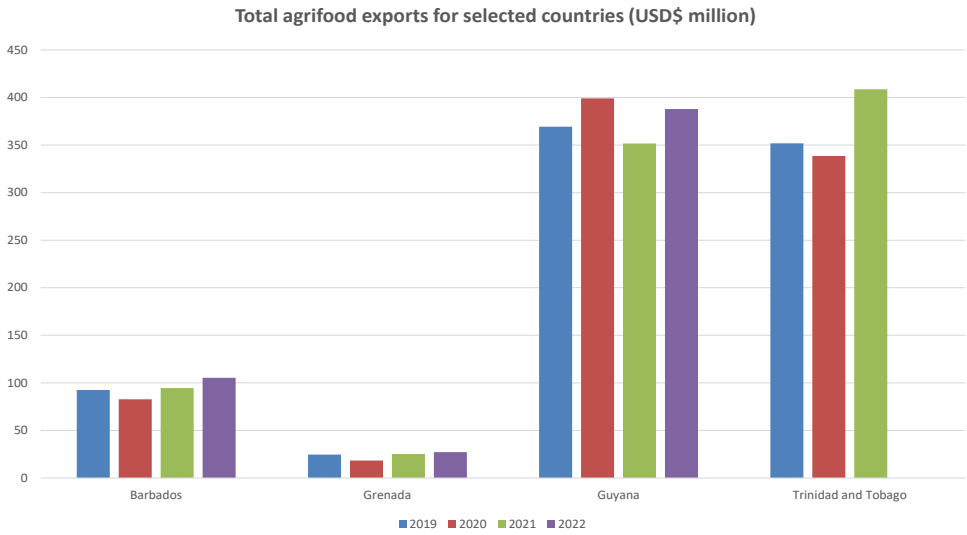


Figure 1. Total agrifood exports for the selected countries

36. The agriculture trade analysis of this section focuses on the four target countries. Table 1 gives a snapshot of the traded commodities and trading partners.

Table 1. Snapshot of traded items and trading partners for the focus countries

COUNTRY	AGRICULTURAL PRODUCTS	INDUSTRIES	TOP EXPORT PARTNERS (2019)	EXPORT COMMODITIES (2019)	TOP IMPORT PARTNERS (2019)	IMPORT COMMODITIES (2019)
BARBADOS	**Sugar cane,** poultry, vegetables, milk, eggs, pork, coconuts, pulses, sweet potatoes, tropical fruit.	Tourism, sugar, light manufacturing, component assembly for export.	**United States 21 %, Poland 14 %,** Jamaica 8 %, Guyana 6 %, Trinidad and Tobago 6 %	Rums and other hard liquor, ships, orthopedic appliances, cement, packaged medicines.	**United States 35 %, Trinidad and Tobago 14 %,** China 9 %, Netherlands 5 %	Refined petroleum, ships, cars, shipping containers, packaged medicines.
GRENADA	Bananas, watermelons, sweet potatoes, **sugar cane**, tomatoes, plantains, coconuts, melons, cucumbers, cabbages.	Food and beverages, textiles, light assembly operations, tourism, construction, education, call-center operations.	**United States 40 %, Saint Vincent and the Grenadines 7 %, Saint Lucia 7 %,** France 6 %, Netherlands 5 %, Germany 5 %, Ireland 5 %, Antigua and Barbuda 5 %	Fish, nutmeg, cocoa beans, fruits, **wheat,** toilet paper.	**United States 35 %, Canada 24 %,** China 5 %	Aircraft, poultry meat, cars, refined petroleum, food preparation materials.
GUYANA	**Rice, sugar cane,** coconuts, pumpkins, squash, gourds, milk, eggplants,	Bauxite, **sugar, rice milling**, timber,	**Trinidad and Tobago 31 %, Canada 11 %, Portugal 11 %,**	Ships, gold, shipping containers, excavation machinery,	**United States 26 %, Singapore 18 %,**	Ships, refined petroleum, excavation machinery,

	green chilies/peppers, poultry.	textiles, gold mining.	Ghana 8 %, Norway 6 %, United Arab Emirates 5 %	aluminum ores, **rice.**	Trinidad and Tobago 16 %, Liberia 11 %, China 5 %, Norway 5 %	shipping containers, aircraft.
TRINIDAD AND TOBAGO	Poultry, fruit, coconuts, citrus fruit, milk, plantains, maize, oranges, eggs, gourds.	Petroleum and petroleum products, liquefied natural gas, methanol, ammonia, urea, steel products, beverages, food processing, cement, cotton textiles.	**United States 33 %, Guyana 9 %, Spain 6 %,** China 6 %	Natural gas, industrial alcohols, crude petroleum, ammonia, iron products, refined petroleum.	**United States 40 %,** Guyana 19 %, China 6 %	Refined petroleum, excavation machinery, shipping containers, iron, cars.

BARBADOS

37. Barbados is the most easterly of the Caribbean islands and is ranked 171 in terms of world total exports, and 164 in total imports globally. As a service economy, Barbados manufactures limited export products, notably hard liquor, packaged medicaments, cement and paper labels, predominantly to the North American markets of United States (USD 70.4 million), Jamaica (USD 41.4 million), Guyana (USD 28.8 million) and Trinidad and Tobago (USD 26.4 million). Its most specialized products according to the RCA index are other paints, video cameras, and paper labels, bitumen and asphalt and hard liquor.

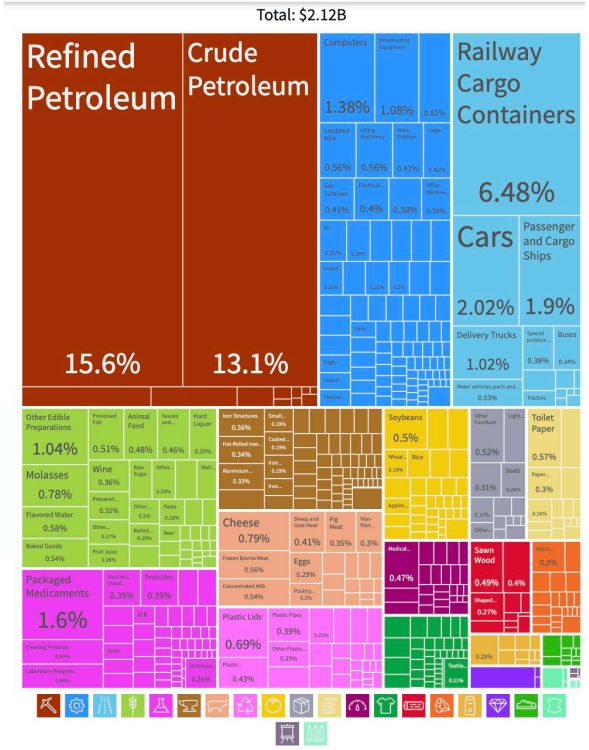


Figure 2. Barbados imports 2021

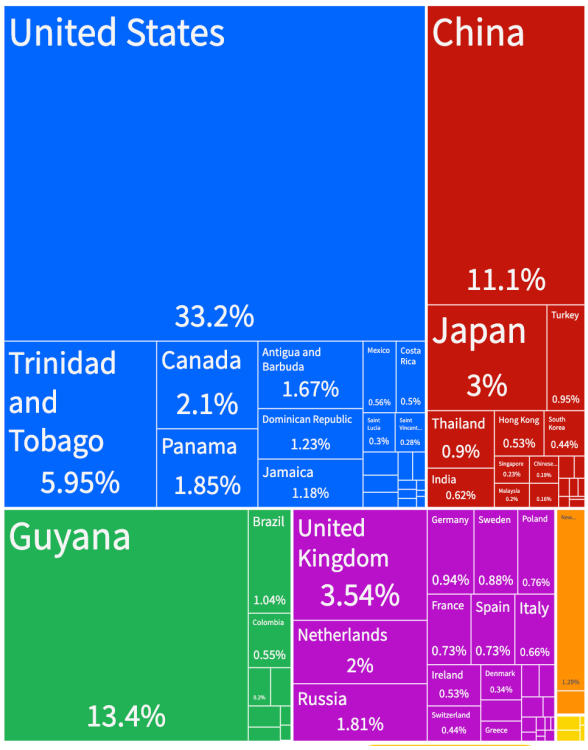


Figure 3. Barbados import partners 2021

38. As it relates to the agricultural products, Barbados imported a total of USD 353 million in 2021, the key food items being cheese (4.73 percent), fresh bovine meat (3.33 percent), and

processed fish (3.06 percent). Figure 4 illustrates the total 2021 food imports.

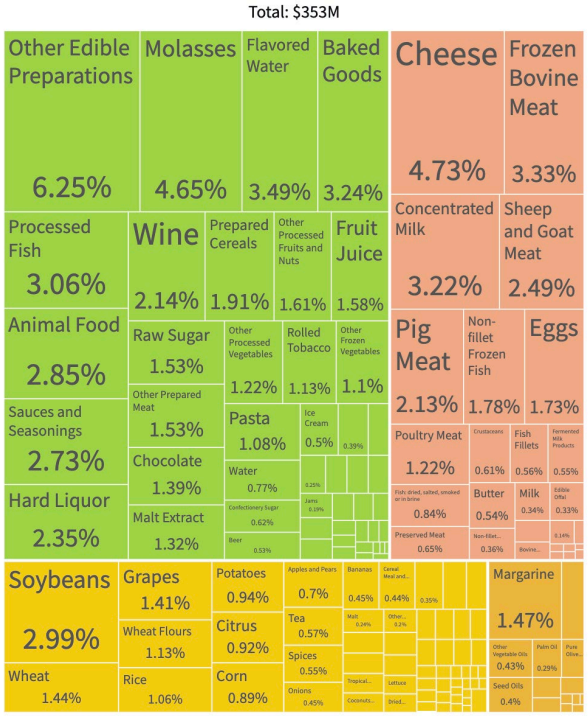


Figure 4. Barbados food imports 2021

Figure 5. Barbados top 30 food imports 2020

GRENADA

39. Grenada comprises the mainland state and two smaller islands called Petit Martinique and Carriacou. It is a member of both the OECS and CARICOM. In 2021, Grenada was rated 208 in world exports and 193 in total global imports. Its exports include yellowfin tuna, nutmeg and other spices, cocoa beans, frozen fruits and nuts, predominantly to the United States , France and Germany markets and St. Vincent and the Grenadines and Trinidad and Tobago within the CARICOM market. As it relates to imports, the top imports include refined petroleum, poultry and cars from the United States, Trinidad and Tobago, Cayman Islands, China and the United Kingdom of Great Britain and Northern Ireland. Grenada is already known for its highly specialized exports namely nutmeg, mace, and cardamoms, other paints and sugar preserved foods.

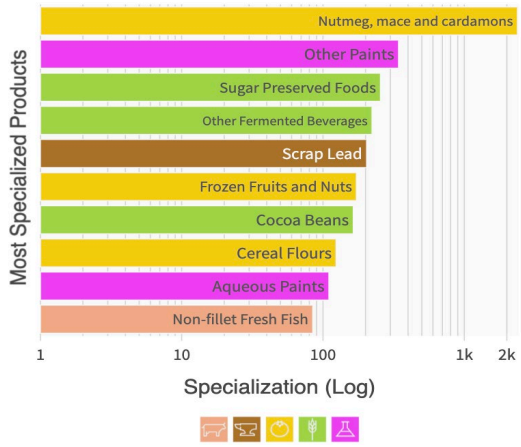


Figure 6. Grenada's most specialized products

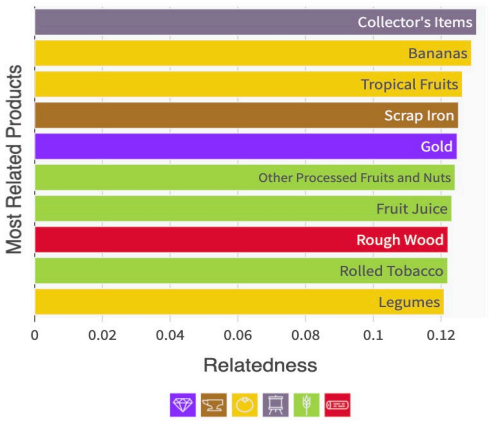


Figure 7. Grenada's export relatedness products

40. There are several food export opportunities for Grenada according to the relatedness index, these being bananas, tropical fruits and legumes. A cursory glance of Grenada's top imports includes refined petroleum, poultry meat, cars, other edible preparations from the United States, Cayman Islands, China and the United Kingdom. Grenada's overall import partner for 2021 was topped by the United States.

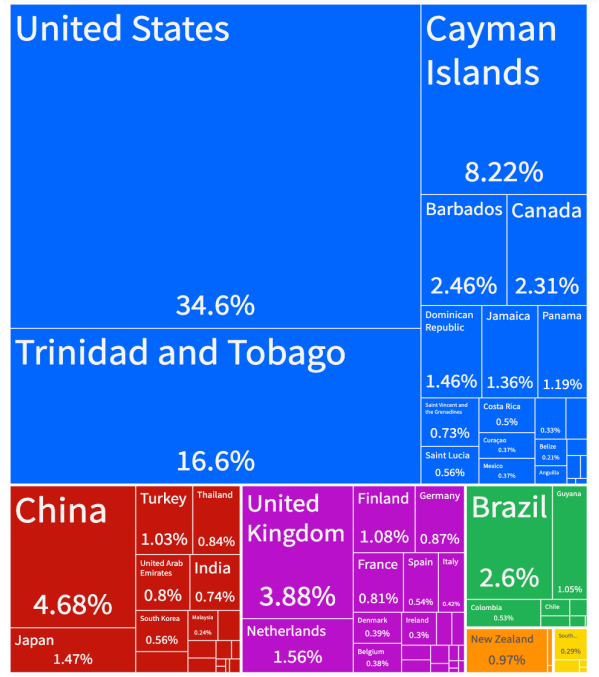


Figure 8. Grenada's overall import partners 2021

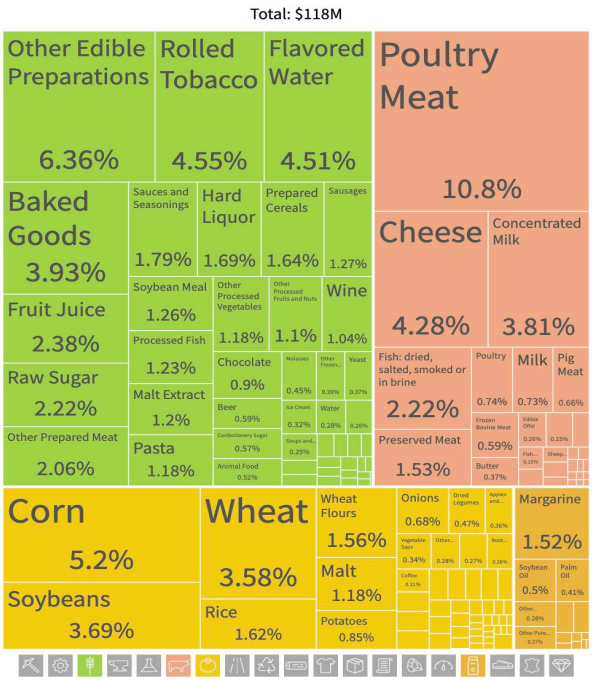


Figure 9. Grenada's food imports – 2021

41. As a small island developing state with limited manufacturing, Grenada imports the bulk of its agricultural products and food.

TRINIDAD AND TOBAGO

42. Although a founding CARICOM member state, Trinidad and Tobago is located a mere seven miles from Venezuela and shares boundaries with Barbados, as well as Grenada and Guyana. It is ranked number 96 in the world economy for exports and 130 for total global imports. As a former oil producing country, Trinidad and Tobago's top exports are ammonia, acyclic alcohols, petroleum gas and crude petroleum to the traditional partners of the United States, Guyana, China and Mexico. As an importing country, the twin republic purchases refined Petroleum, iron ore, iron structures, excavation machinery and passenger and cargo ships from the United States, China, Mexico, Brazil and Canada.

43. Trinidad and Tobago exhibit a high level of specialization in ammonia, iron reductions, acyclic alcohols and fertilizers according to the RCA index. Surprisingly, the top export opportunities for Trinidad and Tobago according to the RCA index are tropical fruits, wheat flours and cocoa beans.

44. Trinidad and Tobago's overall imports for 2021 are depicted below. It is noteworthy that the import bill fluctuates significantly on a yearly basis.

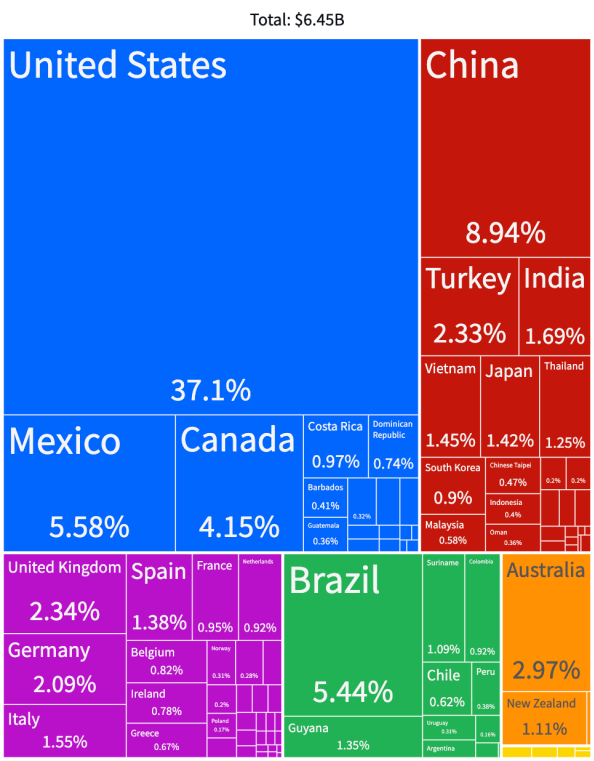


Figure 10. Trinidad top import partners (2021)

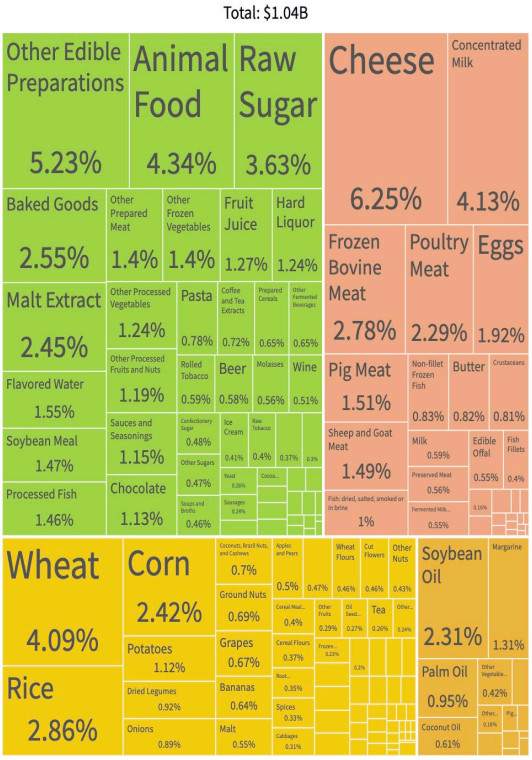


Figure 11. Trinidad agricultural/food imports (2021)

45. For the calendar year 2021, Trinidad and Tobago's top agricultural food imports were cheese, sugar, wheat, rice, corn and baked goods.

GUYANA

46. Guyana in 2021 was ranked as 122 in the world economy in total exports and 141 in total imports. Guyana exports resources ranging from crude petroleum, gold, rice and ore to the United States, Singapore, United Arab Emirates, the United Kingdom and Barbados. Guyana's top imports originate from Singapore, the United States, Trinidad and Tobago, China and Brazil. The imports comprised predominantly: special purpose ships, refined petroleum, valves, large construction vehicles and cars. Guyana has a high level of specification in aluminum ore, railway cargo containers, rice, crude petroleum and sand according to the RCA index.

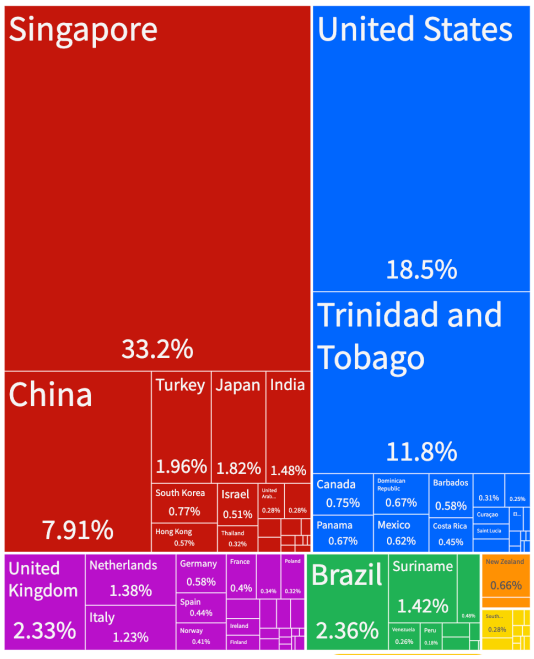


Figure 12. Guyana's import partners (2021)

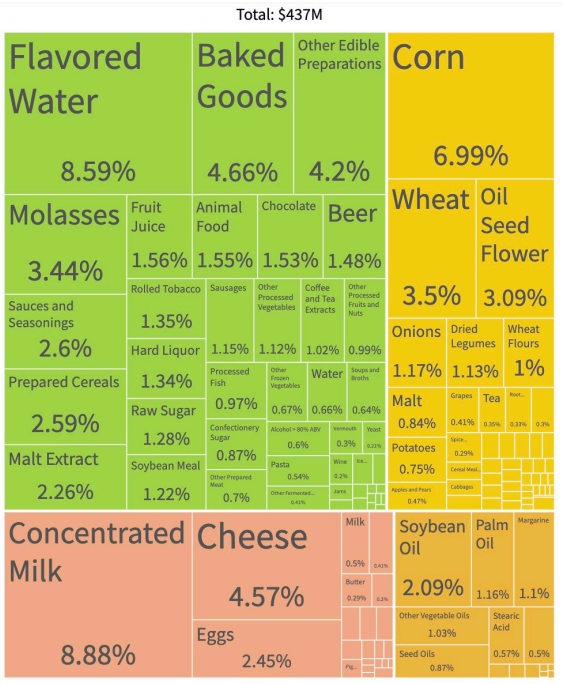


Figure 13. Guyana's agricultural products/food Imports (2021)

47. Guyana's imports of agricultural products were mainly corn, baked goods, wheat, cheese, eggs and sugar.

MACRO-SCAN OF THE STATE OF THE AGRIFOOD TRADE BETWEEN THE SELECTED COUNTRIES

Barbados – Grenada

48. Based on a scan conducted in 2021 of the Barbadian exports to Grenada, the results showed a total value of USD 3.22 million comprising soybean meal, poultry, baked goods and corn; Grenada exported USD 184 000 worth of food and beverages .

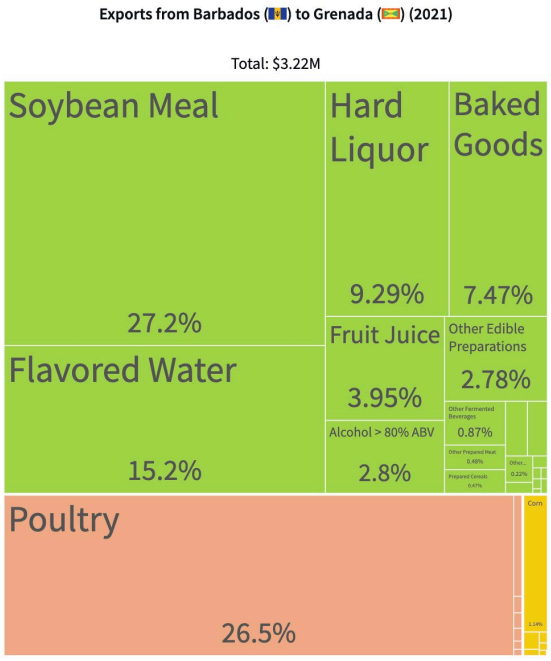


Figure 14. Exports from Barbados to Grenada 2021

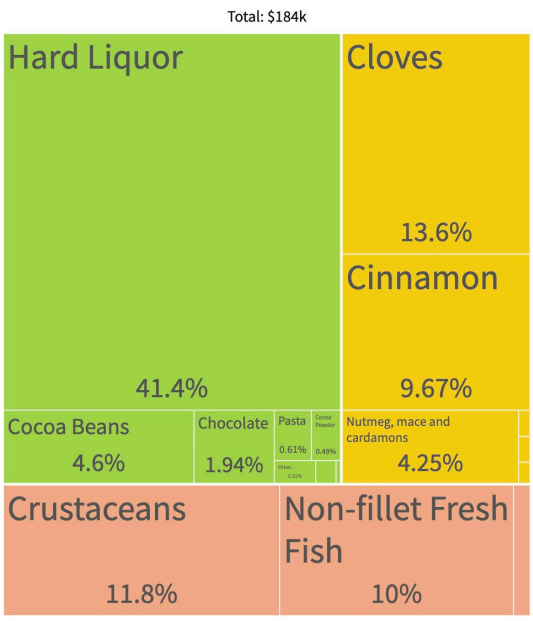


Figure 15. Grenada's exports to Barbados (2021)

49. An analysis of the growth of exports from Barbados to Grenada (2016–2021) illustrates that Barbados exported poultry, margarine, and baked goods during the period 2016–2021 with poultry growing 105 percent over the 5-year period, followed by soybean meal USD 51 400 while margarine increased by 6.62 percent over the 5-year period. Overall, Grenada the Spice Isle exported significant amounts of spices such as cloves and cinnamon. Cloves exports increased over 100 percent over the 5-year period.

BARBADOS-GUYANA

50. The trade in goods between Barbados and Guyana for the year 2021, showed Barbados exported USD 28.8 million to Guyana and comprised cement, petroleum coke, bitumen and asphalt, while Guyana exported USD 283 million worth of products to Barbados comprising of crude petroleum and rice during the same period.

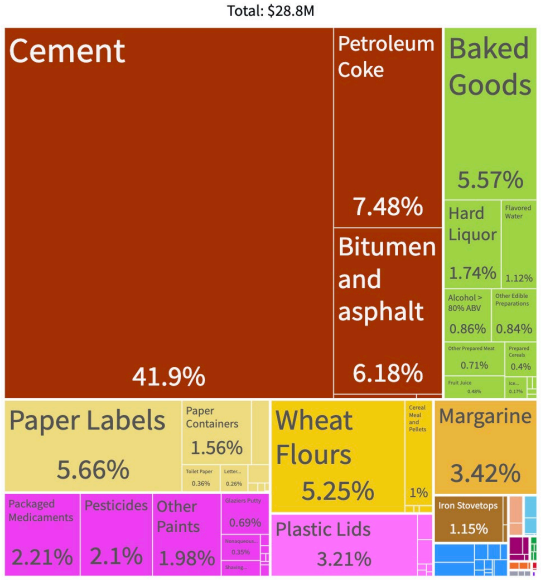


Figure 16. Barbados exports to Guyana (2021)

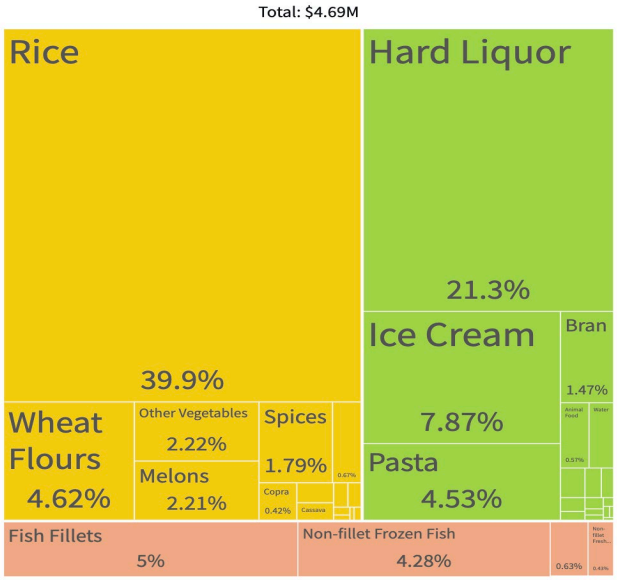


Figure 17. Guyanese exports to Barbados (2021)

51. Over the 5-year period, the predominant comestibles exported to Guyana from Barbados were baked goods at the growth rate of 77.7 percent, amounting to USD 702 000, flavoured water 14.4 percent, wheat flours 15 percent, margarine 54.6 percent increase over the five years. At the same time, the growth in Guyanese exports to Barbados was 100 percent for crude petroleum. Of the total USD 4.69 million exports to Barbados from Guyana, 39.9 percent was rice, 4.62 percent wheat flours, 5 percent fish fillets, 4.28 percent non-fillet frozen fish, 2.22 percent vegetables, 4.53 percent pasta.

BARBADOS – TRINIDAD AND TOBAGO

52. For the calendar year 2021, Trinidad and Tobago maintained a trade surplus with Barbados. Barbados exported USD 26.4 million worth of goods ranging from margarine, pesticides, and aluminum cans, while Trinidad and Tobago exported USD 124 million worth of refined petroleum and petroleum gas to Barbados.

53. According to an analysis in 2021 of Barbadian agricultural products and food exports to Trinidad and Tobago, the exports were predominantly 36.7 percent baked goods, 20 percent raw sugar, 8.3 percent other edible preparations, and 1.53 percent other prepared meat.

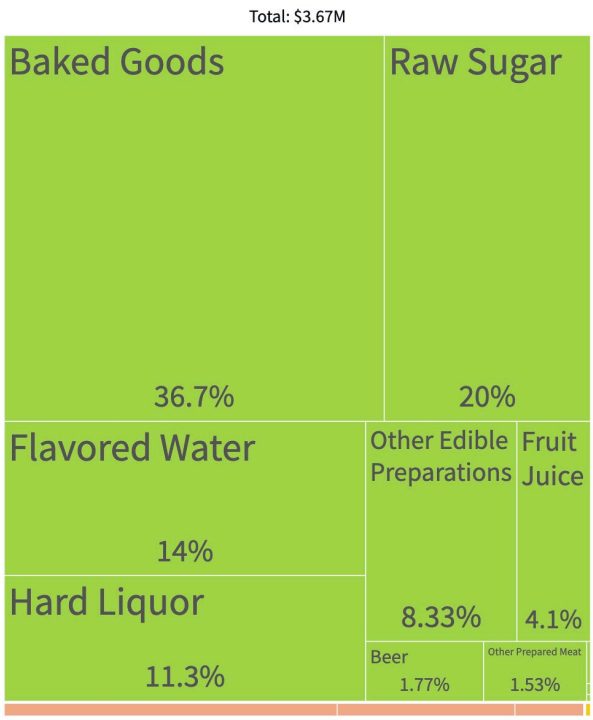


Figure 18. Barbados agricultural products/food exports to Trinidad and Tobago (2021)

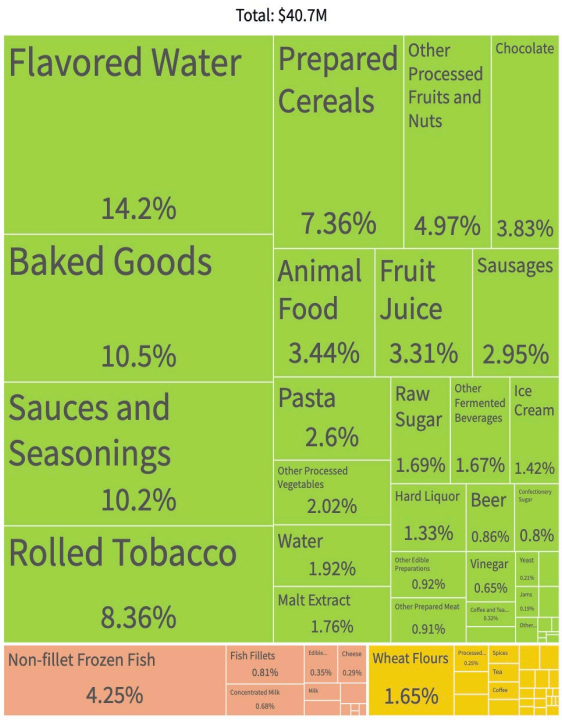


Figure 19. Trinidad and Tobago's exports of food and and beverages to Barbados (2021)

54. Over the 5-year period, Barbadian exports to Trinidad and Tobago grew significantly with 100 percent growth in raw sugar, 18.6 percent in margarine over the 5-year period, and 100 percent in soybean oil.

55. Trinidadian exports to Barbados predominantly involved the oil and gas exports, construction materials, plastics, etc. For the year 2021, the perishables exported from Trinidad and Tobago included 10.5 percent baked goods, 7.36 percent prepared cereals, 1.69 percent raw sugar, 2.95 percent sausages, 2.6 percent pasta, 1.65 percent wheat flours, and 4.25 percent non-fillet frozen fish.

56. Over the 5-year period, the Trinidadian exports to Barbados of perishables increased in the areas of sauces and seasonings, baked goods, sausages, prepared cereals, raw sugar, non-fillet frozen fish and chocolate.

GRENADA-GUYANA

57. Guyana maintains a strong trade surplus over Grenada. For the calendar year 2021, Guyana exported USD 4.8 million worth of goods comprising sand (USD 2.04 million) and rice (USD 1.6 million). On the other hand, Grenada exported toilet paper, iron structures and wheat flour to Guyana for the 2021 calendar year totaling USD 624 000.

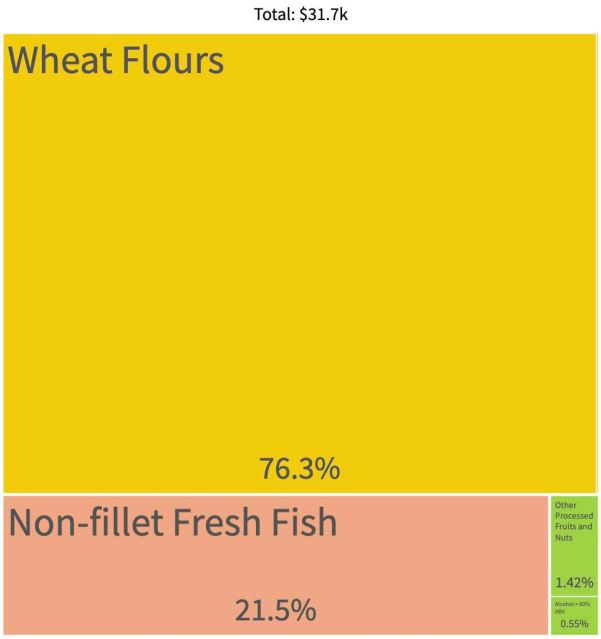


Figure 20. Grenada's agricultural products and goods exports to Guyana (2021)

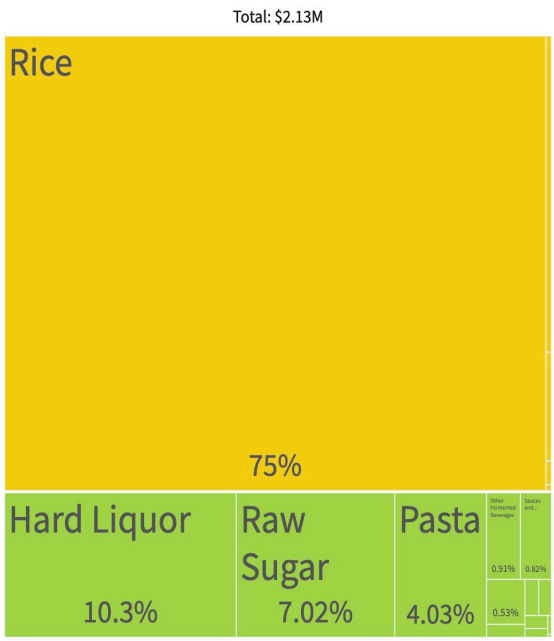


Figure 21. Guyanese food exports to Grenada (2021)

58. Grenadian exports of perishables comprised of predominantly 76.3 percent wheat flours, 21.5 percent non-fillet fresh fish, and 1.42 percent of other processed fruits and nuts for the year 2021. A snapshot of Grenadian exports from 2018 to 2021 to Guyana illustrates that there was a growth in non-fillet fresh fish and a significant decline in wheat flour by 14.2 percent.

59. For 2021, Guyanese exports to Grenada included predominantly 42.1 percent sand and 33.1 percent rice, with another significant component of wood products and raw sugar at 3.09 percent. A glance of the Guyanese exports of agricultural products/food in 2021 to Grenada included Guyanese rice which comprised 75 percent of the exports to Grenada, followed by 7.02 percent raw sugar and 4.03 percent pasta.

60. Over the 5-year period, rice exports grew at a rate of 39.9 percent, while other perishables such as raw sugar (-84.3 percent) and pasta (-6.84 percent). significantly declined.

GRENADA – TRINIDAD AND TOBAGO

61. Grenada exported USD 1.59 million to Trinidad and Tobago in 2021 comprising other fermented beverages, nutmeg, mace and cardamoms as well as crustaceans, while Trinidad and Tobago exported USD 76.9 million worth of refined petroleum, baked goods and cement to Grenada during the calendar year 2021.

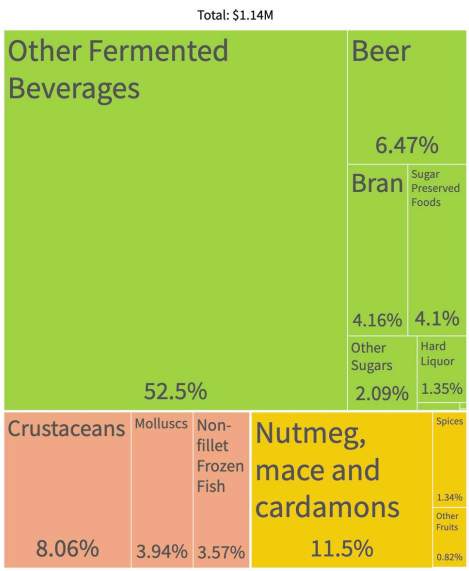


Figure 22. Grenadian food exports to Trinidad and Tobago (2021)

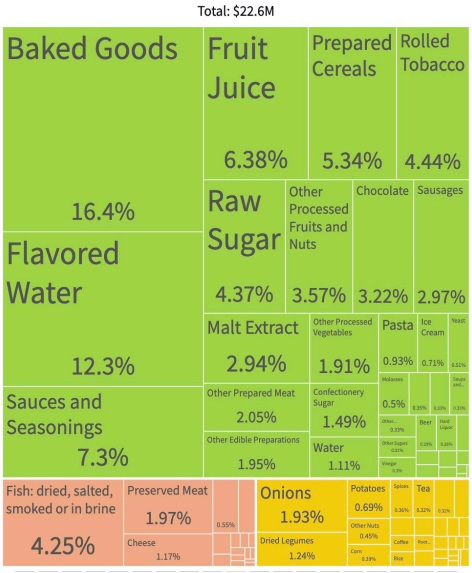


Figure 23. Trinidad and Tobago good exports to Grenada (2021)

62. For the calendar year 2021, Grenada exported 8.0 percent crustaceans, 11.5 percent in spices (nutmeg, mace and cardamoms), 4.1 percent sugar preserved foods, and 2.09 percent sugars.

63. Over the 5-year period, Grenadian exports of crustaceans grew at a rate of 86.5 percent, non-fillet frozen fish 668 percent, sugar preserved foods 100 percent and bran 100 percent, while mollusks declined by 76.2 percent and nutmeg, mace and cardamoms by 84.5 percent.

64. For 2021, Trinidad and Tobago's overall exports to Grenada were comprised predominantly of refined petroleum, glass, plastics and other perishables. An analysis of the food trade from Trinidad and Tobago to Grenada revealed that the Trinidadian exported perishables involved 16.4 percent baked goods, 5.34 percent prepared cereals, 4.37 percent raw sugar, 7.3 percent sauces and seasonings, 3.57 percent other processed fruits and nuts, 7.3 percent sauces and seasonings, 4.25 percent fish – dried, salted, smoked or in brine, 1.97 percent preserved meat, and 1.93 percent onions.

65. Over the last five years, Trinidad and Tobago exports to Grenada grew by 14.5 percent in baked goods, 76.2 percent raw sugar, 46.6 percent sauces and seasonings, 54.4 percent chocolates, 72.2 percent sausages, and 31.7 percent fish – fried, salted, smoked or in brine, onions.

TRINIDAD AND TOBAGO AND GUYANA

66. In 2021, Trinidad and Tobago enjoyed a trade surplus with Guyana. It exported USD 580 million worth of refined petroleum, passenger and cargo ships as well as flavoured water to Guyana, while Guyana exported USD 86.8 million to Trinidad comprising railway cargo containers, rice and raw sugar. Generally, Trinidadian exports to Guyana for 2021 were comprised of refined petroleum followed by passenger and cargo ships and other chemicals and fertilizers.

Figure 24. Agrifood Trinidad and Tobago food exports to Guyana (2021)

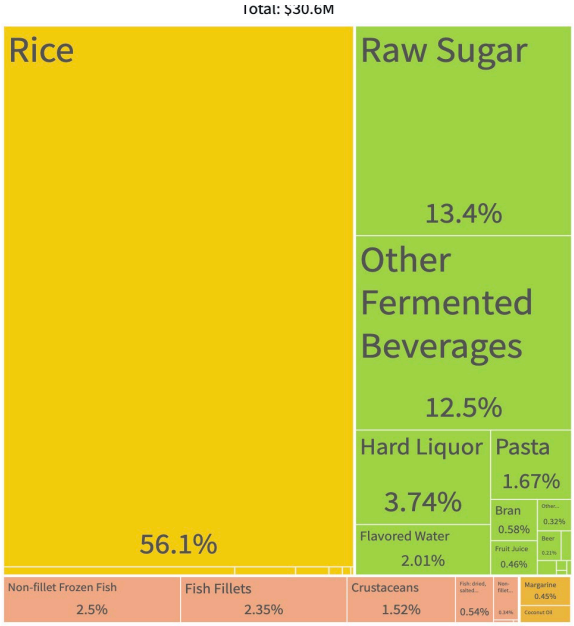


Figure 25. Guyana's food exports to Trinidad and Tobago (2021)

67. For the year 2021, Trinidad exported the following perishables to Guyana: baked goods, 14.8 percent, prepared cereals 13.2 percent, sauces and seasonings 9.98 percent, sausages 2.43 percent, other processed vegetables 1.76 percent, wheat flours 1.5 percent, wheat 1.25 percent, and margarine 1.36 percent. Over the 5-year period, Trinidad's refined petroleum exports grew by 363 percent, prepared cereals 43.6 percent, baked goods 45 percent, sauces and seasonings 73.2 percent, and chocolate 128 percent.

68. For the year 2021, Guyana exported 55.3 percent of its total exports to Trinidad and Tobago comprising railway cargo containers, followed by 19.8 percent rice, 4.73 percent raw sugar, and 2.73 percent refined petroleum. Exports of Guyanese perishables to Trinidad were comprised of 56.1 percent of rice, 13.4 percent raw sugar, 1.67 percent pasta, 2.5 percent non-fillet frozen fish, 2.35 percent fish fillets, 1.52 percent crustaceans. Over the 5-year period, exports of railway cargo containers grew 285 percent, rice 10.3 percent, non-fillet frozen fish, 21.5 percent. There were declines in raw sugar by 48.6 percent, pasta 56.8 percent, and fish fillets 19.7 percent.

Agriculture Maritime transport, commercial routes, and standard of navigation

69. The marine transport sector within the Caribbean can be regarded as a combination of structured and unstructured groupings. A structured grouping refers to liner trade companies with multi-national status whereas an unstructured grouping refers to the intraregional schooner trade sector.

70. The structured group provides access between the islands directly to the United States or Europe, and to regional hubs as well as other islands. Table 2 shows the quantum of liner services per company for the respective ports within the Caribbean. This data revealed that Tropical Shipping, CMA-CGM and King Ocean were found to have the highest modal score for the ports involved in this study, that is, Barbados, Grenada, Trinidad and Tobago and Guyana. As such, the analysis of the liner trade service within this report was developed on data obtained from these three companies.

Table 2. Services per shipping line company

	MSC	Tropical	Seaboard	Crowley	CMA-CGM	Caribbean Feeder Services	King Ocean	Geest	Maersk	Zim	Spliethoff	Hyde	Europe Caribbean Line	Seatrade	Marfret
Antigua		2	2												
Bahamas	2	2													
Barbados	1	2	2	1	1	2	2	1							
Belize						1						1			
Dominica		2			1		1	1							
Grenada		1					1	1							
Guyana	1	1			1		1						1		
St. Kitts					1										
Saint Lucia		1		1	1		1	1							
Saint Vincent		2		1				1							
Suriname	1		1	1	1		1		1	1	1		1	1	
Trinidad & Tobago	5	3	2	1	6	1	2		1				1		1

71. The schooner sector, existent in the Leeward and Windward islands, consists of local operators operating small ships of less than 500 gross tonnage (GT). These small vessels typically operate on regular trading routes.

VESSEL CHARACTERISTICS

CARICOM SHOONERS

72. **Types of vessels.** Schooner sector vessels have distinctive characteristics suited to trade within the region. These vessels are usually converted fishing boats, small ro-ro ships and supply vessels with ramps, allowing cargo to be easily transferred between jetty and cargo hold/area by forklift or small trailer. Table 3 provides a sample of vessels operating as part of the schooner trade within Barbados, Grenada, Trinidad and Tobago and Guyana.

73. **Size and capacities.** An analysis of the sample data revealed an average length of 50.68m and

draft of 3.5m, however, it should be noted that these vessels can be categorized into two subgroups. The first group consist of smaller, non-bulk ships of less than 500 GT/GRT with optimal (Gross Register Tonnage), characteristics for operations at the smaller CARICOM ports/jetties handling break bulk items. The second group of bulk cargo carriers transport mostly sugar, rice and other bulk agricultural commodities and were typically more than 500 GT/GRT. The average cargo capacity of the smaller, non-bulk ships was approximately 159 metric tonnes whilst the average cargo capacity of the larger, bulk cargo ships was 2630 metric tonnes.

74. **Cargo handling capabilities.** There were no vessels within the sampled data set that provided refrigerated storage therefore, damage to perishables is more likely if the ship cannot be discharged immediately on arrival. For cargo handling, all vessels were outfitted with small davits, or in the case of ro-ro vessels, ramps and forklifts provided.

75. **Age.** The age of these vessels is considerable. Of the 23 vessels included in the sample, all were over 45 years old. Maintenance for these vessels can be categorized under two main headers: Category 1 relates to hull and dry docking whilst Category 2 relates to machinery and equipment. It was observed that 80 percent of the operators had no planned maintenance system implemented and maintenance routines were regularly hampered by port turnaround times, weather and crew inefficiency.

76. **Operating Speed**. The average operational speed for these vessels was between 8 and 12 knots.

77. **Regulatory Compliance**:

- International Load Line Convention, 1966.
- International Tonnage Convention, 1969.
- International Convention for the Prevention of Collisions at Sea, 1972.
- International Convention for Prevention of Pollution from Ships (MARPOL 73/78).
- Caribbean Cargo Ship Safety Code.
- Small Commercial Vessel Code for ships trading in the Caribbean.

Table 3. Schooner vessel characteristics

Vessel Name	Vessel Type	Date Built	LOA (m)	Draft (m)	GT	Average Speed (knots)	Cargo Capacity (metric tonnes)	Deck Cargo/Cargo Hold	Craneage
Addie K	ro-ro cargo	1973	42.10	3.35	380	10	100	deck cargo	ramp & forklift
Admiral Bay I	ro-ro cargo	1969	44.50	3.17	310	11	105	deck cargo	ramp & forklift
Admiral Bay II	ro-ro cargo	1965	48.90	3.25	318	12	120	deck cargo	ramp & forklift
Admiral Bay III	ro-ro cargo	1970	44.50	2.65	494	12.5	125	deck cargo	Ramp & Forklift
Dolly C	ro-ro cargo	1972	44.50	3.19	430	10	89	deck Cargo	ramp & forklift
Guidance II	ro-ro cargo	1970	39.58	3.37	365	9	100	deck cargo	ramp & Forklift

Tyrrel Bay Express	ro-ro cargo	1962	52.00	3.62	417	10	80	deck cargo	ramp & forklift
C Elizabeth II	general cargo	1955	41.75	2.21	198	12	61	cargo hold	davit
Lady Victoria	general cargo	1982	55.59	3.60	299	10	690	deck cargo	ramp & forklift
Mary G	general cargo	1968	26.21	2.44	158	10	60	deck cargo + cargo hold	crane
Ocean Princess II	general cargo	1979	35.08	2.90	186	10	52	deck cargo + cargo hold	crane
Scotty Sky	general cargo	1960	34.44	2.12	261	7	60	cargo hold	crane & famp
Inch 1	converted ro-ro	1963	33.53	2.64	261	8	18.80	deck cargo	ramp
Rayniah J	converted ro-ro	1966	25.29		99	9	40	deck cargo	ramp
Tradewind	converted ro-ro	1978	50.29	3.65	284	12	366	Deck cargo	ramp
Tristan Janice	converted ro-ro	1978	33.53	2.87	155	11	80	deck cargo	ramp
Lady Fazeela	bulk cargo	1967	57.76	3.49	494	11	1008	cargo hold	crane
Inga B	bulk cargo	1964	71.36	4.99	1108	10	2427	cargo hold	crane
Irene V	bulk cargo	1979	69.30	5.45	1694	11	2864	cargo hold	crane
Munie Chandra	bulk cargo	1961	61.09	3.65	499	11.50	1133	cargo hold	crane
Sydney Marie	bulk cargo	1975	79.98	5.37	1592	11	3724	cargo hold	crane
Syros Wind	bulk cargo	1986	94.52	5.94	2749	11	4466	cargo hold	crane
Wayambo Trader	bulk cargo	1984	79.78	4.10	1391	12	2789	cargo hold	crane

LINER VESSELS

78. **Types of vessels**. Table 4 provides a sample of 13 vessels operating as part of the liner trade for companies Tropical Shipping, CMA-CGM and King Ocean between Barbados, Grenada, Trinidad and Tobago and Guyana. These ships are classified as either general cargo ships or container ships.

79. **Size and capacities of vessels**. The characteristics of the liner trade vessels only allow port calls at the larger, main container terminals. The average vessel size in the liner trade is 137.24m in length, a draft of 7.85m and gross tonnage of 9700. The characteristics limit the ports that the vessels can visit within the countries for the analysis. The vessels operating within the liner trade carry mainly containers and also provide refrigerated storage. The average cargo capacity of the vessels within the sample is 861 TEU with 169 reefer plugs.

80. **Age.** The age of these vessels included within the sampled data set was approximately 14 years. This was attributed to the need for compliance with new and updated regulatory measures necessitating the acquisition of newer vessels to ensure certification and operational readiness.

81. **Operating Speed.** The average operational speed for these vessels was 15 knots.

82. Regulatory Compliance:

- International Load Line Convention, 1966.
- International Tonnage Convention, 1969.
- International Convention for the Prevention of Collisions at Sea, 1972.
- International Convention for the Safety of Life at Sea, 1974.
- International Convention for Prevention of Pollution from Ships (MARPOL 73/78).
- Maritime Labour Convention, 2006 International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004.
- The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978.

Table 4. Liner vessel characteristics

Vessel Name	Year Built	LOA (m)	Draft (m)	GT	Nominal Capacity (TEU)	Reefer Plugs	Average Speed (knots)
BBC Gdansk	2009	122.38	7.15	6155	502	32	13
BBC HongKong	2008	129.50	8.70	8472	672	30	14
Cedric K	2003	86.54	5.00	2546	167	18	8
Contship Luv	2008	141.37	8.5	9957	1118	220	19
Contship Zoe	2007	147.78	6.70	9948	1100	220	13.5
JSP Bora	2007	147.70	8.50	9957	1080	220	19
Lena	2006	139.10	8.80	9981	960		
Tropic Express	2011	106.68	4.22	3744	368	80	12.5
Tropic Island	2018	159.90	10.50	15 215	1146	260	20
Tropic Jewel	2019	159.73	10.50	15 215	1145	260	20
Vega Scorpio	2010	139.10	8.80	9999	966	252	14.5
Warnow Dolphin	2007	166.15	6.60	15 375	1284	390	13
Nomadic Hjellestad	2010	138.07	8.06	9530	736	50	13.5

TRADE ROUTES

83. Currently, the CARICOM islands of the Lesser Antilles mainly rely on the schooner sector for transport of agri-products between member states, however, all international containerized cargo is transported by the liner sector. For both sectors, Trinidad and Barbados serve as major transshipments ports for cargoes bound for the Caribbean islands.

CARICOM SCHOONER TRADING ROUTES

84. **Routes and distances.** The schooner vessels offer a more flexible schedule for the trans-shipment for agri-products. The schooners usually operate on a given route or solely between regular of traditional ports. Research revealed that seasonal changes in the agricultural sector and or weather contribute to sporadic changes in ports or routes served by these vessels. Based on the vessels sampled, the main routes on which the schooners operate are those connecting the Windward Islands with Trinidad and Barbados, and in particular, Grenada-Trinidad and St. Vincent and the Grenadines-Trinidad.

85. The average distance sailed in round trip voyages from the home port is approximately 271 nautical miles. However, this distance varies according to the trading pattern voyage frequency, speed, the fuel costs, and weather conditions throughout the year.[2] The maps included in Figure 26 show typical routes of the sampled schooner vessels.

86. **Transit times**. Most of the schooners' vessels operate on a weekly round trip service. Table 4 shows the average transit times for the specified routes taking into account the average time spent in port.

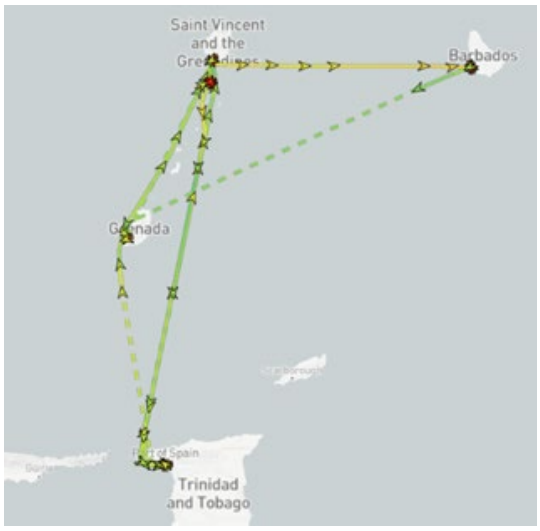
87. **Cargoes carried**. Very few of the schooners provide product dedicated services. The vessels participating in this inter-island trade are niche carriers specializing in less than container load (LCL) and non-containerized goods such as boxes and pallets.

88. Inter-island cargo movements vary widely from live animals to fresh fruits and vegetables, and from individual consignments of manufactured goods to processed foods. The main elements are general cargo, typically construction materials, manufactured goods for retailers and small-scale industrial products from Trinidad exported to Grenada and northwards calling at the various islands, some going as far as St. Maarten. The vessels then return from the islands with cargoes typically consisting of fresh fruit, vegetables and other ground provisions to Trinidad and Barbados.

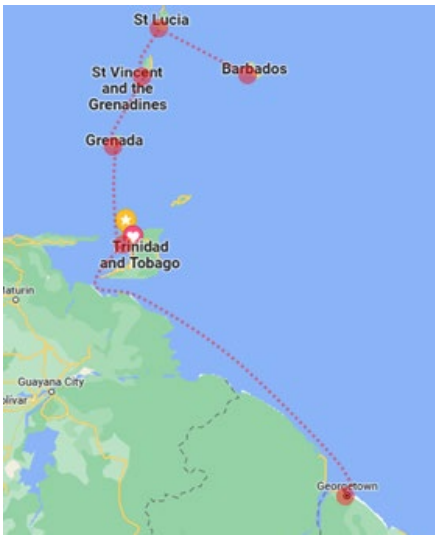
89. The cargoes used for trade are usually limited in volume and are normally presented in different shipping units, for example, break-bulk, pallets, barrels, bales, and indivisible odd-sized units.

90. A notable aspect of trade within the Caribbean region is the "huckster" trade. This occurs where farmers sell their produce to intermediaries, referred to as "hucksters." The huckster then sails on the schooners with the produce to the various islands where it will be taken to the local market to be sold upon arrival.

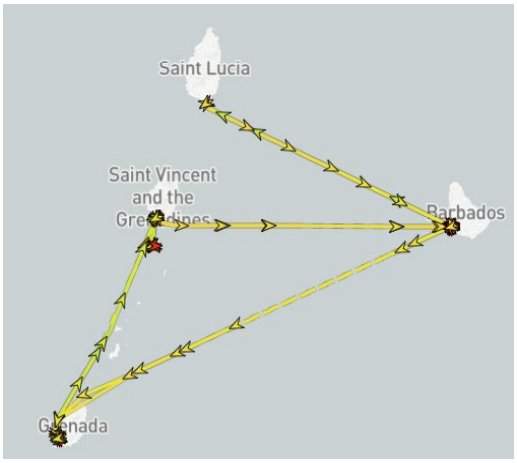
2 (Boerne 1999).



Trinidad, Grenada, Barbados
(Admiral Bay II)



Guyana, Trinidad, Grenada, Barbados
(Lady Fazeela)



Grenada, Barbados
(Admiral Bay I)

Trinidad, Grenada
(Rayniah J & Mary G)

Figure 26. Typical schooner routes

Table 5. Average transit times – Admiral Bay II Ship

Week Day	Route	Average Transit Time	Average Time in Port
Monday (normal route)	St. Vincent and the Grenadines to Bequia Bequia to Trinidad	0.5 hours	1 hour
Monday (occasional route)	St. Vincent and the Grenadines to Barbados Barbados to Grenada Grenada to Trinidad	12 hours 12 hours 6 hours	4 hours
Tuesday	Trinidad	--	36 hours
Wednesday	Trinidad	--	--
Thursday	Trinidad to Grenada	6 hours	4 hours
Friday	Grenada to St. Vincent and the Grenadines	6 hours	4 hours

Table 6. **Average transit times – Lady Fazeela** Ship

Stops	Route	Average Transit Time	Average Time in Port
1	Guyana to Trinidad	32 hours	48 hours
2	Trinidad to Grenada	32 hours	48 hours
3	Grenada to St. Vincent and the Grenadines	32 hours	48 hours
4	St. Vincent and the Grenadines to St. Lucia	32 hours	48 hours
5	St. Lucia to Barbados	32 hours	48 hours

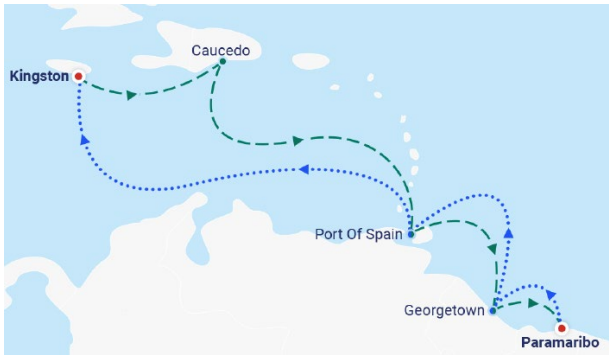
LINER VESSEL TRADING ROUTES

91. **Routes and distances**. All liners sail on a fixed route following a set schedule. The maps included in Figure 27 below show the routes of the weekly liner services offered by Tropical Shipping, CMA-CGM and King Ocean within Barbados, Grenada, Trinidad and Tobago and Guyana.

92. **Transit times**. Fixed-day sailings are a key characteristic of the liner service. The vessels typically spend no longer than one day in each port. Table 5 below provides an example of the weekly sailing schedules for the Eastern Caribbean and Caribbean Feeder Services operated by King Ocean Services.

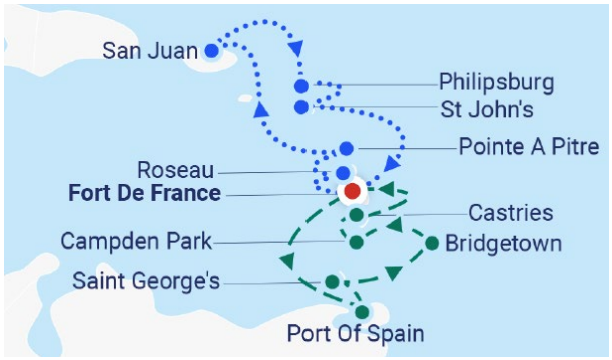
93. **Cargoes carried**. All cargo loaded by the liner vessels are containerized.

CMA CGM



El Dorado Shuttle
(Guyana and Trinidad)

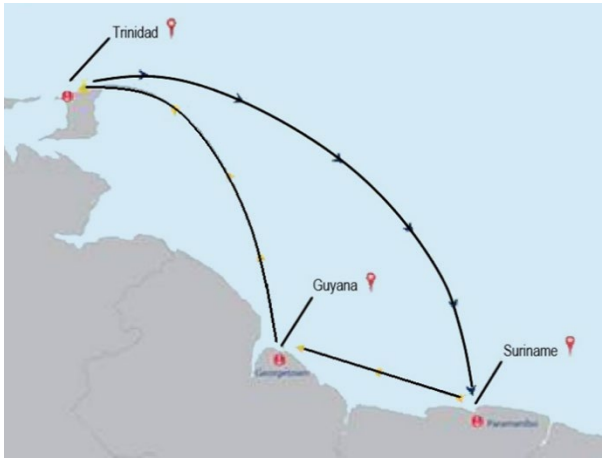
Guyanas Caribbean 2
(Guyana and Trinidad)



Kalinago Service
(Trinidad, Grenada, Barbados)

King Ocean Services

Eastern Caribbean Rotation
(Trinidad, Grenada, Barbados)



Caribbean Feeder Service
(Trinidad, Guyana)

Tropical Shipping

(Trinidad, Grenada, Barbados) | **(Trinidad, Barbados, Guyana)**

Figure 27. Liner service routes

Operating costs

SCHOONERS

94. The operators have no obligation to publish their rates and charges for the information or approval for any public authority within CARICOM. The schooner vessel operators do not typically post or circulate this data however in most instances the agency, handling, and wharfage fees are combined into a lump sum cost per shipped unit. No regional standard charge has been established between country agencies.

95. **Freight.** At present, little information is available on the arrangements for, and levels of freight rates within the schooner sector. Rates can be quoted per bag, (e.g. cements, fertilizer, rice, salt), per crate (e.g. produce), barrel, carton, cask, and other.

96. An average rate is around USD 80 per pallet however schooner operators will adjust their rates if necessary to cover their costs. Our research revealed the following as published information for freight rates in the Southern Caribbean being charged by consolidation agencies:

- 1 cubic ft = USD 10;
- 2 cubic ft = USD 25;
- 3 cubic ft = USD 35;
- 4 cubic ft = USD 45;
- 5 cubic ft = USD 55;
- 6 cubic ft and greater add additional USD 3.44 per cube;
- cargo insurance costs were noted to be approximately 1.5 percent of the value of the goods.

97. **Cargo Handling**. Rates usually include labour for loading and unloading cargo if this activity is not performed by the ship. Normally on CARICOM wharves and jetties shore side cranes are not provided.

98. **Fuel**. Interviews with operators of the schooners included within the sample data set revealed that the average fuel cost was about USD 6 per gallon.

99. **Crew**. The crews of these ships are recruited locally. On some routes the size of the crew can be as small as four whist some can be as large as ten, as is required for manning the vessel and handling cargo. The average monthly payroll for vessels within the sampled data set was between USD 5000 and USD 8000.

100. **Port Dues/Provisioning and Maintenance**. Port dues could not be accurately assessed, however, it was considered that based on GT and size they would be considerably less for schooner trade vessels as compared with liner vessels. With respect to provisioning and maintenance, it was estimated that an expense of USD 5000–7000 per month should be the minimum budget.

LINERS

Containership Hamburg Time Charter Index (1999 – 2009)

Class	1999	September 2009	2009:1999
200-299 TEU capacity	US$ 16.70/TEU	US$ 12.03/TEU	-72 %
1,000-1,260 TEU capacity	US$ 8.24/TEU	US$ 3.71/TEU	-45 %
1,600-1,999 TEU capacity	US$ 7.54/TEU	US$ 2.66/TEU	-35 %

Source: Hamburg Shipbrokers' Association

101. **Freight.** A study conducted by Wilmsmeier and Hoffmann presented the above average time-charter rates per TEU-day for vessels with carrying capacities of between 200 and 1999 TEU during the period from 1999 to 2009 That data was received from one major liner shipping company, "Company A," which provides shipping services throughout the Caribbean region. The presented freight rates in their sample range between USD 650 and USD 3290 per TEU. For routes where no company is providing direct service, such as where all containerized maritime trade involves at least one trans-shipment in a third country's port, freight rates in their sample range from USD 1170 to USD 3290, with an average of USD 2056. For routes with one to four carriers providing direct services the reported freight rates range from USD 650 to USD 2250 with an average of USD 1449. If five or more competing carriers provide direct services, the freight rate ranges from USD 650 to USD 1730, averaging USD 973.[3]

- **Fuel.** It is assumed that this is factored into the freight rates, and the consumer is not charged additionally for this.
- **Crew.** It is assumed that this is factored into the freight rates, and the consumer is not charged additionally for this.

102. Based on the above analysis, Liner services for CARICOM mainly originate in Miami, Kingston, Freeport or Port of Spain. There are currently no intra-regional services that directly connect all CARICOM countries and in particular, the countries being investigated for this study. Agri-products normally necessitate the use of refrigerated containers based on a voyage and storage time of more than two to three days. An analysis of the liner trade routes does not guarantee a delivery service that can maintain a two to three-day cycle, which mandates the use of refrigerated containers. Nonetheless, the types and volumes of agri-products are not cost effective when it comes to the booking and efficient usage of refrigerated containers.

103. With respect to the schooner services between CARICOM countries, the voyage cycle time has been historically developed by ship owners to facilitate a maximum in transit time of perishable and non-perishable goods of not more than three days. Additionally, greater care and attention is paid to the handling of goods due to the personalized nature of the service. It should be noted that thanks to the Caribbean Free Trade Association (CARIFTA), when these schooners operate at CARICOM wharves the tariff and cargo handling costs are minimized. Furthermore, these schooner trade vessels adequately address the requirements of the huckster trade with respect to facilities and the proximity of the wharf to market transfers. Another feature of these vessels is the appropriateness of size of the vessel that accommodates small or limited parcels of agri-products.

104. For the aforementioned reasons the liner trade cannot at this time successfully compete with

3 (GOPA 2009).

the schooner sector on routes, which do not have sufficient volumes to attract a significant number of regular liner shipping services. Based on this analysis, the formal liner trade and schooners appear to complement the services provided, especially on routes involving “lighterage” ports, and when the volume is small. Similarly, small vessels have proven to be competitive in the transport of commodities of low economic density, and possibly even other cargo on routes with a pronounced imbalance of freight.

105. The synergy and compatibility between cargo liners and schooners contribute to the Caribbean's maritime trade ecosystem resilience. Cargo liners ensure the efficient flow of goods between major economic centres, underpinning industries, and international trade agreements. Meanwhile, schooners fill the gaps in the network, by delivering cargo to remote islands, supplying essentials to coastal communities, and connecting people. This dynamic interplay between large-scale efficiency and localized adaptability can be supported with dedicated action for both players.

106. The environmental impact of the shipping industry has come under scrutiny in recent years, leading to the development and implementation of various measures to reduce carbon emissions. One such measure is the Carbon Intensity Indicator (CII), a tool designed to measure and mitigate carbon emissions in the shipping sector.

107. The CII is a metric developed by the International Maritime Organization to assess the carbon emissions efficiency of individual ships. It measures a vessel's carbon dioxide (CO_2) emissions per transport work (such as per ton-mile or per passenger-mile) and provides a standardized way to evaluate and compare the environmental performance of ships. It is a metric designed to evaluate and measure the carbon emissions efficiency of individual ships, taking into account various key elements and factors that contribute to a vessel's carbon footprint. Understanding these elements will be crucial for shipping companies and regulators to effectively assess and improve their CII scores.[4]

108. The CII has thus emerged as a critical tool in the global effort to reduce carbon emissions in the maritime industry. This indicator provides a standardized metric for measuring and reporting the carbon intensity of shipping operations. In the case of the Caribbean, where maritime trade plays a central role in economic development and environmental stewardship, the adoption and implementation of the CII can have a significant impact. However, there is no evidence or recent study on the subject that will affect only the liner services, as the CII applies only to vessels with tonnage greater than 400t, and therefore does not affect most of the schooners’ operators.

[4] The CII determines the annual reduction factor needed to ensure continuous improvement of a ship's operational carbon intensity within a specific rating level. The actual annual operational CII achieved must be documented and verified against the required annual operational CII. This enables the operational carbon intensity rating to be determined.

Port Facilities and related agrifood infrastructures

109. A port can be described as a node in the logistics chain that facilitates trade of goods between the originating production centre and the final consuming centre. Studies have shown that approximately 90 percent of all goods traded in the world are transported by sea. The logistics value chain incorporates all elements involved in the production, processing and packaging, transport from the origin of production to the destination of consumption and finally, the delivery of goods in top quality condition to the consumer.

110. This section of the report focuses on the appropriate systems relevant to the trade of agricultural products, and in particular, those systems which occur at the port facility. In the context of this study, the four ports shall be discussed and assessed in terms of their capability to receive, store, and deliver containers and schooner trade.

111. Agricultural goods are characterized by their perishable nature, some items have a very short period of time from harvesting to consumption to maintain its quality and safety for instance, meat and fish must be cooled immediately or frozen to facilitate storage and transport to the consumer. Other goods like fruits, rice, and other root crops have a relatively longer shelf life and may be transported in appropriate modes either in dry containers, refrigerated containers or atmosphere-controlled containers to preserve its quality and food safety protocols.

112. At the port, the agricultural products have to be unitized in the particular mode suitable for the particular agricultural product to facilitate transport in the ship. It may be in containers, either refrigerated or dry containers in bulk cargo carriers, or in the form of pallets. The product must be shipped under conditions that satisfy the requisite international health and safety standards, and whose quality will satisfy the consumer.

113. Shipping lines transport goods only in full container loads, either in twenty- or forty-foot containers. In certain instances, exporters may have cargo that is less than a full container load, which is prevalent in small economies or production centres where the volume of production is limited. In response to these cases, entities called cargo consolidators have been developed to address this challenge. In the exporting country, they collect and consolidate the less than container load cargo from several exporters into a full container load, and then transport and ship the container to the destination country or port.

114. At the destination, there will be corresponding deconsolidation centres either in the port or at an inland depot outside the port, where the cargo is deconsolidated and delivered to individual importers. As mentioned, because of the nature of the agriculture products, these centres must have the appropriate cold storage facilities, either packing houses with cold storage facilities or reefer plugs for the refrigerated containers.

115. The cargo consolidation system is prone to the risk of conforming to prescribed shipping schedules, as there may be cases where exporters for various reasons, fails to deliver his planned portion of the export cargo at the specified schedule to facilitate preparation for shipping and transport of the container to the port. Such instances lead to the delay in export of the container, and the resulting risk for the exporter who has met his obligations, but the container has not been shipped as per the agreed schedule. Depending on the nature of the goods, the agreed terms and conditions for export of the goods and delivery to the customer, such matters can lead to a default by the exporter and a cancellation of the contract. This is especially important in the case where the customer is a cruise ship, where the delivery of food supplies of specified quantity and quality is critical to the success of the business. In this instance, there is no exception made for non-compliance by the

supplier.

Key Operational and Technological Indices relevant to Port Operations

116. The key operational and technological indices relevant to port operations are those which:

- enable the port facility to safely accommodate the ships being used by the shipping line on the particular service;
- berth, load and unload the cargo from the vessel in a safe and efficient manner so that time spent at the terminal is minimized. To support this objective would be the availability of any management and technological system, which would enable the shipping line/exporter/importer to manage the process of loading or unloading and delivery of the cargo to the customer.

117. Examples of such indices would be:

- Navigation: is there a well-defined access channel to the port, what is the length and width of the channel, the water depth? Is the port accessible at all times, are there water depth or tidal limitations or climatic conditions, which affect the entry/exit of the port? Is the port subject to pilotage and towage conditions? If so, what are they, and what are the terms and conditions for such services?
- Facility/berth infrastructure: are the available berths suitable for the vessels in operation i.e. container vessels, general cargo vessels, bulk cargo vessels available on demand? Is there a berth reservation system? If so, what are the terms and conditions for accessing a berth. Is there adequate equipment to safely undertake the loading and unloading process? Is there space to store the cargo and containers being unloaded and loaded to facilitate the efficient execution of the process? Are there suitable facilities for special cargo types that is, reefer containers such as reefer plugs and a dedicated reefer container storage yard?
- Does the port possess a suitable IT infrastructure and terminal management system to allow for the vessel to advise the terminal on the details of the cargo/container numbers and types to be unloaded and loaded? Is the terminal management system coordinated with customs and other appropriate regulatory authorities to enable the cargo to be discharged or loaded with optimal efficiency? In the latter case, the efficiency may be measured by container moves or tons of cargo discharged or loaded per berth hour. Is the system digital and can data/information be provided or received electronically to minimize bureaucratic delays in the operations? Is the network secure and data acquisition/retention/ delivery secure for unauthorized access or from hackers? Are the port gate delivery receipt systems integrated with the terminal management system?
- From the perspective of the exporter and importer the efficiency of the port gate system is measured by the time taken for a haulage truck to be granted access to the port, deliver its export container in the appropriate location and leave the port compound. For import containers the indices would be the time taken to move from the port gate to the storage yard, the accurate identification and loading of the container onto the truck and exit the port with all customs, port and other regulatory approvals completed. This index is usually measured as the time taken for the process and is used to measure the efficiency of the port operations from the importer or exporter perspective. Furthermore, the terminal should have systems where all documentation, payments, and statutory can be processed electronically.

Impact of indices on port operations and trade facilitation between countries

118. The indices referred to previously measure the efficiency of the port from the perspective of the primary stakeholders involved in port operations, the shipping line and the importer or exporter:

- Shipping Lines – ports strive to improve their efficiency indices as an increase in containers loaded or unloaded per hour (measured as moves per hour), or cargo loaded or unloaded per berth hour (measured as tonnes per hour) means that the vessel spends less time at the port facility and more time sailing to the next port. This results in improved productivity of the shipping line to its customers and facilitates a reduction of overall shipping costs and time for the goods to reach its ultimate customer. This will redound to lower costs of the particular product to the consumer and thus increased trade facilitation between countries.

  Reduction of the time to process the export or import of the cargo at the port gate, either by less gate processing time to the hauler, or the ability of the importer or the exporter to electronically submit his documentation, address queries, and receive the appropriate approvals from the statutory authorities. The result is increased efficiencies during the process and therefore lower costs of export and import, hence lower product prices for the customer.

119. The above conditions increase the competitive advantage of the particular good from the production country and consequently leads to an increase in trade between countries.

Specific Indices for Agricultural Trade and efficient /competitive port operations

Minimum requirements for agricultural trade port operations.

120. Agriculture products are characterized by their perishable nature, which essentially means that the conditions under which it is harvested, treated and packaged, and transported is key to maintaining its quality or fitness for consumption. Each of these constituent processes must be addressed and steps implemented to preserve the integrity of the product.

121. At the port it is presumed that the harvesting, treatment, and packaging requirements for the product have been implemented by the exporter and the cargo is in a fit state for transport by sea. The port's responsibility is to temporarily store the product in the appropriate manner for the scheduled time and then load the cargo onto the vessel for shipping to its destination. Most cargo are shipped by containers in a prepackaged form. The containers must be suitable for transport of the particular product. In most cases cold storage containers (reefers) are used. For the sea transport phase, the vessel must have adequate and sufficient reefer plugs with standby backup systems. At the port the terminal should have sufficient reefer plugs to cater to the number of reefer containers anticipated to facilitate the trade. In other cases, like fruit and bananas which are subject to ripening during the transport phase, the container must have atmosphere control systems to control the ripening process.

122. Some ports may have cold storage facilities within the terminal, or as is mostly the case, there may be independent cold storage facilities offsite as in for example Barbados, where an LCL cargo can be unloaded and stored for the customer. In the case where bulk cargo is being shipped, there would be specific systems for loading or unloading such cargo. This can be in the form of vacuum suction systems, or grab systems. These unloading systems would be supplemented by a conveyor process

system to a nearby storage facility for further processing of the product. These systems are usually used in the importation of wheat, grain, bulk rice, corn, and other.

Description of the four ports included in the Study and characteristics of current operations.

Port of Bridgetown, Barbados

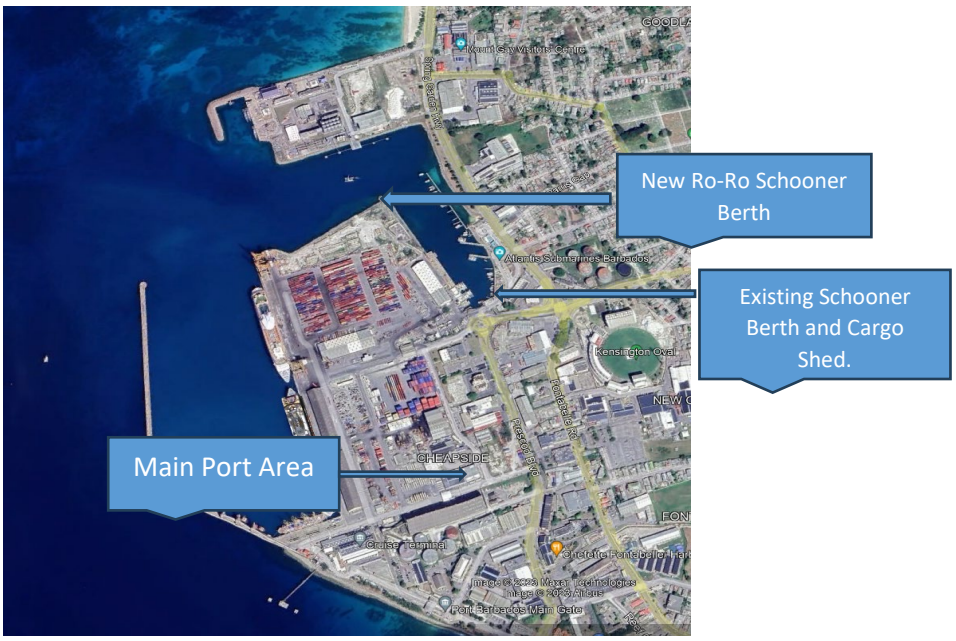


Figure 28. Port of Bridgetown, Barbados

123. The Port of Bridgetown or the Barbados Port Inc. (BPI) is a commercial state-owned enterprise. The Legislation under which the BPI operates, "the Barbados Port Inc. Transfer of Management and Vesting of Assets Act of 2003" is used as a framework for port regulation and grants the BPI certain rights as a warehouseman and harbour authority. BPI oversees marine operations, owns the port superstructure, and is involved in cargo operations.

124. The BPI has developed a business plan for 2021–2026, which is aligned with the corporate strategy and its overall vision, and outlines key objectives for cargo, cruise, labour reform, national development, green technologies, digital initiatives, and institutional change.

125. There are several infrastructure projects identified in the plan and are all focused on the improvement of efficiencies in the cargo and cruise ship operations of the BPI. The total cost of the capital improvement projects identified in the plan, over the five-year period, is estimated at BBD 510.1. The implementation of the plan is in progress and several projects are currently ongoing. It should be noted that the infrastructure improvement projects are primarily focused on commercial cargo and cruise operations.

Port Infrastructure

126. Three berths are used for container vessels and general cargo: berths 3, 4 and 5 with a total continuous berth length of 517 m. The water depth alongside the berths for container ships is listed as 11.0 m^2, and the maximum length of vessel accommodated at the port is 244 m or 293 m for those fitted with bow thrusters.

127. There are three covered sheds used for cargo storage: Shed #2 – 3,972 m2, Shed #3 – 3584 m, and Shed #4 – 5314 m^2. There is an open storage area for containers which measures 47 348 m^2. For the handling of reefer containers there are 96 reefer plugs at 440 V.

128. Schooner trade such as those vessels that trade between the islands, for instance, Admiral Bay 11 berths at the Shallow Draught berth, which has a berth length of 156 m and a depth alongside of 6.8 m. There is also an associated shallow draught shed with a covered area of 3,345 m^2.

Equipment

129. The BPI possesses 3 ship-to-shore cranes, 1 mobile harbour crane, 14 straddle carriers, 2 reach stackers, 15 fork trucks and 8 trailers.

130. To improve its efficiency and to service importers and exporters, the BPI has implemented a new web-based terminal operating system.

131. Pilotage and tug attendance is compulsory for vessels over 1000 tonnes or 168 m in length. BPI possesses (a) two pilot launches and (b) two tugs each equipped for firefighting, salvage and rescue operations. Tug Pelican II – 4660 hp, Tug Barbados II – 5500 hp.

132. All the major shipping lines call at the BPI, including lines which currently call at the port of Port of Spain, Port of St. Georges and at Port of Georgetown. Therefore, the existing connectivity to all the ports is under evaluation by the major shipping lines. In addition, the shipping lines representatives have advised that the existing spare capacity presently unused be made available to facilitate any increase in agricultural trade.

Current Operations

133. At the present time, the trade in agricultural products occur mainly by using containers, either refrigerated or dry, depending on the characteristics of the product. This trade is currently taking place in the main port and is operating satisfactorily.

134. In addition, agricultural trade is undertaken by utilizing the inter-island schooner, the Admiral Bay II, which operates between Grenada, St. Vincent and the Grenadines, St. Lucia and Barbados. This vessel berths at the shallow draught berth. Adjacent to the berth is the cargo storage shed where products are temporarily stored pending the necessary inspections and approval by the relevant agencies: customs, health, and plant quarantine. The cargo is then loaded directly onto trucks and taken to the consignee.

135. Included as one of the projects identified in the master plan, a new ro-ro off berth is being constructed to the west of the present schooner berth. This will address the facility for berthing of the vessel only, there are no systems contemplated for temporary storage of the cargo such as a storage shed, as the plan expects the immediate delivery of the cargo to the customer. Indeed, on completion of the new ro-ro facility the existing shed will be converted for cruise operations.

136. It has been reported that the BPI has no specific interest in developing a dedicated facility on the port for agricultural products. The BPI has indicated that it would be more beneficial for such produce to go directly to the food terminal and pack house facility being developed by the Ministry of Agriculture and the Barbados Agricultural Development and Marketing Corporation.

137. Based on the feedback from key stakeholders, while the new berth will address existing

berthing challenges, supporting facilities are needed in close proximity to promote the sustainable aspects of the trade in agricultural products. These include cold storage facilities and reefer plugs at strategic locations near the berth. In addition, the schooner berth is located within the main International Ship and Port Security Code (ISPS) controlled port facility, while in contrast the ports of Port of Spain and St. Georges facilities are located outside of the main port. It has been reported that in the latter case, trade is more efficient due to less bureaucracy, and ultimately trade costs are lower.

138. The schooner trade is characterized by relatively small quantity and volumes of goods, that is, less than a container load with products that do not need refrigerating, as the products are usually transported by pallets and the levels of packaging vary. Given these limitations, the schooner trade usually occurs between islands that are within 24 to 36 hours of sailing. This is why schooner trade primarily takes place between Grenada-St. Vincent and the Grenadines to Trinidad and Grenada-St. Vincent and the Grenadines-St. Lucia to Barbados.

139. In terms of capacity, the BPI has adequate facilities to cater for the current and future projected trade volumes.

Port of St. Georges, Grenada

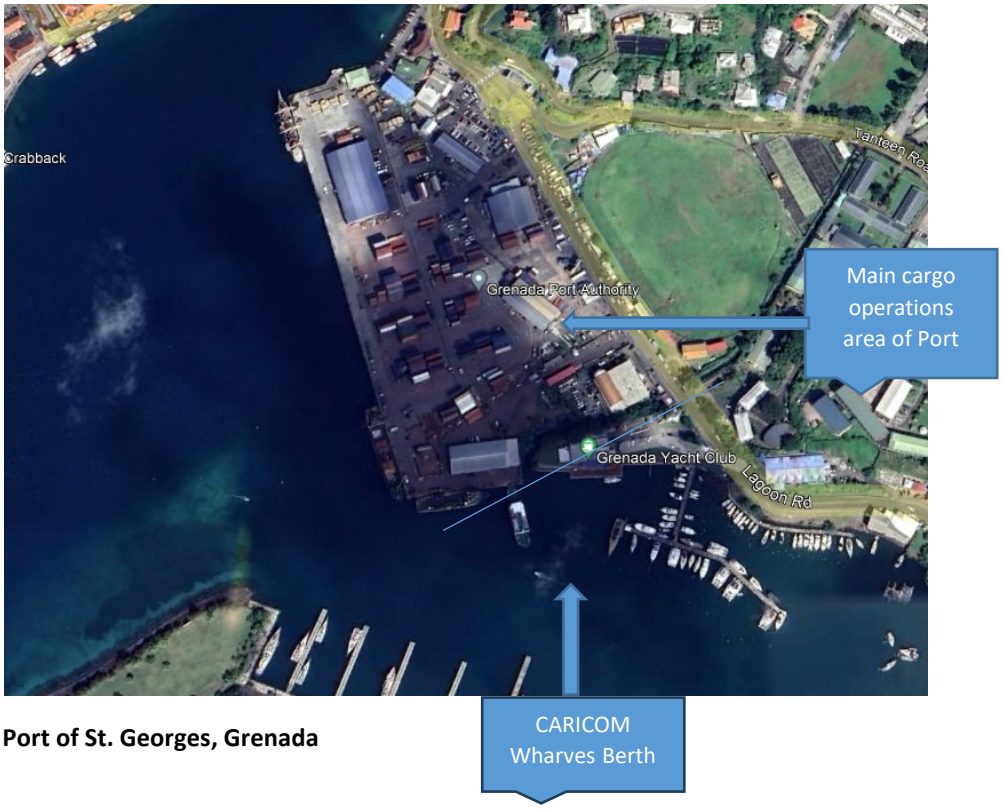


Figure 29. Port of St. Georges, Grenada

General Description

140. The port of Port St. Georges is located on the south-western coast of Grenada. It is the major commercial port of Grenada and can be divided into two operational areas, one for cruise vessels to the west, and the other for cargo operations. The cargo operations area as shown in Figure 29 is further subdivided into (i) the main port area where international container and general cargo vessels are berthed and their cargo loaded and unloaded and (ii) the CARICOM wharves area where the

smaller schooner vessels which operate between the nearby islands are berthed. Shipping lines that currently call at the main port area of Port of St. Georges include Tropical, CMA CGM, Geest and KOS.

Port Infrastructure

Terminal

141. The main port has a 335 m long berth with water depths alongside ranging from 8.0–9.1 m. There is 3252 m^2 (35 000 sq. ft.) of open storage space and six acres of container stacking area. Covered storage such as Transit Shed 1 has a covered area of 2044 m^2 (22 000 sq. ft.) for storing general cargo while the Queens Shed has an area of 1133 m^2 (12 200 sq. ft.). The freight station has 25 reefer plugs for refrigerated containers. The main port operates within the ISPS mandates and processes.

Equipment

142. At the main port area, containers or general cargo are unloaded or loaded using the ship's cranes, and are moved into storage within the terminal or in the warehouse sheds using forklift trucks, tractor trailers, reach stackers, and a top lifter. It has been reported that the Grenada Ports Authority has plans to acquire a 100-tonne mobile harbour crane.

143. The port of Port St. Georges reported that it handled 25 000 TEUs in 2022. At the present time, it has commissioned the development of a master plan to improve the capacity of the port to handle additional cargo volumes with greater efficiencies.

144. The CARICOM wharves area, where the inter-island schooners operate, falls outside the operational protocols of the main port. Access to this area has a separate adjacent gate, the berth has a total length of 82.5 m and water depth of 5 m. The covered warehouse adjacent to the berth is 910 m^2 (9800 sq. ft.). Vessels can berth alongside or pull up to the dock to facilitate ro-ro operations. There are no reefer plugs in this area and furthermore no refrigeration facilities in the cargo shed.

145. Export schooner trade to Trinidad and Barbados consists mainly of agricultural products such as fruits, vegetables and root crops. There are no facilities for consolidation or pre-packaging of the agriculture products either on the port or offsite, thus the cargo is wrapped or placed in bags on pallets for shipping. The return trade cargo is mainly construction and other general cargo.

146. The existing facilities at the main port area of the Port of St. Georges is adequate for the current cargo profiles and volumes. However cold storage facilities should be established in the CARICOM wharves area to support the existing trade in agricultural products. This would be supported by the establishment of a packing facility, similar to that at the National Agricultural Marketing and Development Corporation facility in Trinidad. This facility should preferably be offsite from the port at perhaps a production centre to increase the treatment and packaging of the products.

Port of Port of Spain, Trinidad

Figure 30. Port of Port of Spain, Trinidad (PPOS) – Kings Wharf – main port area

Figure 31. Port of Port of Spain – Queens Wharf - CARICOM Wharves area

General Description

147. The port of Port of Spain is one of the two major commercial ports in Trinidad and Tobago. It is located to the northwest of the island and falls within the limits of the capital city Port of Spain.

148. The port of the Port of Spain runs parallel to the coast in an east-west direction and can be divided into two areas:

- Kings Wharf, which is the main port area (Figure 30). This is where all the large container, general cargo and other miscellaneous vessels berth and undertake cargo operations;
- The Queens Wharf: (a) the which operates between Trinidad and Tobago and (b) the CARICOM Wharves operations falls within this area.

149. At the main port, which is a customs and ISPS-controlled area, all commercial vessels which have a GRT of greater than 500 tonnes are required to call at this area.

Port Infrastructure

150. Maritime access:

- approach channel: 8.5 Km in length, 122 m width and -12 m CD (Chart Datum) depth;
- access basin: 550 m in diameter.

Terminal Infrastructure

151. The total continuous wharf length is 1745 m (Berths 1–8), of which 1395 m (Berths 3– 8) is used for cargo operations. Included within this berth space a container terminal (Berths 6AE, 6AW and Berth 7) is available with a total wharf length of 505 m. The water depths alongside are -9.0 m (at the general cargo berths) and -12 m at the container terminal.

- covered warehouse storage: 14 272 m^2;
- full container storage yard: 14.54 Ha;
- empty container storage yard: 9.0 Ha;
- reefer container storage yard: 5,000 m^2;
- miscellaneous open storage: 4.8 Ha.

Equipment

152. A summary of the major items of equipment available at the port of Port of Spain is as follows:

- ship-to-shore cranes 5 (1 Panamax and 4 Post- Panamax)
- mobile harbour crane 1
- rubber tyred gantry cranes 14
- reach stackers 4
- full container handlers 2
- empty container handlers 9
- tractor trucks 21
- tractor trailers 54

CARICOM Wharves:

153. The CARICOM Wharves falls within the Queens Wharf area and consists of a L-shaped berth measuring 160 m (E-W) and 155 m (N-S) or a total berth length of 315 m (refer to Figure 31). There are two open sheds with a total covered area of 440 m^2 adjacent to the berth where cargo is inspected prior to release or loading. The water depth is advertised as 6.5 m. Only vessels whose GRT is less than 500 tonnes are allowed to berth at the wharf.

154. At the CARICOM Wharf, the port of Port of Spain only provides berth availability to vessels. The shipping agent is responsible for arranging for customs, plant quarantine inspections of the cargo, as well as the sourcing of any labour and equipment resources need to load or offload the cargo.

155. The area is not ISPS-controlled and there are no cargo storage facilities in the area, for example, the cargo operations are primarily a direct delivery operation. Import cargo includes, but is not limited to agricultural products, however export cargo is primarily building construction and other general cargo.

156. The CARICOM Wharves operate Monday to Friday during the period 07:00–23:00 hours. Cargo operations at the wharves occur primarily on Tuesday, Wednesday and Thursday, as a result, the wharves are basically underutilized on Monday and Friday.

157. Revenue from cargo operations in this area is limited, consequently, the infrastructure facilities need significant repairs and maintenance. Examples of such repair and maintenance work include:

- improved lighting both operational and security;
- repairs to bollard system;
- repairs to the paved surfaces at the wharves;
- repairs and improvement of the security fencing to the area;
- upgrade of the electrical system in the area to facilitate the installation of reefer plugs and cold storage facilities;
- the inter-island ferry service has taken over a portion of the area to facilitate ferry cargo operations. In addition, the customs and excise division has taken charge of the area and is using it for employee parking and storage of derelict vehicles. These two activities have severely compromised the efficient cargo operations in the area and are adversely impacting the ability of the CARICOM Wharves to expand and develop trade in agricultural products.

Port of Georgetown, Guyana

158. The Port of Georgetown is situated on the north coast of Guyana, along the east bank of the Demerara River. It stretches 16 km inwards from the mouth of the Demerara River along the ships channel 70 m wide with an average depth of 5.5 m at low tide.

159. There are five independent terminals within the Port of Georgetown with respective terminal lengths as follows:

- John Fernandes Limited – 190 m;
- Guyana National Shipping Corporation – 290 m;
- Guyana National Industrial Company – 200 m;
- Demerara Shipping Company Limited – 140 m;

- Muneshwers Limited – 166 m.

160. John Fernandes Limited and Muneshwers Limited are two privately-owned companies operating the terminals that primarily deal with the import and export of commercial cargo into Guyana.

Figure 32. Port of Georgetown, Guyana

Port Infrastructure

161. A key issue differentiating the Port of Georgetown from the other ports referenced and which impacts on its operations is the terminal area utilized for port operations. In the other ports, each port has land area available to facilitate the temporary storage of containers and general cargo during the loading and unloading process. This allows the loading and unloading process to be more efficient and minimizes the time the vessel stays at the terminal.

162. In the case of the terminals at the Port of Georgetown, there is limited terminal area and this adversely affects the efficiency of operations. Inland depots are utilized for container storage and severe logistics challenges are introduced. Critical planning must be done by the terminal operator to pre-stage the containers and cargo at the terminal during the loading process. During the discharge process, the containers and cargo must be taken off the terminal in the shortest possible time to mitigate against congestion at the terminal. This challenge is further exacerbated by the road traffic conditions in the proximity of the terminal.

163. The water level restrictions due to the tidal conditions of the river is another constraint in the process. The water depth in the channel is 5.0 m and alongside the terminal 7.0 m. This therefore limits the size of the vessels calling at the terminals and thus the cargo carrying capacity of the vessel. Indeed, one shipping line advised using restricted size vessels for the service calling at Port of Georgetown.

164. In order to improve efficiency of their operations, Muneshwers and John Fernandes are jointly

upgrading the wharf structure at their terminals to accommodate a mobile harbour crane. It is reported that a mobile harbour crane will be acquired by the two terminals to be shared during cargo operations.

165. The terminals do not possess any shore based craneage and depend on the ship's crane for loading and unloading. The Fernandes Terminal has advised that the productivity using the ship's crane be 14 moves per hour.

166. Equipment available and utilized at the terminal consists of reach stackers, tractor trucks and trailers.

167. Due to the physical constraints at the Port of Georgetown, there are limited improvements that can be made to the terminal infrastructure to significantly improve the capacity of the terminals.

168. It has been reported that a new deep-water port is being built in Berbice to facilitate larger vessels visiting Guyana. The new port will address the needs of the oil and gas and commercial cargo, such as the agricultural sector.

Assessment of port capacity to meet agricultural trade development

169. Each of the four ports under study have the basic resources in terms of port infrastructure, and appropriate equipment resources to competitively support trade development and a possible new cargo service.

170. Two of the ports, BPI and the port of Port of Spain, have abundant water depths, berth availability, equipment resources such as ship-to-shore cranes, horizontal transport in BPI – straddle carriers in the port of Port of Spain – rubber tyred gantry cranes, container storage yards, refer plugs, and terminal management systems.

171. Port of St. Georges and Port of Georgetown both use ship cranes for loading and unloading containers, and their horizontal transport equipment fleet is adequate for the current cargo trade.

172. Port of St. Georges is currently reviewing its port infrastructure layout and will develop a master plan for relocation of facilities, which are not required at the terminal and thus increase its capacity to support trade development.

173. Port of Georgetown lacks the storage space and support facilities in terms of electrical infrastructure to support cold storage equipment at the terminal.

Main Gaps

Facilities and Equipment

BPI:

- dedicated facilities for schooner trade for temporary storage of agricultural products;
- packing house facility for receiving, treating and packaging of agricultural products.

The port of Port of Spain – CARICOM Wharves:

- upgrade of electrical system to provide (a) cold storage facilities, (b) operational and

security lighting;
- repairs to, and upgrade of, security fencing and CCTV systems;
- repairs to terminal pavement, fenders and bollards system;
- installation of four reefer plug outlets and two solar cold storage rooms.

Port of St. Georges:

- relocation of facilities and operations that are not required to be inside the terminal, thus maximizing terminal operational space and efficiencies;
- installation of four reefer plug outlets and two solar cold storage rooms at the CARICOM Wharves area.

Port of Georgetown:

- completion of wharf-strengthening project and acquisition of mobile harbour crane;
- installation of electrical system to support cold storage facilities like reefer plugs.

Logistics and flow management

BPI:

- is being addressed as part of the business plan 2021/22–2025/26;
- construction of food terminal and pack house facility offsite.

PPOS – CARICOM Wharves:

- removal of (a) customs practices with respect to derelict vehicle storage and car parking facilities and (b) inter-island ferry cargo operations that free up areas, for an improvement in security and logistics flows within the terminal.

Recommendation of measures to address the gaps identified

Port of Bridgetown, Barbados

Facilities

174. Based on feedback from key stakeholders, while the new ro-ro berth will address existing schooner berthing challenges, the facilities in close proximity of the berth to preserve the quality of the agricultural products will need support. These include cold storage facilities and reefer plugs at strategic locations near the berth.

175. In addition, the schooner berth is located within the main ISPS-controlled port facility, while at the ports of Port of Spain and St. Georges these facilities are located outside of the main port. In the latter locations trade appears to be easier and more efficient from an operational standpoint due to less bureaucracy, which ultimately results in lower trade costs.

176. BPI is believed to have no specific interest in developing a dedicated facility at the port for agricultural products. It considers that it would be more beneficial for such produce to go directly to the proposed food terminal and pack house facility, to be developed outside of the BPI terminal by the Ministry of Agriculture and the Barbados Agricultural Development and Marketing Corporation. This facility represents the long-term measure for the promotion of agriculture trade in the region.

177. In the interim period while the food terminal and pack house facility is being planned and constructed, it is recommended to procure and install two solar-powered cold storage rooms. The estimated cost of the procurement and installation of one such cold room is USD 0.25 million.

Port of St. Georges, Grenada

Facilities

178. Port of St. Georges has an adequate infrastructure capacity, equipment resources, and reefer plug outlets for trade given the present volume of containers and general cargo being handled. At this time, Port of St. George is undertaking the preparation of a master plan to improve its container. Based on the results of the proposed master plan, should the development of the CARICOM Wharves area be necessary to cater for the further development of that aspect of the trade it will be incorporated in the proposed plan.

179. The berth space at the CARICOM Wharves for the inter-island schooners, and the existing cargo shed is adequate for the current level of trade in cargo. What is required however is the establishment of facilities for handling products that need cold storage facilities to maintain product quality and safety requirements

180. The establishment of electrical systems for reefer plugs and the installation of approximately four to six plug outlets, or in lieu of this investment, the procurement and installation of the solar cold storage rooms as identified for Bridgetown.

181. Parallel to this is the recommendation for the establishment of a food terminal and pack house facility offsite, with the appropriate size to cater for existing trade volumes and product characteristics. This will enable agricultural products producers to prepare and package their products according to appropriate health and safety standards prior to export.

182. A preliminary cost estimate for the solar cold storage rooms and the packing house is USD 3.65 million.

Port of Port of Spain, Trinidad

183. At the Kings Wharf area, the port of Port of Spain has the adequate capability and capacity to accommodate existing and proposed shipping lines using container or general cargo vessels that transport agricultural products. There are sufficient reefer plugs, container and general cargo storage space, container handling, and general cargo equipment to address the needs of the trade that use containers for the transport of agricultural products.

184. In the case of the schooner vessels using the CARICOM Wharves area, there are a number of maintenance and upgrade projects that need to be undertaken to facilitate and improve the trade. These include:

- upgrade of electrical infrastructure and the installation of reefer plugs and two solar cold storage rooms,
- upgrade of lighting systems both for cargo operations and for security requirements;
- repairs and upgrade of external security fence work;
- repairs to (a) paved ground surface, (b) fender and (c) bollard systems;
- removal of derelict customs vehicles and elimination of the use of the area as a car parking facility by customs; the relocation of the cargo storage aspect of the inter-island ferry

service from the area; and make more efficient use of the land space available such as the development of a new traffic and cargo movement and operations system. These operational improvements will enable the services being provided at the CARICOM Wharves to be improved by (i) a reduction in operational risk; (ii) improvement in cargo operations efficiency; and (iii) provision of cold storage facilities at the wharf, which will result in an enhancement of the agricultural trade.

- A preliminary cost estimate of the total cost would be USD 4 million.

Port of Georgetown, Guyana

185. Given the limited area available at the two terminals, John Fernandes and Muneshwers, the proposed immediate infrastructure works will include the establishment of an appropriate electrical system. A national grid or a dedicated generator system will be set up at the junction of the two terminals to enable the temporary provision of an electrical supply to reefer containers at the terminal, either in preparation for export or prior to dispatch to the inland depots of the respective terminals.

186. During the fieldwork, a system of consolidation centres for agricultural products at strategic locations in Guyana had been initiated some time before. The current status of this project and furthermore, what centres have been established, are uncertain at this time. An up-to-date evaluation of the current status of the centres is recommended, which would include a review of the input data that could support the establishment of these centres. This information will confirm whether the existing centers are adequate or new centres at strategic locations should be developed to contribute towards Guyana's new agricultural initiatives to be a provider of agricultural products to the region.

187. The construction of a new deep-water port in Berbice, which would provide the long-term facilities to promote and enable trade in agricultural products, is apparently underway.

Pilot model to test the potential demand of freight and of logistic services

188. The objective of this study is to define the transport chains for intra-CARICOM trade in agrifood products step by step, and for each step to analyse:

- Transport activities, what exactly is done in each step?
- What are the associated costs in each step?
- What functions well and what does not?
- What could be some possible solutions to improve each step?

189. Three different transport options are considered in the analysis:

- container liner transport: transport in containers using the existing container liner services;
- schooner transport: transport in small consignments (palletized) using the existing schooner services;
- a new service: transport in containers on chassis using a potential ro-ro service, which combines regularity and reliability of the container liner service with the low-cost approach and accessibility of the schooner trade.

190. The transport chain cost comparison focuses on mapping costs along the transport chains of the three options, thus deriving the landed costs (costs of product, trade tariff if applicable and costs of transport from origin to destination port gate) of a few example products exported from Guyana to the three island nations in the study: Barbados, Grenada and Trinidad and Tobago. These are subsequently compared with the landed costs of products sourced from outside CARICOM.

191. In relation to the non-cost impediments to intra-regional agrifoods trade, information has been collected from earlier studies and interviews during field visits to the focus countries. These interviews were conducted with a range of stakeholders, such as container shipping lines, schooner shipping lines, shipping agents, warehouse operators, port authorities, terminal operators, export associations, shipping associations, major importers. Potential solutions to these impediments have been formulated.

192. The three options each involve a complete transport chain, from farm at the country of origin to port gate or inland depot and storage at country of destination. This section describes the different steps in each of the three transport chains.

Option 1: containerized transport

193. This option considers transport in dry of reefer containers, depending on the refrigeration needs of the products. Sea transport will be carried out by using the container liner network in the region. The transport chain for containerised transport is depicted in

194. .

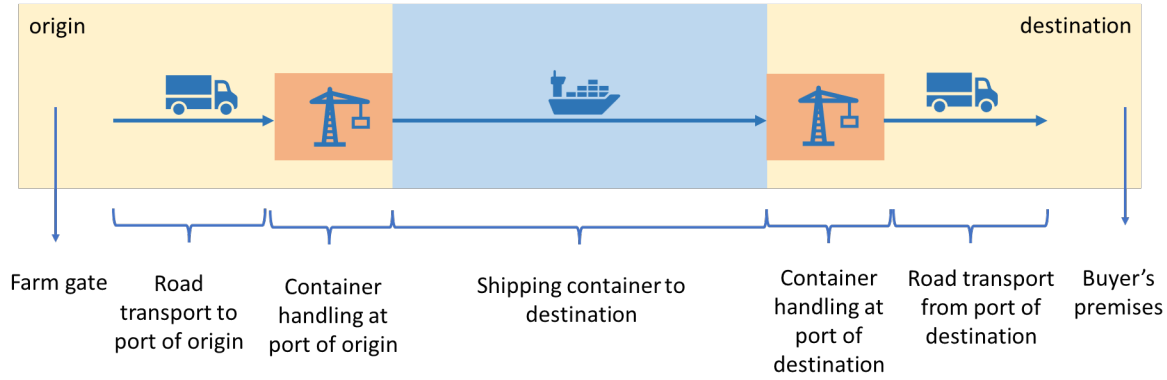


Figure 33. Transport chain for containerized transport

195. The container is usually loaded on the producer's premises, therefore, the producer is in full control of the packaging of his products and of the temperature and atmosphere inside the container. The container is trucked to the terminal, either by means of the producer's own vehicle or by means of a third party's vehicle. In cases where there is limited space to store containers at the container terminal, operators work with inland depots where containers are received and stored until it is time to move them to the terminal for loading onto a vessel. In those cases, the terminal operator will be responsible for transport of the container from inland depot to terminal.

196. In Guyana, terminal operators have limited space at their terminals to store containers, so most of them work with inland container depots where storage (and also stuffing and stripping) takes place. They transport their containers to the terminal prior to arrival of a vessel, so that all containers that need loading are ready at their terminal when the vessel berths. This transport is done during the night as much as possible to avoid daytime traffic.

197. Receipt of the container at the terminal is a step that includes receiving the container at the port terminal, and inclusion in stacks for exporting. This means the container is physically lifted off the truck chassis and stored in stacks by way of reach stackers. The costs for this service are either charged separately by means of a receipt tariff, or they are included in the terminal handling tariff (which in that case includes receipt of a container and loading it onto the vessel).

198. **Loading containers onto the container vessel.** During this step the container is taken from the stack and loaded onto the container vessel. In Guyana, there are seven private terminal operators, each operating from their own facilities. Loading (and offloading) of containers is currently done by means of ships gear, as there are no mobile harbour cranes or ship-to-shore (or gantry) cranes available at any of the terminals. John Fernandes and Muneshwers are each investing in the acquisition of a mobile harbour crane, to be used jointly between the two companies. They are currently strengthening a stretch of quay that overlaps both their premises for the mobile harbour cranes to operate upon.

199. **Maritime transport by container liner.** This is the maritime transport leg of the transport chain. Depending on the destination and the shipping line, there are either direct connections between Guyana and the three other countries, or connections with transshipment. In the latter case, the container is offloaded from one service in a transshipment port to be loaded onto another service to reach its final destination. Port of Spain and Point Lisas are both used as regional transshipment ports.

200. There are several lines offering direct connections from Guyana to Trinidad and Tobago and

Barbados. Grenada is not directly connected to Guyana at the moment and therefore would require transshipment (at one of the Trinidad ports or at Bridgetown). Sea freight rates are charged on the basis of a container unit: 20' or 40,' dry container or reefer container. The sea freight rate includes all costs of bringing the vessel into the port of origin and destination, as well as sailing costs from origin to destination.

201. The current developments in the oil sector in Guyana have resulted in increased imports of containerized (as well as non-containerized) goods. At the moment there is a trade imbalance in containerized imports: for every three TEU of containerized imports there is only one TEU of containerized exports. The other two TEUs are exported as empties. For reefer containers, the imports and exports are more balanced, but there are still more reefer imports than reefer exports. This suggests that there is ample spare capacity to increase containerized exports of agrifood products in both dry and reefer containers in the current container liner network.

202. The container liners are currently servicing the four countries in this study (only services calling at least two ports in the four countries are included): CMA-CGM, MSC, King Ocean and Tropical Shipping. Vessel sizes are usually between 900 and 1200 TEU, with a few exceptions of smaller vessels. The smallest vessel is the shuttle service operated by CMA-CGM between Georgetown and Port of Spain, which is only 167 TEU. It may be replaced by a larger vessel if the service draws more cargo, as this operation has only recently been building up its market share. In total, 12 vessels provide a weekly capacity of just over 5000 TEU between two or more of the ports involved in this study.

203. Offloading containers from the container vessel at the port of destination: the container is offloaded from the vessel and placed in the container stack. In Port of Spain, four STS cranes are available and a fifth one is being constructed. Containers are transported from the STS crane to stack by terminal trucks – stacks are operated using rubber tyre gantry cranes. Reach stackers are also available. Point Lisas has two STS cranes and uses terminal trucks and rail mounted gantry cranes, and Bridgetown also has two STS cranes. Container transport from STS cranes to stack and stacking is done by means of straddle carriers. St. George's has no STS cranes or mobile harbour cranes and ship gear is used to load and offload containers. Terminal moves are done by means of reach stackers.

204. **Delivery of containers at port gate.** In this step, containers are taken from the stack and put on a chassis to be transported by truck to the premises of the buyer. In case the terminal operator works with an inland depot, this step means transport of the container to an inland depot. Customs clearance, as well as all health, phytosanitary, sanitary and other controls are either done before the container leaves the port to be taken to the buyer's premises, or done before the container leaves the inland depot to be taken to the buyer's premises. Our transport chain cost analysis will stop at this point, so that cost, insurance and freight (CIF) rates can be compared, which include all costs up to delivery at the port gate or inland depot at destination, including the value of the product itself.

205. Delivery of the container to the buyer's premises. A final step would be delivery of the container to the buyer's premises. Generally, this would be done by the buyer at its own costs.

Option 1 for less than container load cargo: containerized transport of less than container load cargo

206. In the case of a part of the farming sector in Guyana consists of small(er) scale farmers that do not produce enough to fill a container by themselves, LCL services would be required to transport this part of the market in containers. In an LCL service the transport service provider, for instance a container liner shipper, organizes a container transport from an origin to a destination and offers

space in this container to several smaller producers. Thus, the cost of container shipping can be shared between the smaller producers.

207. The next few sections describe this process, to the extent that it is different from the transport chain of full container loads. The transport chain for containerized transport is depicted in **Error! Reference source not found.**.

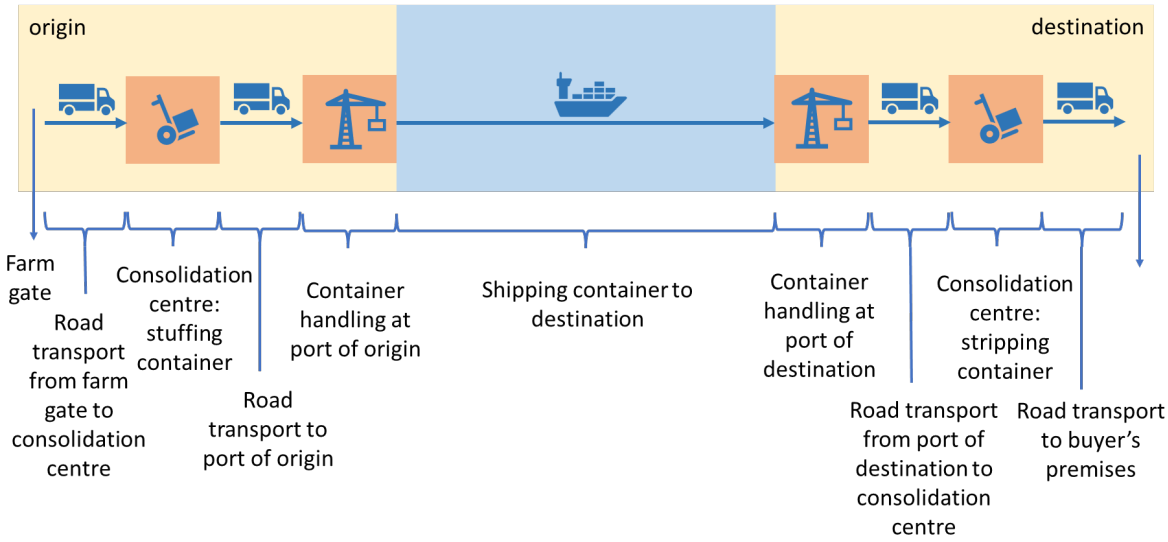


Figure 33. Transport chain for less than container load cargo transport

208. The main difference with transporting full container loads is that an intermediary step is added both at the country of origin and at the country of destination. In the country of origin, cargo is collected at a consolidation point where the cargo is stuffed into a container, and in the country of destination the container is taken from the port to a consolidation centre where it is stripped (unloaded).

209. Several shipping lines have attempted to set up such as LCL facilities in Guyana, however they failed due to a lack of a consistent and regular supply of products to fill their containers. This caused them to either transport containers with partial loads (low stowage), in which case the shipping line transported below their breakeven point, or postponed departure of the container until it filled up, which made the service unreliable for exporters and unsuitable for perishables transport. Shipping lines confirmed that they would be willing to absorb the low stowage costs in the first few months after starting up an LCL service, but that they could not continue this for a longer period of time.

210. During interviews, several causes were revealed for the fact that LCL services did not take off:

- Part of the farming sector in Guyana is based on the principle of harvesting today and selling tomorrow, mostly on local markets. There is lack of planning, which results in the lack of a reliable and regular supply which can be the basis for both buyers (relying on weekly supply of products) and shipping lines (being able to maintain a weekly sailing schedule).
- Related to this is the disconnection between the supply in Guyana and demand in the islands included in this study. This is not the case in larger scale farming where networks between producers and traders exist, but it is true of the small-scale farming sector.

- There is a lack of cold chain facilities in the transport chain. Up until the point where products are loaded into a reefer container no refrigerated storage or transport facilities are available, which reduces the shelf life of products.
- There is a lack of professionalization in the small-scale farming sector. Timing and methods of harvesting and packing are usually aimed at the immediate sale of products on local markets, and not extending product shelf life for export. Lack of suitable packing can also make it hard to pile up products and efficiently load containers. Quality control measures as required by other CARICOM countries are often deficient . Although the topic of making the farming sector more professional is not part of the study, it is part of the solution for improving trade in agrifood products between the CARICOM countries.

211. **From farm gate to consolidation centre.** This step consists of the collection of products from farmers and transport for a consolidation centre. Currently, farmers are responsible for transporting their products to a consolidation centre and incurring the cost themselves. Generally, this step does not include refrigeration facilities.

212. **Stuffing of containers at consolidation centre.** In this step, the first stage of the LCL service takes place, that is, loading several small consignments into a full container load. Key issues here are the compatibility of product requirements to temperature and atmosphere; not all products can be transported together in the same reefer container. For dry products, this is much less of an issue. The costs of stuffing containers are generally included in the LCL tariff charged by the shipping line. If the terminal operator at the port of origin operates the consolidation centre, the costs are included in the terminal handling tariff.

213. **Transport of loaded containers to the terminal at the country of origin.** This part of the transport chain is usually carried out by the LCL service provider, likewise to transport from an inland depot to container terminal being arranged by the terminal operator.

214. Delivery of containers to consolidation centre at country of destination. In this step, containers are taken from the stack and put on a chassis to be transported by truck to a consolidation centre (or inland depot), where the container is stripped and the LCL cargo is temporarily stored. Customs clearance and all health, phytosanitary, sanitary and other controls would ideally take place here. Our transport chain cost analysis will stop at this point, so that CIF rates can be compared, which include all costs up to delivery at the port gate or inland depot at destination, including the value of the product itself.

215. Delivery of goods to the buyer's premises. A final step would be delivery of goods to the buyer's premises from the consolidation centre. Generally, this would be done by the importer at its own cost, by means of smaller transport vehicles which are generally without refrigeration facilities.

216. Conclusions containerized transport (full and LCL):

- There is enough capacity on the container liner networks out of Guyana to increase the exports of agrifood products in both dry and reefer containers.
- There are no cool chain facilities between farm and port in Guyana, which impedes exports of perishables.
- There is a lack of LCL services for agrifood products in Guyana. Attempts to start such services have failed due to a lack of a regular stream of perishables for export, as farming in Guyana is mainly based on 'grow today, sell tomorrow.' Overseas buyers are only interested if they can rely on regular supply of perishables.

- Sellers in Guyana and buyers overseas lack the connections to make their deals.

Option 2: schooner transport

217. Option 2 considers transport in as breakbulk or general cargo by schooner vessels. The latter is a collective name for small vessels connecting the Caribbean islands either on scheduled or unscheduled services. These vessels transport all kinds of cargo, from construction materials to finished goods, from personal shipments to perishables, and sometimes passengers too. Many of these vessels are ro-ro system vessels with a ramp at the stern. Schooner trade serves a different market which trade for sending small consignments between Caribbean nations, at relatively low cost and with easy accessibility.

218. When it comes to transport of agrifood products, schooners typically transport small quantities of products in bags, boxes or on pallets. The trade character matches that of 'grow today, sell tomorrow' type of small-scale farming. **Error! Reference source not found.** shows the transport chain for schooner transport.

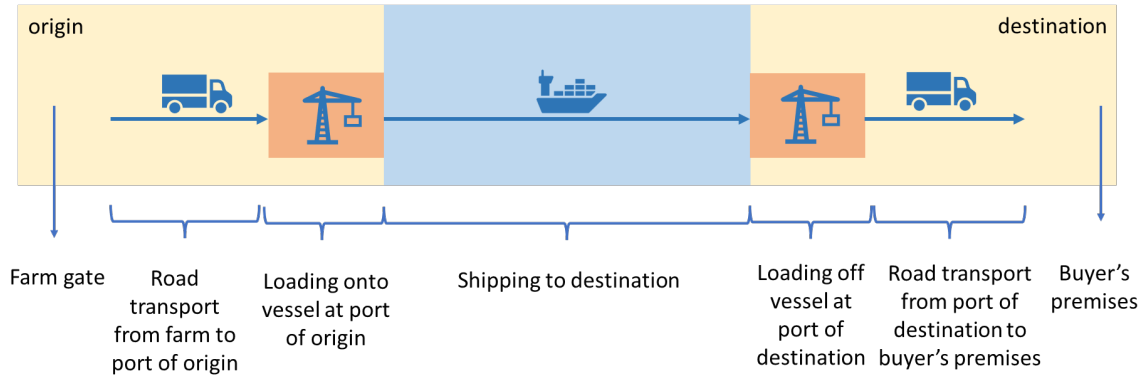


Figure 34. Transport chain for schooner transport

219. **From farm gate to port.** The major difference with containerized transport (full or LCL loads) is that there is no inland depot or consolidation centre involved. Exporters (farmers) take their products directly to the port terminal using pick-up trucks or small vans. This also means that there is no cool storage available between farm and port.

220. **Loading cargo onto the vessel**. This is either done by small cranes mounted on the vessel, or by forklifts that drive on and off the vessel using the vessel ramps. In most cases these forklifts belong to the vessel owner, but there is also an operator renting out forklifts at CARICOM Wharves at Port of Spain. In the first case the cost of loading is included in the sea freight rate, in the latter case a small fee has to be paid to the forklift operator.

221. In Guyana, schooner vessels will use whatever port facility is available. The seven main private operators will attend to schooner vessels if they have berthing space available, but they will prioritize container liners and other deep-sea vessels. However, there is a wide range of private jetties along the main rivers in Guyana, all with limited drafts but which can be used by schooner vessels.

222. **Maritime transport by schooner vessel.** This part of the transport chain includes sea transport from port of origin to port of destination. The tariff is usually by weight or by volume, whichever is

greater. The tariff includes all costs of bringing the vessel into the port at origin and destination. At CARICOM Wharves, a reduced tariff regime is in place for vessels under 500 GT, in order to support inter-island trade. None of the other ports maintains specific CARICOM tariffs.

223. Most of these vessels have no cool storage on board, although some offer covered storage (so that products can be out of direct sunlight). Schooner services between Guyana and Trinidad and Tobago only take agrifood that can withstand the two to three days of transit, such as rice or coconuts. From St. Vincent and the Grenadines to Trinidad and Grenada to Trinidad perishables are regularly transported by schooner services, as transit times are only 10-12 hours. However, this is not their main market – most of the revenues are made by transporting general cargo (construction materials and finished goods) out of Trinidad to the islands. The perishables are taken as return cargo which helps cover the costs.

224. **Offloading cargo from the vessel.** Similar to loading, small ship cranes or forklifts are used to offload products from schooners. All cargo is put at the quayside for direct delivery. Out of the four ports, only Port of Spain has a separate facility for inter-island trade – the CARICOM Wharves. The facility is located outside the ISPS-controlled main area of Port of Spain, and has a small covered storage area where products can be protected from direct sunlight. It is freely accessible to the public. There is no cool storage available, and no equipment except for an operator that rents out forklift services.

225. In Bridgetown, schooner vessels use a specific ro-ro system berth. Products are offloaded and put onto the quay next to the ship by equipment operated by the schooner (ship crane or forklift) and subsequently transported into a shed (without cool storage) by port operated forklifts. In St. Georges, schooners berth at a 100 m berth outside the ISPS-controlled area. There is a shed where cargo is temporarily stored pending customs processing and subsequent collection by buyers. No cool storage facilities are available.

226. Customs clearance, health, sanitary and phytosanitary controls are performed at the port of destination, before collection of the products by the buyers.

227. Delivery of cargo to importers or buyers. Buyers pick up their cargo directly from the port using their own means of transport. At CARICOM Wharves this usually implies that cargo is placed directly from ship into a pickup truck or small van. In Barbados and Grenada buyers go to the shed used for the schooner trade to pick up their products.

228. Conclusions schooner transport:

- In general, schooner trade is easily accessible and relatively low-cost, which is convenient for transport with smaller consignments between CARICOM nations.
- There are no cool chain facilities between farm and port in Guyana, which impedes exports of perishables.
- There is capacity on schooner services between the islands, but agrifoods trade is not the raison d'être for schooner services.
- Schooner trade lacks cool storage facilities, at ports as well as on board vessels. This makes it unsuitable for trade between Guyana and the islands for perishable products. Only between the islands, where sailing time is up to 12 hours, are perishables traded using schooner services.
- Only at CARICOM Wharves in Port of Spain a specific reduced tariff for intra-CARICOM trade is applied. None of the other ports applies such reduced tariffs.

- There are no cool chain facilities at the ports of destination. Only covered storage is available.

Option 3: launching a new inter-island transport service

229. This option considers launching a new shipping service between Guyana, Trinidad and Tobago, Bridgetown and Grenada for the export of agrifood products out of Guyana to the three island nations. In the interviews during the field trip, two key elements became obvious:

- **Reliability:** the service has to be reliable and scheduled. It must perform a weekly loop with fixed calling times at each port so that sellers can plan their production according to the weekly sailing date out of Guyana, and buyers can plan their inventories according to the weekly arrivals in their countries.
- **Cool chain integrity:** cool storage must be guaranteed throughout the transport chain as transit times are simply too long to transport perishables without cool storage facilities.

230. It should be a shipping service that combines the schedule and reliability of container liner networks with the ease of accessibility and low-cost character of the schooner trade, whilst offering cool storage along the transport chain. A ro-ro system vessel would allow for easy loading and unloading of dry and reefer containers on a chassis. The advantage is that no expensive port equipment is needed, while the shipping service still can offer refrigerated transport by means of reefer containers.

231. The vessel should be small enough to be able to use the CARICOM wharves at Port of Spain, which means below 500 GT. It should also be manoeuvrable so that it can enter the port without tugs or pilotage. This will help keep costs down.

232. In the case of full container loads, the transport chain would resemble that of containers being transported by means of the liner shipping network (see
233.). In the case of LCL loads, the transport chain would resemble that of LCL containers being transported by means of the liner shipping network (see **Error! Reference source not found.**). The main difference is that containers are loaded and offloaded as ro-ro system cargo, so that container handling equipment is not needed. This reduces costs and makes the maritime transport leg very flexible in terms of berthing requirements; a ro-ro ramp is sufficient for loading and offloading the vessel.

234. **From farm gate to port.** Transport from farm to the port would be the farmer's responsibility. Ideally, a chassis with container would be delivered at the farm for loading and transported to the port once full. This means that the farmer should have sufficient storage for one container load of products.

235. **Consolidation centre (if applicable).** Farmers that do not produce enough to export full container loads could use a consolidation centre. At the consolidation centre, products are received from the farmer. Products can be washed, selected, weighed and packed and if necessary stored in refrigerated storage rooms. Quality controls can also be performed here. Products are subsequently loaded into a reefer container on a chassis for further transport, or in a dry container if no refrigerated transport is required. Distances should be kept as small as possible, so that the lack of cool storage does not affect product quality too much.

236. An example of such consolidation centre is the National Agricultural Marketing and Development Corporation (NAMDEVCO) packaging plant at Piarco International Airport in Trinidad and Tobago. Whilst NAMDEVCO is predominantly aimed at assisting farmers to sell their products at domestic markets, a similar facility (or multiple facilities) could be set up in Guyana to promote exports of perishables from Guyana to the islands.

237. The chassis with dry or reefer containers is transported from the consolidation centre to the port. If the distance is not too long, a reefer container can remain unplugged during the journey. At the port, the dry or reefer container stays on the chassis. In case of a reefer container, it can be plugged into a reefer plug to maintain refrigeration. The port should thus be equipped with reefer plugs.

238. **Loading the container onto the vessel.** Once the vessel arrives, the container can be rolled onto the vessel on its chassis by means of a truck, and therefore no ships gear, mobile harbour crane or STS crane is needed, keeping costs to a minimum. It also means that the shipping service is flexible when it comes to berthing; a ro-ro ramp is sufficient for loading and unloading the vessel.

239. **Offloading the container from the vessel.** At the port of arrival, the container can be offloaded from the vessel on its chassis by means of a truck. The reefer container stays on the chassis and can be plugged into a reefer plug at the port to maintain refrigeration if it needs to stay at the port for some time, or it can be taken directly to a consolidation centre.

240. **Transport from port to consolidation centre.** The reefer container is transported to an inland consolidation centre. At all islands distances are small, hence there is no need to plug in the container during transport.

241. **Consolidation centre.** At the consolidation centre the container can be stripped and products can be stored in a cool storage temporarily. All customs, health and quarantine, sanitary and phytosanitary controls can be performed at the consolidation centre. Once cleared, buyers can collect their products from the consolidation centre. Such consolidation centres with cool storage facilities currently do not exist in the three island nations involved in this project. However, Barbados is currently planning for one.

242. **Transport to buyer's premises.** This final transport leg would be the buyer's responsibility and would generally be without cooling facility. However, as distances in the island nations are short, this will not affect product quality.

243. Conclusion new inter-island transport service:

- Reliability is important: the service should be regular (weekly) and on a fixed schedule, so that producers rely on regular offtake and buyers can rely on regular supply. At the moment this reliability exists in container liner transport, but due to a lack of LCL services these are not accessible to smaller traders. Some schooner services also operate on regular schedules and offer reliable services, but these are not always suitable for agrifoods transport due to the lack of refrigeration.
- Cool chain facilities should be guaranteed throughout the transport chain. This requires the use of reefer containers and the provision of reefer plugs at ports and on-board the vessel.
- LCL facilities are needed as most farmers do not produce sufficient products to fill a container on their own. This requires development of consolidation centres, which can also be used for washing, selecting, packaging and quality controls of products (see NAMDEVCO example).

- Vessels should be equipped with ro-ro ramps, so that containers (dry or reefer) can be rolled on or off on chassis by means of a truck. This makes the service flexible a regards berthing and low cost in terms of loading and unloading, as no specialized equipment is needed.
- Vessels should be small enough to use CARICOM wharves at Port of Spain, which means below 500 GT, or the specific schooner berths in Bridgetown and St. Georges, which means they should have limited draft comparable to today's schooner vessels. The vessels should be manoeuvrable and able to enter ports without tugs and pilotage. This will help keep costs down.

Transport chain cost simulations

244. Several simulations of transport chain costs have been run with the aim to investigate to what extent prices of agrifood products sourced from Guyana may be different from alternatives sourced from outside CARICOM. The three typologies of services analysed before have been run.

245. The cost of products sourced from outside CARICOM is based on customs data (only available for Barbados) which indicates product price, trade tariffs and CIF prices. On the basis of this information, transport costs can be derived. CIF prices do not include transport from port to buyer's premises, hence the costs for this step are not considered in the transport chain cost simulations for products sourced from Guyana. This means that the comparison is based on the so-called landed costs; the costs of the product in the port of destination. It includes the cost of the product itself and all costs needed to get the product at the port of destination, including a trade tariff if applicable.

246. Currently, rice is already produced in Guyana by larger farming corporations, in larger quantities). It is also exported, for a large part to Europe but also to other CARICOM nations. In 2020, the total volume of rice exports from Guyana was 71 600 tonnes.[5] In the period 2007–2021, Barbados annually imported on average 2243 tonnes of paddy rice from Guyana, with a peak of 3540 tonnes in 2020 and a low of 1629 tonnes in 2008. For Grenada, the average annual volume was 1567 tonnes in the period 2014–2021, with a peak of 2236 tonnes in 2015 and a low of 1184 tonnes in 2019. For Trinidad, the annual average over 2007–2021 was 22 183 tonnes with a peak of 27 798 in 2007 and a low of 19 224 tonnes in 2015.

247. CARICOM nations source their rice from various countries, also outside CARICOM. This is partly due to the fact that certain varieties are not grown within CARICOM, such as basmati or pandan rice.

248. **Rice exports in full container loads.** Rice is typically exported in 20' containers, as these can be loaded at a higher tonnage per TEU than 40' containers. In a 20' container, up to 25 tonnes of rice can be loaded. Table **7** details the costs of transport up to the port of destination per tonne of rice, based on a full 20' container with 25 tonnes of rice exported from Guyana.

Table 7. Costs of exporting rice from Guyana to three island nations in full container loads (in USD/tonne)

5 World Bank Trade Statistics, retrieved from https://wits.worldbank.org/trade/comtrade/en/country/GUY/year/2020/tradeflow/Exports/partner/ALL/product/100640

item	unit	Trinidad and Tobago	Grenada	Barbados
value of rice at farm gate	USD/ton	650,00	650,00	650,00
packaging	USD/ton	1,89	1,89	1,89
customs (incl seal)	USD/ton	1,89	1,89	1,89
road transport to port of origin	USD/ton	11,36	11,36	11,36
cargo handling at port of origin (receipt and loading)	USD/ton	12,00	12,00	12,00
maritime shipping	USD/ton	80,00	106,00	84,00
cargo handling at port of destination (unloading and delivery)	USD/ton	7,32	18,00	19,60
costs of customs clearance and other inspections	USD/ton	5,00	5,00	6,00
total costs	**USD/ton**	**769,47**	**806,15**	**786,75**
total costs per kilogramme	USD/kg	0,77	0,81	0,79
landed costs per kilogramme from the US	USD/kg			1,25
landed costs per kilogramme from Brazil	USD/kg			1,36

249. The bottom 2 rows of Table 7 show a comparison of the landed costs for a kilogramme of US- and Brazilian-sourced rice in Barbados with Guyana-sourced rice. Unfortunately, landed costs from the United States or Brazil are only available for Barbados, not for Trinidad and Tobago and Grenada. It is clear that rice from Guyana has a much lower landed cost than rice from the United States or Brazil. The analysis suggests 63 percent compared to US-sourced rice and 58 percent compared to Brazil sourced rice, which means a reduction of the rice import bill with 25 percent should be feasible, even if considering a margin of uncertainty on the Guyana transport chain cost analysis.

250. **Rice exports on pallets by schooner trade**. This section assesses the costs of rice export from Guyana to the three island nations on pallets by schooner trade. One pallet of rice is assumed to contain 1 tonne of rice. Table 8 shows the transport chain along with the cost items. Table 8 shows the costs per item for each of the three island nations.

Table 8. Costs of exporting rice from Guyana to three island nations on pallets by schooner trade (in USD/tonne)

item	unit	Trinidad and Tobago	Grenada	Barbados
value of rice at farm gate	USD/ton	650,00	650,00	650,00
packaging	USD/ton	1,89	1,89	1,89
customs (incl seal)	USD/ton	1,89	1,89	1,89
road transport to port of origin	USD/ton	14,20	14,20	14,20
maritime shipping	USD/ton	100,00	105,00	120,00
costs of customs clearance and other inspections	USD/ton	5,00	5,00	6,00
total costs	**USD/ton**	**772,99**	**777,99**	**793,99**
total costs per kilogramme	USD/kg	0,77	0,78	0,79
landed costs per kilogramme from the US	USD/kg			1,25
landed costs per kilogramme from Brazil	USD/kg			1,36

251. The bottom 2 rows of Table **8** show a comparison of the 'landed costs' for a kilogramme of US- and Brazilian sourced rice in Barbados with Guyana sourced rice. As with containerized transport, rice from Guyana has a much lower landed cost than rice from the United States or Brazil.

252. **Rice exports by means of a new service**. This section assesses the costs of rice export from Guyana to the three island nations in containers by means of a new service.

Table 9. Costs of exporting rice from Guyana to three island nations in containers by new service (in USD/tonne)

item	unit	Trinidad and Tobago	Grenada	Barbados
value of rice at farm gate	USD/ton	650,00	650,00	650,00
packaging	USD/ton	1,89	1,89	1,89
customs (incl seal)	USD/ton	1,89	1,89	1,89
road transport to port of origin	USD/ton	11,36	11,36	11,36
port costs on vessel origin	USD/ton	2,13	2,13	2,13
maritime shipping	USD/ton	117,88	125,74	141,45
port costs on vessel destination	USD/ton	7,28	18,53	15,50
costs of customs clearance and other inspections	USD/ton	5,00	5,00	6,00
total costs	**USD/ton**	**797,44**	**816,54**	**830,23**
total costs per kilogramme	USD/kg	0,80	0,82	0,83
landed costs per kilogramme from the US	USD/kg			1,25
landed costs per kilogramme from Brazil	USD/kg			1,36

253. The bottom 2 rows of Table 9 show a comparison of the landed costs for a kilogramme of US- and Brazilian-sourced rice in Barbados with Guyana-sourced rice. As with containerized transport, rice from Guyana has a much lower landed cost than rice from the United States or Brazil.

Overall conclusion on transport chain cost analysis of rice exports

The following conclusions can be drawn from the transport chain cost analysis of rice exports:

- The costs of all transport options are not very different, the difference is at most a few cents per kg.
- The costs of transport by means of a new service are on the basis of exports out of Guyana to the three island nations only, which means no return cargo from the island nations to Guyana is considered. If any return cargo could be taken, this would reduce the cost of transport per unit (TEU or tonne). The costs of the new service option are very dependent on the daily costs of the vessel, a cost which fluctuates along with variations in major cost drivers such as bunker fuel prices or with demand and supply of maritime transport capacity.
- Sea freight rates per tonne are the lowest for container liner shipping, but when stevedoring costs are included the container liner costs per tonne roughly compare to schooner tariffs, which include stevedoring.
- Typically, transport costs make up for 16 percent–22 percent of the landed costs for a tonne of rice from Guyana.
- Landed costs for rice from Guyana are lower than landed costs for rice from the United States or Brazil, respectively 36 percent and 41 percent. This means that there is room for reducing the rice import bill by 25 percent, even if an uncertainty margin on the transport chain cost analysis is considered.

Corn exports from Guyana to the three island nations

254. The previous section elaborated a transport chain cost analysis for the export of rice from Guyana to the three island nations by means of three different options: i) in containers by container liner service; ii) on pallets by schooner service; and iii) in containers by a new service. The main conclusion is that transport costs for the options are not very different, at roughly 20 percent of the landed costs for a tonne of rice from Guyana.

255. A similar pattern may be expected for other dry product exports. As part of the 25 by 2025 policy, Guyana is currently testing corn and soy production with the aim of exporting these products

to other CARICOM nations, mainly to be used as animal feed and to a lesser extent for human consumption. In this section, the potential price of corn imports into Barbados is analysed in greater detail. Soy is currently not imported into Barbados as a cereal and is therefore not part of the comparison.

As currently no product price per tonne of corn from Guyana is available, an estimate of the maximum price of corn and soy from Guyana using the same price as corn sourced from the United States is made. This analysis uses information on product costs and transport costs from Barbados customs for the United States as the origin, and transport chain cost analysis results from the previous sector as Guyana transport cost inputs (see

256. Table **10**).

Table 10. Comparison cost of corn imports into Barbados sourced from the USA and Guyana (in USD/tonne)

	From USA	**From Guyana**
Product price	929	929
Trade tariff	386	-
Transport costs	1101* (330)**	137–180
Total landed costs	**2416 (1645)**	**1066–1109**

* based on Barbados customs information for one tonne of corn.

** equal to Barbados customs information for one tonne of rice.

257. Table 10 clearly shows that there is a large price difference between landed costs of corn from the United States and from Guyana in Barbados. The comparison comes with a caveat: transport costs per tonne from the United States seem high *vis-à-vis* the price of rice – this figure may be a divergence. However, even if transport prices from the United States were in the same range of those for rice (about USD 330 per tonne), and with product prices in Guyana similar to those in the United States, the landed costs of corn from Guyana could be 33 percent to 35 percent lower than the landed costs of corn from the United States. This would partly be on account of the absence of a trade tariff within CARICOM and partly because of lower transport costs. It is likely that if corn were grown in Guyana, the product price would be lower than if it were grown in the United States, as is the case with rice.

258. Results in the same order of magnitude may be expected for corn imports to Trinidad and Tobago or Grenada.

Perishables exports from Guyana to the three island nations

259. The cost analysis described in the previous two sections focused on products that can be transported in dry containers. Transport conditions as well as costs for such products are less

demanding than for perishables, which require refrigeration. Maintaining a refrigerated transport chain is more challenging and more costly. In this section, an assessment is made of the landed costs of importing watermelon from the United States and from Guyana into Barbados, and from pineapple from Costa Rica or Honduras into Guyana, which are always transported through the United States. As currently there are no imports of watermelon or pineapple from Guyana into Barbados, the comparison uses product prices from the existing countries of origin.

260. Changes to the estimate of transport chain costs from Guyana to Barbados are:

- Schooner option is not considered as it does not offer refrigerated transport.
- Load factor of a 20' container is estimated to be half that of rice: 12.5 tonnes per TEU.
- Costs of road freight transport and container liner transport are 60 percent higher for reefer containers than for dry containers, as quoted during interviews.
- Costs of reefer container transport by new service are 20 percent higher based on an assumed additional fuel costs to cater for power supply.
- Additional plug-in costs for container liner transport are an estimated USD 30 in Georgetown and BBD 98 per TEU in Barbados.
- For the new service, USD 10 per port call are added for power supply costs to the reefer container.

261. The results are not very different for the container liner option or the new service option: USD 426 per tonne for the container liner service and USD 443 per tonne for the new service. Therefore, in Table 11 the average of both is: USD 435 per tonne.

Table 11. Comparison cost of watermelon and pineapple imports into Barbados sourced from elsewhere and from Guyana (in USD/tonne)

	Watermelon		**Pineapple**	
	From USA	**From Guyana**	**From Costa Rica or Honduras (through USA)**	**From Guyana**
Product price	737	737	644	644
Trade tariff	202	-	253	-
Transport costs	1237	435	1095	435
Total landed costs	**2176**	**1172**	**1992**	**1079**

262. Table 11 shows that for watermelon as well as pineapple the landed costs from Guyana could be just over 45 percent lower than from the United States (watermelon) or Costa Rica or Honduras (pineapple), assuming that if a product is grown in Guyana the price would be equal to that same product grown elsewhere. Again, this difference is partly caused by the absence of a trade tariff, and partly by lower transport costs. It may be assumed that product costs if grown in Guyana are lower than those of grown elsewhere, as is the case with rice.

263. The challenge lies in organizing the transport of perishables from Guyana to the island nations so as to maintain refrigerated conditions throughout the land legs on both sides of the transport chain. Facilities for cool chain transport are currently lacking at both the source and the destination.

Conclusions from the transport chain cost comparisons

The following conclusions can be drawn from the transport chain cost comparisons:

- The transport chain costs of each of the three options that have been compared are not very different.
- Transport costs for perishable goods that need to be transported in reefer containers are higher than for goods that can be transported in dry containers. The costs per tonne of a product are about 40 percent higher in reefer containers than in dry containers. This difference applies to imports from within CARICOM as well as imports from outside CARICOM.
- When compared to products sourced from outside CARICOM, landed costs in Barbados for products sourced from Guyana are in the range of 35 percent to 45 percent more economical, even without accounting for the fact that the product itself may be less expensive when sourced from Guyana, as compared to sources outside CARICOM. The 35 percent to 45 percent range is purely based on the absence of a trade tariff for intra-CARICOM trade and comparably lower transport costs if sourced from Guyana.
- This means that there is room for reducing the food import bill if products sourced from outside CARICOM are sourced from Guyana in the future.

Agrologistics infrastructure and services to promote agrifood trade

264. Increase of agrifood trade within the focus and wider CARICOM countries will require supportive agrologistics and distribution systems to ensure the competitive and sustainable access to market agriculture products in the region. The enhancement of international logistics infrastructures and services such as ports or maritime transports is key to supporting agrifood trade, however at the regional level more needs to be done to organize a competitive supply chain.

265. Current fragmentation of actors, services, coordination, and information are impacting the competitiveness of the export food value chains in the region. In addition, the lack of improved marketing infrastructure and food distribution systems in the importing countries increases marketing costs. Moreover, it does not provide the essential services for delivering fresh, safe, and healthy products at a fair price.

266. Within this context a well-functioning upstream of the supply chain, production and post-harvest activities in Guyana will be essential to ensure the supply of growing quantity and quality products to the study countries (Trinidad and Tobago, Barbados and Grenada). In addition, it will create synergies and economy of scales among agrifood operators to reduce aggregation, transport and transaction costs.

267. There is a potentially growing demand for Guyanese products. Demand for food in CARICOM goes beyond the rising population, considering the importance of regional tourism (32 million annual international arrivals). Retailers in the CARICOM region, including Massy Stores, EcoMax, Leader Price, and Carrefour, are interested in purchasing fresh and processed agricultural goods from Guyana if quality and quantity requirements can be met.

268. Guyana aims to become the “food basket” of the region. During the presentation of its budget in 2021, the Ministry of Agriculture introduced the implementation plan to achieve this vision to develop a larger share of the more than USD 10 billion CARICOM market and the growing demand of food products. Furthermore, the 25 by 2025 Initiative at CARICOM level where heads of government of CARICOM have committed to reducing the region’s large food import bill by 25 percent by 2025 offers further opportunities for Guyana. This initiative gives special attention to priority crops and products such as poultry, corn, soya, meat (goat, sheep, beef), rice and niche vegetables that are heavily imported products in the region, and are produced competitively by the country.

269. Guyana has engaged in diversification and higher value products to promote export of fruit and vegetables, clearly prioritizing coconuts, heart of palm, peppers, herbs, tea, coffee and cacao. Furthermore, given the planned expansion of regional poultry production (particularly broilers), a significant increase in demand for feed inputs is anticipated. In order to meet this increased derived demand, Guyana has taken the initiative and embarked on a rapid but phased expansion of corn and soy cultivation; the two main ingredients in poultry feed formulation.

270. Processed food products are also included in this diversification: coconut water, jams, purees, sauces, spices, oils, vegetable oils, ice cream, and prepared foods. Non-food manufacturing based on agriculture are also considered such as biofuels, plant-based cosmetics, and plant- based packaging.

271. According to the 25 by 2025 reduction in the regional food bill (February 2022) forecasts, based on linear projections assuming a continuation of the upward trend of poultry, and assuming that the region meets the minimum target of 25 percent reduction in poultry import by 2025, a total of 419 396 metric tonnes of corn and 236 230 metric tonnes of soy would be required in the region.

This represents a huge market for Guyana's emerging corn and soya production (see Table 12).

Table 12. Production of corn and soya in Guyana (2018-2021)

	2018	2019	2020	2021
Soya beans	0.0	0.0	0.0	0.0
Maize (corn)	4000.0	4000.0	4000.0	4000.0

Source: FAO STAT, 2023.

272. In 2021, GoG started the trial of 125 acres of corn and soya bean, with the objective to continuously increase the production to cover at least 25 000 acres by 2025 to become self-sufficient by 2025.

273. **Agrologistics assessment for agrifood export in Guyana**. Guyana Logistics Performance Index (LPI) is ranked 115 with a score of 2.4, under the average of the Latin America and Caribbean region. The main deficiencies are identified in the international shipments, tracking and tracing as well as the timeliness.

Table 13. LPI Guyana 2023

Country	Year	LPI Rank	LPI Score	Customs Rank	Customs Score	Infrastructure Rank	Infrastructure Score	International shipments Rank	International shipments Score	Logistics competence Rank	Logistics competence Score	Tracking & tracing Rank	Tracking & tracing Score	Timeliness Rank	Timeliness Score
Guyana	2023	115	2.4	101	2.3	89	2.4	132	2.1	92	2.6	129	2.2	116	2.6
Region: Latin America & Caribbean	2023	106	2.37	100	2.32	104	2.21	107	2.31	106	2.41	107	2.28	103	2.73

Source: World Bank, 2023.

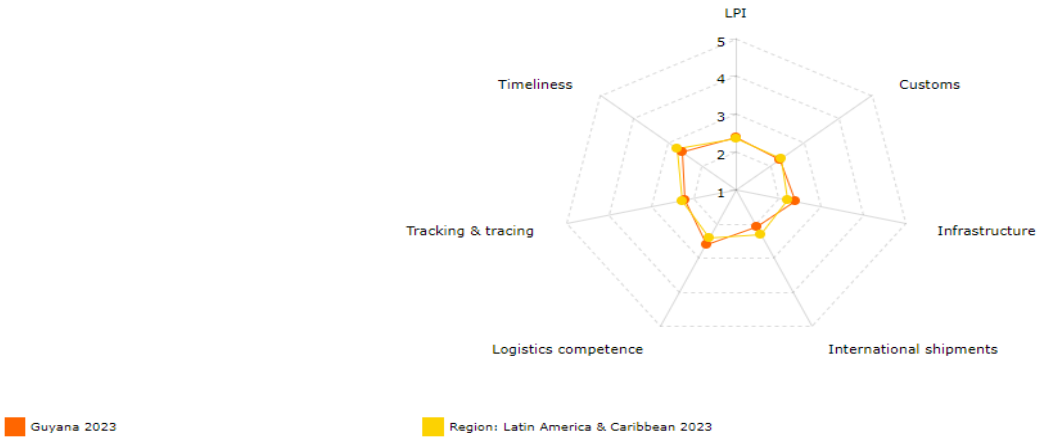


Figure 35. Comparison Guyana vs Latin America and Caribbean region countries LPI
Source: World Bank, 2023.

274. **Rice.** Agrologistics in the rice value chain are mainly organized around mills (27 licensed rice millers and 16 registered exporters in 2023 – Guyana Rice Development Board) serving as aggregation and processing points for rice growers. The main clients from rice exporters in the CARICOM region

are large retailers and hotel, restaurant, and catering sector (HoReCa). The main challenges for rice exporters are:

- high cost of production;
- lack of access to large vessels to decrease logistics costs.

275. **Vegetables.** The export of vegetable products to Barbados, Antigua, Trinidad and St Lucia is organized through processing facilities under the governance of the New Guyana Marketing Corporation (NGMC), a government corporation promoting the cultivation and export of Guyana's non- traditional agricultural crops to regional and extra-regional markets. Exporters and farmers registered under NGMC have access to export facilities.

276. The transit of export products is mandatory through these packaging facilities as clearly stipulated by the protocols established between Guyana and these countries, to ensure traceability and correct monitoring of fruits and vegetables being exported from Guyana. They provide the following services: sorting, grading, packing, cold storage and shipment preparation through containers. Inspections to assure the products meet export countries standards are achieved by the National Plant Protection Unit. The export of horticulture is mandatory through these facilities that prepare produce for exports (average four container loads of produce per day):

- The Central Packaging Facility – Sophia;
- The Parika Agro-Packaging Facility.

277. In the 2022 budget, the government, through the NGMC, commissioned GYD 96.5 million to equip the Sophia, Parika and Mabaruma agro-processing and packaging facilities.[6]

278. The process is the following: NGMC provides refrigerated trucks from production to processing facilities for farmers and exporters. The facilities have been established to ensure traceability and correct monitoring of fruits and vegetables being exported from Guyana. All packaging facilities must adhere to the standard sanitation operating procedures (SSOPs) and ensure provisions are made for all workers, in accordance with the Standard Operating Procedures (SOPs) for conduct, hygiene, and other regulations for packaging facility workers:

- The facilities are opened daily at the request of the exporters.
- The facilities are furnished with equipment used for washing, drying and sanitizing, cooling (cold storage and refrigerated trucks).
- Priority for the use of the facility is given to exporters to countries that fall under the protocol arrangement such as Barbados, St. Lucia, Trinidad and Tobago, and Antigua and Barbuda.

279. Most of the horticulture products are then sent to Port of Georgetown (mainly Muneshwar Wharf) in refer containers or directly to the airport for air shipment (highly perishable products).
The main challenges for export of horticulture products are:

- need for air cargo services (for pineapple and other non-traditional crops);
- freight rates;
- availability of refer containers plugs facilities;
- additional packaging facilities to meet the increase of export quantity and support efficient grouping.

280. **Agrologistics for food import and distribution in Trinidad and Tobago, Grenada and Barbados.** The three countries are end markets for export coming from Guyana, with one main

6 Budget at a Glance 2022, Ministry of Finance Guyana.

transshipment hub[7] for the region in Trinidad and Tobago. Grenada and Barbados will also have a function for the reshipment/transit of agrifood produces flows (see Figure 37).

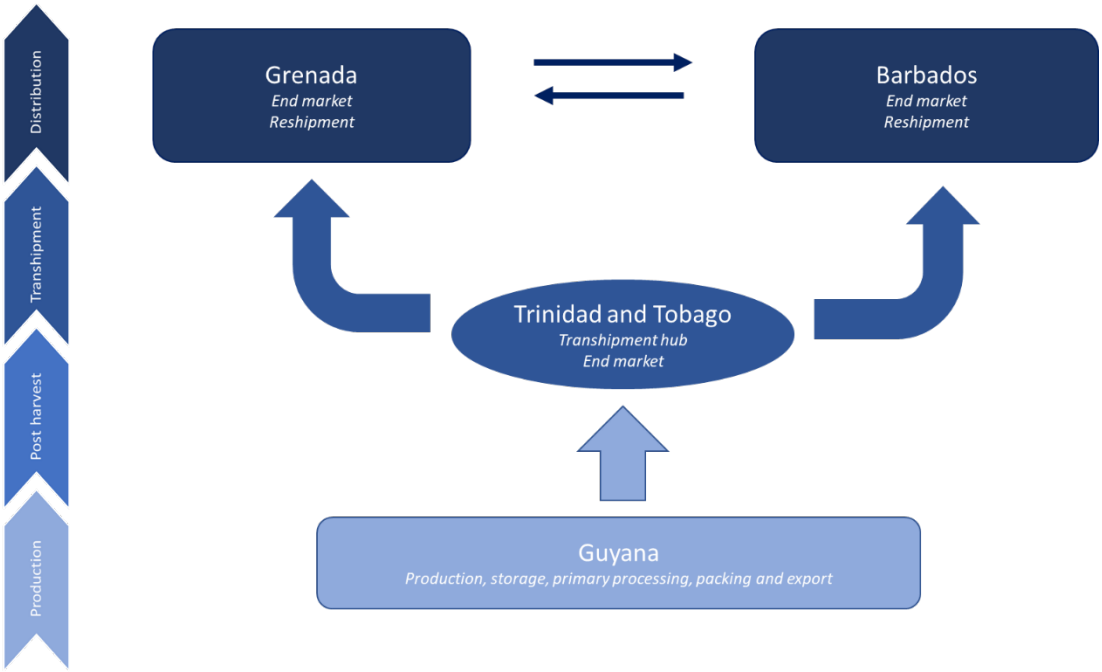


Figure 37. Organization of agrifood produce flows and agrologistics services

281. The conclusions of the preliminary assessment of the CARICOM dedicated area in the ports in Port of Spain, Barbados and Grenada underline the lack of storage and cold storage facilities to improve the handling of the products during transshipment process and support cold chain. It is particularly sensitive in Port of Spain and Grenada. Port of Spain, as the transshipment hub for the region will need specific equipment that corresponds to the quantities and requests for cross-docking activities.

282. Concerning food distribution and deconsolidation of the imported products, the three countries offer mostly first- or second-generation wholesale food markets characterized by important physical market areas for trading, where there is a low offer of value-added (e.g. cold storage, warehouses, primary processing units, cross docking, picking) services and logistics to provide support for food operators activity.

283. Main challenges to develop agrifood trade in the region:

- **Volume and diversification of production**. It is key to develop and increase production capacity, in particular in Guyana, through the expansion of cultivated land and post-harvest services to ensure the supply of the growing quantity of agriculture products to meet the objectives of the 25 by 2025 strategy in the region on key crops: rice, corn, some fruits such as coconuts, pumpkins, watermelons, limes eddoes, and pineapples.

7 Trinidad and Tobago is a hub-and-spoke transshipment location, which connects short distance feeder lines (and ports) with long distance deep-sea lines, linking regional and global shipping networks. The transshipment hub is usually a central location commanding access to a region.

- The diversification of production towards crops required by markets is an opportunity to reach new outlets and support agrifood export resiliency in particular for soya, fruit and vegetables, agro processing.

- **Quality and food safety enforcement**. Agrifood export needs improvement in terms of quality and food safety enforcement to meet high final buyers' standards requirements. Better aggregation and primary processing services (e.g. sorting, grading, and packing), efficient preparation of shipment, development and monitoring of cold chain for perishable products are decisive to support quality and traceability of agriculture products along the supply chain.
- **Increased competitiveness.** Current fragmentation of actors and services, the lack of coordination and information are strongly impacting the competitiveness of the export food value chains in the region. Creating synergies and economy of scales among agrifood operators to reduce aggregation, transport and transaction costs are key factors to support competitiveness of agrifood trade in the region. Main areas of improvements are:

    - shipment preparation location for reducing logistics/marketing costs and socioeconomic impacts on Georgetown (e.g. traffic, pollution);
    - bulking and coordination of exports to take advantage of container shipping as well as managing supply-demand alignment with longer shipping lead times.

- **Efficient transshipment, reshipment and storage facilities in CARICOM Wharves (see Figure 37).** Transshipment of products in the different ports of the region, in particular in Trinidad and Tobago as the main hub, has to be upgraded to support food quality and safety, while reducing food losses specifically for perishable products. CARICOM Wharves lack the basic facilities to support the short-term storage, safe handling, picking and the monitoring of cold chain for perishable products (e.g. cold storage units or area for reefer storage/plug).
- **Upgrade food distribution systems**. The lack of upgraded marketing infrastructure and food distribution systems in importing countries, creating the linkage between production and consumption, increase marketing costs while not providing essential services to agrifood operators to deliver fresh, safe, healthy and fair price products. Main areas of improvements are:
    - developing better access to end consumers of imported and domestic products through modern agrifood hubs;
    - supporting the request of food operators for more value-added services to meet high end outlets (e.g. HoReCa);
    - providing support for consolidation of potential export.

Agrologistics infrastructure and services investment needs for agrifood export enhancement in the focus countries

284. Improving access to the international markets in Guyana domestic production requires the development of an agrologistics strategy, and organizing and monitoring the flows of products from main production areas in Guyana to consumers in Trinidad, Grenada and Barbados. This agrologistics system will support the competitiveness of agrifood export in CARICOM region while connecting main logistics hubs (e.g. ports and airports) with production and markets. The agrologistics strategy should take into account the current challenges identified above, but also the objectives of agrifood products export increase in the region under the 25 to 2025 initiative and the different investments plan in agriculture sector developed by the different countries (see above Guyana vision for agriculture).

285. The upgraded infrastructures and services will:

- support the growth of agrifood flows in the region, delivering essential services (e.g. primary processing, cold chain) to provide access of higher quantities of safe and nutritious products while reducing food loss and waste;

- improve transshipment, deconsolidation of products in Trinidad and Tobago and reshipment of products in transit countries;
- reduce overall logistics and marketing costs for agrifood operators to increase the competitiveness of regional supply chain;
- enhance food distribution systems and access to safe and healthy, regional sources food.

A different typology of investments is then required according to the position of each country within the agrifood supply chain in the region.

Table 14. Investments costs evaluation

Location	Category	Function	Schedule	Preliminary cost
Guyana	Modern agrifood hub	Wholesale food market (WFM): price information, physical trading, urban distribution. Agrologistics centre. Aggregation, storage, primary processing and shipment preparation.	Short-term agrologistics centre Middle term (WFM)	USD 65 million (USD 40 million agro-logistcs centre + USD 25 million WFM)
Trinidad and Tobago	Upgraded WFM	Food distribution, storage, consolidation/ deconsolidation and value added.	Middle-term	USD 40 Million
Barbados	Food terminal	Food distribution, storage, consolidation/ deconsolidation, and value added.	Short-term	USD 20 Million
Trinidad and Tobago, Grenada	Solar-powered reefer	Transshipment and short-term cold storage.	Short-term	USD 100 000 USD/unit
Guyana	Traffic study	Transport and handling optimization.	Short-term	USD 250 000
Regional	E market platform	Coordination, information sharing, consolidation.	Short-term	USD 200 000

Total costs estimated investment costs: over USD 125 million

286. The different stages of the supply chain will require strong coordination and information dissemination to strengthen competitiveness of the process. An information system must be developed between the study countries to support trade through:

- information on price;
- information on quantity;
- shipment and grouping optimization;
- customs and trade process.

287. The following infrastructures and facilities will be key to collecting trade/market information to support the future information system/regional E-market platform.

288. **Guyana: production and expedition hub for CARICOM countries**. The modern agrifood hub will be located in the outskirts of Georgetown and possibly the Berbice river deep water port (depending on the schedule of construction and function for agricultural products trade), close to the main access roads to production areas of export commodities (e.g. rice, soya, corn, and horticulture).

The role of the modern agrifood hub will be to aggregate the production to ship to CARICOM countries while providing primary processing services (e.g. sorting, grading, and packing), short-term (cold) storage, and preparation of shipment through containerization of the different products. Public agencies for food safety enforcement and customs will be present on-site to improve efficiency of the export process and traceability. It will complement or replace the current packaging facilities in horticulture as well as providing new options for exporters in terms of shipment preparation.

289. The agrifood hub will also propose physical market services, that is, wholesale food markets (WFM) to support food trade at the domestic level and urban food distribution to support the urban food supply of the growing population in the urban area of Georgetown (300 000 inhabitants). It will also be able to move into the outskirts of the city's main wholesale activities located in particular in the Stabroek market, and provide upgraded services to the current vendors, reducing impacts in the urban areas (e.g. pollution, traffic) while strengthening access to a market with safe, fresh, quality and affordable food products. The case study of a similar project for example, the WFM in Montevideo, Uruguay, highlights the advantages of such agrologistics infrastructures that could support domestic food distribution and export. In addition, this modern agrifood hub could integrate the current "Federación Latino Americana de Mercados de Abastacemientos" (WFM association of Latin America and the Caribbean) to support regional trade and coordination between the different countries in terms of the agrifood supply chain.

290. It will in particular participate in order to:

- support access to domestic and export markets to local production;
- provide added value to products to meet end markets standard requirements;
- support cold chain development and monitoring through the furniture of cold storage and cool transport services (optional service);
- create synergies and economy of scales for food operators to decrease transaction and marketing costs (increase competitiveness);
- reduce impacts on Georgetown (e.g. pollution, traffic);
- reduce food losses;
- participate in the price information system and data collection for future virtual trading platform coordinating agrifood trade in the region.

291. The modern agrifood hub could also be a logistics hub for LCL reefer cargo, thus making consolidation easier. The entering agriculture products will be consolidated and kitted into containers containing the exact mix of different goods required by the destination country.

292. **Traffic study for access to Port of Georgetown.** The current situation in Port of Georgetown in terms of traffic and congestion requires the development of an access strategy to the Port of Georgetown reducing impacts and optimizing transport conditions. The aim of such a strategy is to suggest different scenarios for reorganizing traffic flows from the future modern agrifood hub, as well as potential other logistics flows towards the main wharves of Port of Georgetown. The study will identify in particular:

- key bottlenecks in goods transport to the port;
- the main impacts on transport, supply chain, costs;
- the main impacts on Georgetown livelihood;
- key urban developments, infrastructures, access roads and options for a more efficient and sustainable logistics transport within the city to access port of Georgetown;
- new circulation/traffic strategy for the city and the port.

293. **Trinidad and Tobago**: Transshipment hub and end market.

294. Cold storage units in CARICOM wharf. CARICOM Wharf in Port of Spain needs to be upgraded if the facility is to be used to promote and facilitate intra-regional trade by schooners. It will have to adapt to requirements for transshipment or short storage of perishable products, such as horticulture.

295. This cold storage unit will support the good monitoring of cold chain and provide services mainly to food operators with palletized products, as most of the perishable products are shipped by refers. The cold storage unit should use renewable energy to reduce environmental impacts.

Figure 36. example of solar-powered reefer

296. Two solar-powered reefer (40 ft.) storage areas must be built for consolidation/deconsolidation and short-term cold storage. The total storage capacity is 30 tonnes.

297. **Upgraded wholesale food market**. The current context in Trinidad and Tobago would require the modernization of food distribution systems to improve food supply from Guyana and other CARICOM countries, and the access to markets with both international and domestic production.

298. The WFM would provide a modern facility for the handling and logistics, and primary processing of food products, and modern cold storage facilities to relocate small traders and vendors, especially those operating at the Norris Deonarine northern wholesale market in Macoya, and food service providers (as buyers) who are looking to source large quantities of fresh produce. The new WFM would also become an agrifood platform attracting potentially the activity of large retailer (e.g. massy), exporters and importers as well as logistics companies.

299. The WFM is key to supporting food distribution in addition to consolidation and deconsolidation of agrifood products flows through:

- supporting access to market of local and imported products;
- providing added value to products to meet end markets standard requirements;
- supporting cold chain development and monitoring through the furniture of cold storage;
- creating synergies and economy of scales for food operators to decrease transaction and marketing costs (increase competitiveness);
- reducing impacts on Port of Spain (e.g. pollution, traffic);
- reducing food losses;
- participating in price information systems and data collection for future virtual trading platform coordinating agrifood trade in the region.

300. The project development of the WFM will be phased and scalable in order to reduce financial risks, test the pilot and support the increase of agrifood flows (international and domestic). Most of the land parcel will remain as an extension area at the beginning of the project. The volume to be

considered is between 300 000 and 500 000 tonnes of dry and perishable products. The WFM will be located in the outskirts of Port of Spain and well connected with the port and main production and consumption areas (including touristic areas).

301. Grenada: reshipment and end market

302. **Cold storage units on Port of Grenada**. The wharf facility needs to be upgraded if it is to be used to promote and facilitate intra-regional trade by schooners. It will have to adapt to requirements for transshipment or short storage of perishable products, such as horticulture and fresh fruits. This cold storage unit will support the good monitoring of the cold chain and provide services mainly to food operators with palletized and a low quantity of products, as most of the perishable products are ship by refers. The cold storage unit should use renewable energy to reduce environmental impacts. The modular approach to be used is the same proposed for the CARICOM wharf in Port of Spain.

303. Barbados: reshipment and end market. The proposal for investment is based on the current exploratory study being carried out by the government concerning the development of a food hub in Barbados. The physical terminal would be a small physical consolidation or breakdown terminal and wholesale marketing facility.

304. **The Food Terminal facility** would complement the private storage capacity of importers and provide modern wholesale postharvest and cold storage facilities, to complement the private sector's chilled storage facilities and to attract small traders and vendors, especially those that operate at the Cheapside Public Market and the Spring Garden Vendors Market, and food service providers (as buyers) who are looking to source large quantities of fresh produce. The current estimated throughput amounts to 700 tonnes per week, around 35 000 tonnes annually.

305. The food terminal would become the major fresh produce wholesale market in Barbados, with the aim to:

- support access to market of local and imported products;
- provide added value to products to meet end markets standard requirements;
- support cold chain development and monitoring through the furniture of cold storage;
- create synergies and economy of scales for food operators to decrease transaction and marketing costs (increase competitiveness);
- reduce impacts on Bridgetown (e.g. pollution, traffic);
- reduce food losses;
- participate in price information systems and data collection for future virtual trading platform coordinating agrifood trade in the region.

Conclusions

306. The issues discussed concerning the need to improve maritime shipping, port efficiency, trade competitiveness, and supply chain logistics have motivated this study to test the viability of refining the maritime agricultural trade networks in the focus countries. This section highlights some of the most important themes, and presents some of the short- to medium-term investment directions to be taken towards improving trade among the CARICOM countries, as well as the areas of work for the next phase.

307. This study highlights the critical importance of port infrastructures to meet the growing demands of global trade and ensure long-term economic prosperity. The findings demonstrate that inadequate port facilities can hinder trade efficiency, increase logistical costs, and limit a country's competitiveness in the global market. As trade volumes from CARICOM countries are expected to rise, ports with CARICOM Wharves must be equipped with modernized and expanded infrastructure to accommodate vessels, enhance cargo handling capabilities, and improve storage of agrifood including fresh products.

308. **The current state of the shipping networks in the Southeastern Caribbean, suggests that there is sufficient capacity and that** there is no need for additional maritime transport capacity. Many of the containers, including reefer containers, return empty on the routes from Guyana; these empty volumes could be used to increase the flow of agrifood from Guyana to the other focus countries, in addition to the wider CARICOM countries.

309. Many exporters in the Southeastern Caribbean have cited high freight rates and low service reliability as the key impediments to accessing the markets of nearby countries. Earlier research suggested that oligopolistic pricing strategies used by shippers were somewhat mitigated by the development of accessible and efficient port infrastructure, but this scarcely applied to the Southeastern Caribbean. On the other hand, the current study analysis suggests that while freight rates are higher than in other geographical regions, they are not an impediment for trade. More research is needed to understand the determinants of how freight rates and reliability vary with different policy interventions in port infrastructure and shipping procedures in the region, particularly in the context of unabated firm consolidation and increases in ship size.

310. **The informal shipping networks** (inter-island schooners) continue to play a vital role in offering cost-effective means for the transport of agricultural goods and may hold important lessons for building new inter-island networks. The first step in understanding the cost-effectiveness of small-scale local shipping was to conduct a thorough inventory of the activity of both the shippers themselves and the ships available, including the CARICOM wharves facilities available to them and the needed upgrade.

311. The difference in costs between the various transport options analysed in the study (container liner, schooner, or a potentially new service) is marginal. This applies to non-perishable products (transported in dry containers) as well as for perishable products (transported in reefer containers). The cost of transport in reefer containers are about 40 percent higher than transport in dry containers. Landed costs (cost of product, trade tariff as far as applicable and transport costs up to the landside gate of port of destination) for agrifood products from Guyana are lower than landed costs for agrifood products sourced from outside CARICOM (such as from the United States or Brazil). This is certainly due to the absence of trade tariffs within CARICOM, and most probably also due to lower transport costs. Moreover, the production price in Guyana is potentially lower than in other source countries, nonetheless this element was not part of this study.

312. The fact that trade in agrifood between Guyana and other CARICOM nations today is limited is largely due to mismatches in the transport chain. Container liner services offer reliable and regular transport services, including refrigerated services, but are not accessible for the small-scale suppliers and buyers that are predominant in the CARICOM market. Schooner services are aimed at cost effectively servicing the maritime transport needs of small-scale businesses, but do not provide refrigerated services which are needed for perishables trade between Guyana and other CARICOM nations.

313. Liner services for CARICOM mainly originate in Miami, Kingston, Freeport or Port of Spain. There are currently no intra-regional services that directly connect all of the CARICOM countries and in particular, the countries investigated for this study. Agri-products normally require refrigerated containers based on the voyage and storage time of more than two to three days. The analysis of the liner trade routes cannot guarantee a delivery service that maintains a two to three-day cycle, which mandates the use of refrigerated containers. Nonetheless, the types and volumes of agri-products are not always cost effective *vis-à-vis* the booking and efficient usage of refrigerated containers.

314. With respect to the schooner services between CARICOM countries, the voyage cycle time has historically been developed by ship owners to facilitate transit time of perishable and non-perishable goods of not more than three days. Additionally, greater care and attention is paid to the handling of goods due to the personalized nature of the service. It is to be noted that thanks to CARIFTA,[8] when these schooners operate at CARICOM Wharves the tariff and cargo handling costs are minimized. These schooner trade vessels also effectively address the requirements of the huckster trade with respect to the facilities and proximity of wharf to market transfers. Another feature of these vessels is the appropriateness of the size of vessel that can accommodate small or limited parcels of agri-products.

315. The synergy and complementarity between cargo liners and schooners contribute to the Caribbean's maritime trade ecosystem resilience. Cargo liners ensure the efficient flow of goods between major economic centers, underpinning industries, and international trade agreements. Meanwhile, schooners fill the gaps in the network, delivering cargo to remote islands, supplying essentials to coastal communities, and connecting people. This dynamic interplay between large-scale efficiency and localized adaptability can be supported with dedicated action to both players.

316. The CII has emerged as a critical tool in the global effort to reduce carbon emissions in the maritime industry. This indicator provides a standardized metric for measuring and reporting the carbon intensity of shipping operations. In the context of the Caribbean, where maritime trade plays a central role in economic development and environmental stewardship, the adoption and implementation of the CII can have a significant impact. Nevertheless, there is no evidence or recent study on the subject. The CII will affect only the liner services as they apply to vessels of tonnage greater than 400.

317. **Enabling environment action to promote trade should include the below points inf the following paragraphs**. However, the effectiveness of these private sector facilitation mechanisms relies on the collaboration between various stakeholders, including government agencies, port authorities, and industry players. Public-private partnerships can be instrumental to creating an

8 The Caribbean Free Trade Association (CARIFTA) was founded by Antigua and Barbuda, Barbados, Guyana, and Trinidad and Tobago on 15 December 1965, with the signing of the Dickenson Bay Agreement (the Agreement establishing the Caribbean Free Trade Association). They were joined on 1 July, 1968 by Dominica, Grenada, Saint Kitts-Nevis-Anguilla, Saint Lucia and St Vincent and the Grenadines; and on 1 August, 1968 by Montserrat and Jamaica. In 1971 Belize (then British Honduras) joined the association.

enabling environment for maritime trade, fostering economic growth and international commerce.

318. **Better schedule of vessels**. A more efficient and well-structured schedule of maritime cargo services would significantly enhance agrifood trade in the Caribbean by reducing supply chain bottlenecks and enhancing overall market competitiveness. Currently, irregular shipping schedules and long transit times can lead to perishable goods spoilage, increased costs, and unreliable delivery times. By implementing a more reliable and frequent maritime cargo schedule, Caribbean farmers and agrifood exporters can ensure consistent and timely access to international markets, thereby reducing post-harvest losses, lowering transportation expenses, and building trust with foreign buyers. This enhanced predictability and efficiency in trade logistics would ultimately boost the region's agrifood sector, fostering economic growth, employment opportunities, and food security for its residents.

319. **Increase the working hours and workdays of customs in all ports**. Extending working hours for customs at ports and operating during weekends would significantly enhance agrifood trade in the Caribbean by expediting the clearance of goods, reducing costly delays, and bolstering overall trade efficiency. Currently, limited operating hours and closures during weekends can result in frustrating delays in customs clearance, especially for perishable agricultural products. By extending customs working hours to include weekends, Caribbean exporters can benefit from shorter waiting times, quicker turnaround for inspections and documentation, and more flexible scheduling for shipments. This improved accessibility and responsiveness would not only reduce trade costs but it would also encourage more foreign and regional buyers to engage in agrifood trade with the Caribbean, and furthermore promote economic growth and greater food security for the region.

320. **Freight forwarders and non-vessel operating common carriers (NVOCC).** These private sector entities specialize in coordinating the transportation of goods by sea. They can consolidate LCL shipments from multiple shippers into full container loads and negotiate contracts with shipping lines on behalf of their customers. Freight forwarders and NVOCCs handle documentation, customs clearance, and other logistics aspects, making it easier for small and medium-sized enterprises (SMEs) to engage in maritime trade.

321. **Container freight stations and inland depots**. Container freight stations facilities act as intermediate storage and consolidation points for LCL shipments. They receive cargo from multiple shippers, consolidate it into containers, and transport them to seaports for loading onto vessels. Inland depots provide a similar function but are located farther away from seaports, allowing for greater accessibility and convenience for businesses located inland. These facilities streamline the process of consolidating and deconsolidating LCL shipments, reducing costs and improving efficiency.

322. **Online freight marketplaces**. Digital platforms that connect shippers with carriers and logistics service providers can enhance efficiency and transparency in maritime trade. Online freight marketplaces enable shippers to compare rates, book cargo space, and track shipments in real-time. They can facilitate LCL shipments by providing access to shared container services, allowing multiple shippers to utilize unused space in containers, reducing costs and improving resource utilization.

323. **Trade facilitation platforms**. Collaborative platforms that bring together various stakeholders, such as shippers, freight forwarders, customs authorities, and port operators, can streamline trade processes and enhance coordination. These platforms can offer features like electronic documentation, automated customs clearance, and real-time shipment tracking, making it easier for shippers to manage LCL shipments and navigate regulatory requirements.

324. **Industry associations and chambers of commerce**. Private sector organizations, such as industry associations and chambers of commerce, play a vital role in promoting maritime trade and

facilitating LCL shipments. They can advocate for favourable trade policies, provide information and training to SMEs, organize trade missions and networking events, and establish partnerships between businesses and service providers. These associations can act as a collective voice for the private sector and drive initiatives that benefit the maritime trade ecosystem.

325. **LCL default insurance** is specifically designed to protect shippers against the risk of default by a freight forwarder or consolidator in the context of LCL shipments. This type of insurance provides financial protection to shippers, in case the freight forwarder or consolidator fails to fulfill their contractual obligations, leading to financial loss or non-delivery of cargo.

326. **New investments** are needed in physical and digital infrastructures, and repositories of technical capacity that can help producers overcome technical barriers to trade. Recent literature demonstrates that complying with phytosanitary standards and other regulations allows agricultural exporters to benefit from more lucrative markets and to trade within common economic zones more efficiently. Within the CARICOM region, however, these standards and regulations have often developed into barriers to trade due to a lack of cost-effective means for achieving or verifying compliance. Cross-country investments in efficient regulatory procedures and common supply chain infrastructure should be more thoroughly investigated, and should also factor into the master planning process for ports and shipping networks.

327. A contributing solution would be the development of consolidation centres on both ends of the transport chain. In Guyana, consolidation centres could serve to process quality control on agrifood products up to export standards, at the same time offering LCL services for both dry and refrigerated products. In the destination countries, similar consolidation centres would guarantee cool chain integrity until the moment that the buyer collects his shipment.

328. Transport between the consolidation centres can reliably and efficiently be performed by container liners. The consolidation centres can partly overcome the lack of professionalism in the small-scale farming sector by selecting and packing products suitable for export, and by performing quality controls according to the standards in the destination countries. The consolidation centres could be extended to the digital domain by providing a market platform that connects supply and demand.

329. The improvement of the different stages of the regional supply chains should be considered within a global investment strategy from farm to fork to strengthen the competitiveness of the agrifood trade between CARICOM countries through the support to a better integration of the different stakeholders to create synergies and economy of scales. Improving access to international markets of Guyana domestic production require the development of an agrologistics strategy, organizing and monitoring the flows of products from the main production areas in Guyana, to consumers in Trinidad, Grenada and Barbados. These agrologistics system will support the competitiveness of agrifood export in CARICOM region while connecting main logistics hubs (e.g. ports and airports) with production and markets.

330. These different stages of the supply chain require a strong coordination and information dissemination to strengthen competitiveness of the process. An information system/regional E- market platform, built on infrastructure and facilities collecting trade and market information, will enhance trade through the consolidation of information on price, quantities, suppliers, buyers, support services providers and other actors.

331. **To maximize the benefits of new investments in port infrastructure, policymakers should look for better ways to pair them with institutional reforms.** Ports and their surrounding supply

chains face several fundamental institutional issues whose resolution would have spillover effects towards the profitability of maritime networks. Public private partnerships, systematic capacity building programmes, and more efficient regulations for customs and due diligence procedures have been identified as potential avenues for doing this, but a stronger evidence base of their use in the CARICOM region is needed to understand how to implement them.

332. Possible areas of focus for the second phase of the study identified in the phase one report are:

- expanding the analysis into **trade facilitation measures**, particularly in the context of the growing utilization of digital trade tools and the commitments to implement the World Trade Organization (WTO) Trade Facilitation Agreement, offers numerous advantages for both economies and global trade. Firstly, embracing digital trade tools such as electronic documentation and customs clearance systems can significantly streamline and expedite cross-border trade processes. This leads to reduced administrative burdens, lower transaction costs, and enhanced predictability for businesses engaged in international trade. Secondly, aligning with the WTO Trade Facilitation Agreement fosters international cooperation and harmonization of trade practices, creating a more transparent and standardized global trading environment. It promotes the development of robust trade infrastructure, encourages greater participation of developing nations in global trade, and ultimately fuels economic growth. Moreover, by focusing on trade facilitation measures, countries can strengthen their resilience to external shocks and crises, ensuring the uninterrupted flow of essential goods and services, as demonstrated during the COVID-19 pandemic. Overall, this holistic approach to trade facilitation, bolstered by digital tools and international commitments, paves the way for increased trade efficiency, economic competitiveness, and inclusive growth in the global marketplace;
- analysis of the investments and support **needs for the schooners' operators**;
- **expanding the study geographical coverage** to Suriname, St. Vincent and the Grenadines, Dominica and potentially St. Lucia would be beneficial to understand the comprehensive flow of agrifood products in the Caribbean. Like Guyana, Suriname has ample land to expand its production of agrifood products and to increase its export. St. Vincent and the Grenadines, Dominica and St. Lucia face similar issues as Grenada and Barbados, but are also exporters of agri-products to other CARICOM nations by means of schooner transport;
- **further development of the critical infrastructure needs identified in the initial phase of the study** based on discussion with government authorities and other stakeholders.