

GT-Panama Thesis Series

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Georgia Institute of Technology

MS in Supply Chain Engineering

CAPSTONE PROJECT

Panama as a Cruise Ship Resupply Hub

ADVISORS: DR. AMAR RAMUDHIN

DR. DONALD RATLIFF

MEMBERS: LARISSA BARRIOS

ALEXIS BURGESS

ALEJANDRO FÁBREGA

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Executive Summary

The “Panamas as a Cruise Ship Resupply Hub” project examines the potential of Panama for resupplying cruise ships focusing in food and beverages through an assessment of the current logistics involved for replenishing cruise ships in the Colon 2000 homeport and other regional homeports. Currently, there are two cruise ships that depart from Panama: Grandeur of the Seas of Royal Caribbean and Ocean Dream of Pullmantur.

The purpose of this research is to analyze the supply chain strategy that cruise lines adopt as well as identifying which local and imported products could be efficiently supplied from the country, and outlining what will be required in infrastructure, equipment, and other services for resupplying cruises in Panama and other regional homeports.

Panama has several advantages that allow the country to gain entry into the cruise food provisioning industry. Some unique features that give Panama the opportunity to compete in this market are the country’s strategic geographic position and logistics assets that allow forming strong connections with major ports of the region, and providing connectivity to several overseas markets.

The supply chain involved for resupplying cruise ships can be described as follows: it starts in the farmlands or manufacturer, and then it gets to a supplier or a ship chandler. The supplier or the ship chandler can ship the goods directly to the cruise ship or to a Cruise Distribution Center, and in the end this distribution center will consolidate and dispatch the cargo to their respective homeports for resupplying the cruise ships.

The cost of resupplying cruise ships in Panama with imported containers from Miami is approximately \$10 million dollars per cruise season; while shipping directly the sources to Panama has a total cost around \$9 million dollars per season. Our proposed network for consolidating and redistributing cargo in Panama rather than in Miami could save up to \$6 million dollars per cruise season. The main points for developing a distribution center for cruise food resupply in Panama are: sourcing directly to Panama, a ship chandler in charge for consolidating and distributing the goods and providing high quality of products.

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Introduction

Panama has proved to be a logistics hub for containerized cargo given its logistic assets, geographic advantages and amount of containerships that pass through the country. However, there is a maritime sector that has been underestimated over the years, specifically the activity of providing food to cruise ships. Every year Panama is a homeport for over forty cruise departures. The vessels can transport up to 3,000 people among guests and crew; making the food resupply services an important business opportunity for the country. The project will consist on analyzing Panama's potential for establishing a hub for resupplying cruise ships focusing in food and beverages.

The project "Panama as a Cruise Ship Resupply Hub" has been divided into four chapters: the first chapter consists of the project setting along with the description of the supply chain involved for resupplying cruise ships; objectives to be accomplished, our motives and interests in this topic; a literature review that discloses research done by experts about resupplying cruise ships; and the methodology will cover the techniques used to collect information and methods for achieving the project goals.

The second chapter studies the current situation in Panama for provisioning cruise ships. Focusing in food demand, quality and volume for cruise ships; and a detailed description of the process for resupplying cruise ships in Panama.

The third chapter displays the proposed network for resupplying cruise ships in Panama and other homeports. It outlines a plan for resupplying local products, importing, consolidating in Panama and redistributing cargo to regional homeports. In addition, it will show the comparison of costs of consolidating the cargo in Panama rather than in Miami.

The fourth chapter considers a deep analysis of the information gathered and it will identify the required infrastructure and equipment for the founding of a cruise ship resupply hub in Panama.

Finally, we share our conclusions, recommendations, and topics for further research; also a glossary and a consulted bibliography are included in this project.

Chapter I

Project Setting

The project setting will present some features that were taking into consideration to establish a relationship with the study of this research. It includes the project description which defines the processes involved for provisioning cruise ships; the project goals that are going to be achieved; the purpose and benefits for doing this study; a literature review related to the cruise industry and food provisioning of cruises; and the methodology used for the development of the project.

1.1 Project Description

Provisioning a ship is one of the main requirements in a vessel because it takes into account all the supplies, food, and other services that the ship might need in order to guarantee the safety and wellness of the crew during the journey. Nevertheless, when we are talking about cruise ships the demand becomes larger, especially in food and beverages. The demand of food for a cruise ship depends on the total capacity of the ship among guests and crew, the demographics of the passengers and crew, and the length of the voyage. Ship managers and caterers have to plan ahead all the goods and supplies that will be necessary to satisfy the passengers throughout the voyage. Some supplies can be sourced from the same country which the cruise is departing; but in most of the cases supplies are obtained from a main logistics center located in the United States, like in the situation of Panama.

The supply chain involved for resupplying cruise ships can be described as the following: it starts in the farmlands or manufacturer, and then it gets to a supplier or a ship chandler. The supplier or the ship chandler can ship the goods directly to the cruise ship or to a Cruise Distribution Center, and in the end this distribution center will

consolidate and dispatch the cargo to their respective homeports for resupplying the cruise ships. The main purpose of having a centralized hub is to certify a standardized quality of products and it also offers a centralization that simplifies the tracing of products and strengthens the food chain safety.

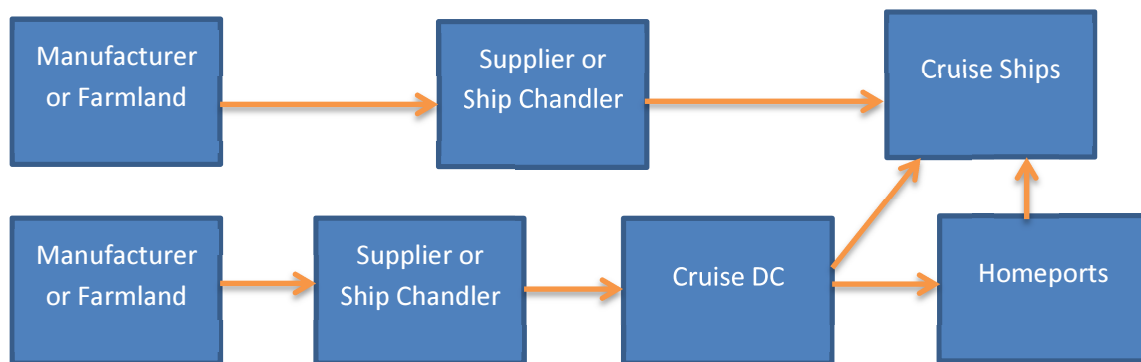


Figure 1. Cruise Replenishment Supply Chain

Panama has been developed as a touristic destination and has turned into the major consolidation and transshipment hub for Latin America in the last years. Cruises that transit through Panama may depart from a *homeport*, stop at a *port of call* or transit through the Panama Canal. Panama has three ports that are available for attending cruise ships; two of them are in the Atlantic and one in the Pacific Region. In the Atlantic Region, “Pier Six” is operated by Panama Ports Company and serves as a port of call. The other one is Colon 2000 that serves as a homeport and a port of call. In the Pacific Region, Fuerte Amador is used also as a port of call for many cruises. There is a total of 146 cruise visits per cruise season (October to May), in which 30% uses Panamanian ports as a homeport and a 70% uses them as port of call. From that 70%, almost all these cruise ships depart from cities in North America such as Fort Lauderdale, Los Angeles, Miami and a small number comes from South America. In cruise homeports off-going passengers board to start their cruise and also disembark the cruise ship at the end of their journey. It is also the place where the supplies are loaded for the voyage, which include fuel, fruits,

vegetables, beverages, and any other supplies needed for the cruise.¹ The project will focus on resupplying cruise ships that have their homeport in Panama given that is not common for cruise ships to take supplies in ports of call.

Panama has several advantages that allow the country to gain entry into this industry. Some unique features that give Panama the opportunity to compete in this market are the country's strategic geographic position and logistics assets that allow forming strong connections with major ports of the region, and provide connectivity to several overseas markets.

Logistic assets like the Panama Canal that assists about 14,000 ships through 144 maritime routes and container terminals in the Pacific and Atlantic, serves as cargo transshipment and redistribution for many overseas companies. Tocumen International Airport has 53 air lines among commercial, private and cargo flights and about 250 daily flights providing another source of connectivity.

The project will analyze the potential of Panama to become a hub for resupplying cruise ships; by assessing the current logistics, legislative and infrastructure barriers; as well as identifying which local and imported products could be efficiently supplied from the country, and outlining what will be required in terms of infrastructure, training, equipment, and other services for resupplying cruises in Panama and other regional homeports.

1.2 Project Objectives

The project will be completed through the achievement of the objectives. These will be classified in main and specific objectives in order to answer the proposed goals.

The main objective of the project is:

- Examine Panama's potential for resupplying cruise ships focusing on food and beverages.

¹<http://en.wikipedia.org/wiki/Port>

The specific objectives are:

- Identify the demand and the specific quality standards of the cruise ships.
- Determine the products that can be efficiently supplied from Panama.
- Contemplate a plan for importing products, consolidating and distributing them to cruise ships.
- Outline the additional infrastructure and equipment that would be necessary to supply these products in a competitive way.

1.3 Project Rationale

In the project rationale we will deliver an explanation of the value, importance, and benefits for the country.

Currently, Panama serves as a homeport for two cruise lines that are Royal Caribbean and Pullmantur, generating over 40 ship departures per cruise season. The combined capacity of the two ships is 5000 persons among passengers and crew; which represents an appealing business opportunity for the cruise food resupply industry. Although having this opportunity, Panama has not been developed yet to satisfy the cruise ship replenishment market.

Panama is the center for trade and commerce through Latin America and the world, providing a global connectivity with other regional and international ports. The country has four major container ports which are: Panama Ports Company in the Pacific Ocean, Manzanillo International Terminal, Panama Ports Company, and Colon Container Terminal in the Atlantic Ocean. Panama also has the Panama Canal and the Panama Canal Railway for transferring cargo from one ocean to another. In addition to this market, highlighted are the Colon Free Zone, the Central Bank, and logistics parks, which are the facilities that contribute to the connectivity of the country. Having these logistics assets in Panama, gives the country a tremendous advantage for consolidating and distributing cargo from different sources turning Panama into a Hub for resupplying cruise ships in other homeports.

The major beneficiary from this project will be a ship chandler company that will be responsible for the operations of resupplying cruise ships, importing products, consolidating and distributing them to regional homeports. Also companies like freight forwarders, refrigerated warehouses, ports and local producers can get involved in this process and be stakeholders in this important business. Therefore, Panamanian companies and other maritime auxiliary services can increase their revenues by serving these ships while contributing with the Gross Domestic Product (GDP) of the country.

1.4 Literature Review

The literature review helps explain and organize ideas, opinions and reasoning of facts and contents which will be taken into consideration and analyzed to support the project.

1.4.1 Industry overview

The cruise industry is strongly consolidated, with three main players namely Carnival Corporation, Royal Caribbean International and Star Cruises/Norwegian Cruise Lines (NCL). Carnival owns 45% of the market with eleven individual cruise line brands, including Carnival Cruise Lines, Cunard Line, Holland America Line, P&O cruises and Princess Cruises. It is followed by Royal Caribbean International with 21% of market share and the ownership of five different lines including Royal Caribbean Cruises, Celebrity Cruises and Pullmantur Cruises. In the third place is Star/NCL with 10% of the market with Star Cruises, Norwegian Cruise Line and Orient Line.

As a major destination, the Caribbean represents the main market of cruise industry reflecting a majority of North American passengers in particular from United States. The Caribbean has been positioned as a destination since the beginning of the 1980s, and has dominated the cruise industry over the years. According to The United States Department of Transportation Maritime Administration (MARAD), the Caribbean is divided into six sub categories: Bahamas – cruises that only go to the Bahamas; Eastern

Caribbean – St. Maarten to Haiti; Southern Caribbean – all ports in the south of St. Maarten and along the Southern region; American coast up to Aruba; Western Caribbean – Mexico, Central America, Colombia and the islands West of Haiti and the Panama Canal if the cruise turns at Gatun Lake.

In the last years, there has been a shift from the Bahamas, Eastern and Southern Caribbean towards the Western Caribbean. The market share for the Western Caribbean increased from 1.5% in 1995 to 20.1% in 2004.² Likewise, Panama has been impacted by this growing trend thru the amount of cruise passengers that arrived to the country increasing 12% from 2008 to 2009.³

However, within the Caribbean area there are some challenges to resolve in order to be more efficient than others markets. For example, ports are not suitable for the new vessels that are traveling to the region because there are some adjustments required in the port facilities to serve these larger vessels. For instance, Fuerte Amador (Panama) does not have required facilities to serve cruise ships, while Pier Six (Colon) shares its port facilities with containerships.

1.4.2 Cruise Ship Supply Chain

According to Florida-Caribbean Cruise Association more than 12 million passengers cruised in 2009.⁴ Having such amount of customers traveling shows some complexity in the supply chain for this industry. The major characteristics of the cruise ships supply chain are large global deployment, sourcing of a great variety of products in large quantities, and short time windows to supply.

An empirical study of current practices and challenges of a cruise line corporation (2008) examines the complexity of global cruise ship supply chain management. Cruise ship's management is divided in two areas: hotel and marine operations. Hotel operations are in charge of performing customer service, scheduling activities, meals, and others;

² www.eclac.org/publicaciones/xml/5/23825/L.75.pdf

³ <http://www.laestrella.com.pa/mensual/2009/06/30/contenido/116601.asp>

⁴ <http://www.f-cca.com/downloads/2009-cruise-industry-overview-and-statistics.pdf>

while marine operations are responsible for the traditional marine activities like power generation, ships maintenance, and navigation.

The project describes the main processes involved at each planning level. On the strategic level, every plan developed will affect the supply chain design, demand forecasts, and products mix. The tactical level will define a scheme to ensure the constant replenishing plan for cruise ships. On the operational level, food recipes and historical consumption behavior are inputted into an inventory control and forecasting system that will determine required inventory levels for other voyages. The business process model for cruise ships could be described in the Figure 2.

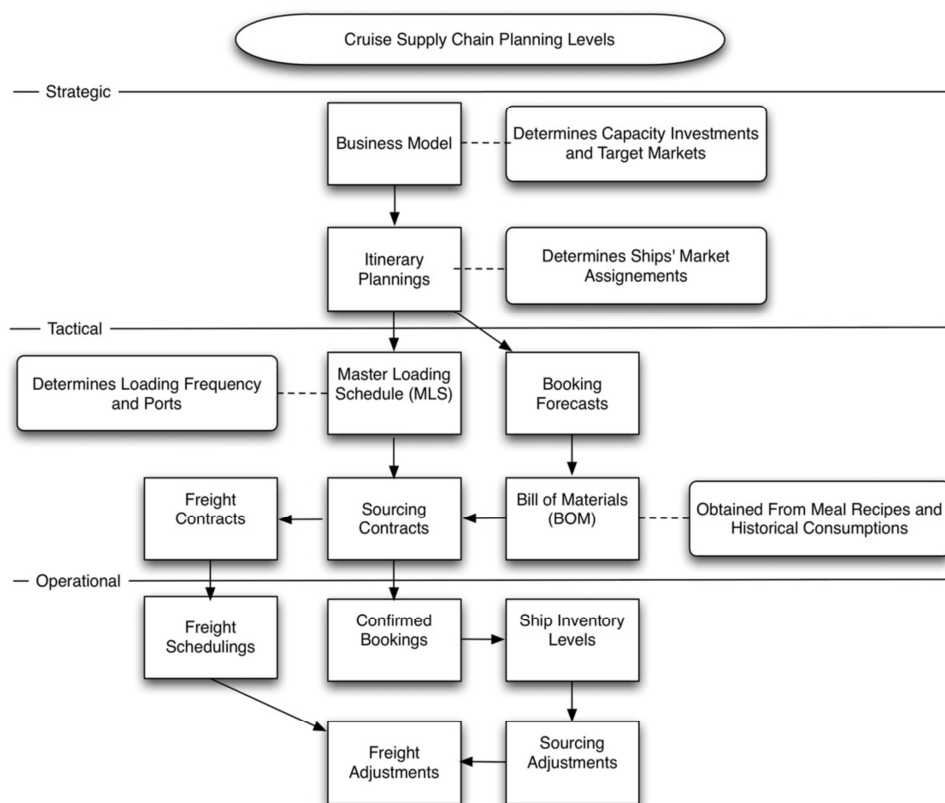


Figure 2. Planning for consumable products with dependent demand⁵

⁵ Véronneau, S., Roy, J., Global service supply chains: An empirical study of current practices and challenges of a cruise line corporation, *Tourism Management* (2008), doi:10.1016/j.tourman.2008.05.008

1.4.3 Background of Cruise Ship Resupply in Panama

An evaluation of the situation of Panama as a resupply location for cruise ships was developed in 2007 by the Maritime & Logistics Consulting Group⁶. The study was focused on fresh products from Panama that could be supplied to the vessels. The researchers found out that cruise ships only resupply fruits and vegetables from Panama in case of emergency, and the products were usually obtained from the public market of Panama City or wholesaler companies. Other finding of the study was that cruise vessels just buy the amount required to get into the United States because products sourced in Panama from ship chandlers do not have the necessary documentation to comply with the phytosanitary standards of the United States. For instance, if a Panamanian producer wants to export agricultural products to any country there are four documents needed: exports declaration, sworn commercial invoice, origin certificate, exports permit for the type of product, and phytosanitary certificate.

According to the report the major issues to provide fresh products to cruise ships were identified to be the lack of specialized docks and equipment, and the absence of a refrigerated distribution center close to embarkation points. Another complaint from the stakeholders of the process is that most of the times there is not a balanced proportion between price and quality for the fresh products of Panama.

A major part of the study was dedicated to describe the behavior of the production of the main fruits and vegetables produced in Panama, as well as the harvest seasons for each of the popular ones. A fact that was highlighted in the research was that Panama exports an important percentage of fruits produced in the country while for vegetables there is a different scenario. This means that there is more opportunity to resupply fruits since they are already positioned as an export product.

The information provided by this study should be verified because it was made four years ago and the situation might have change during that time. In addition, the

⁶ Study to determine the insertion of fresh products in the supply of ships that transit through Panama Canal and the ones that dock in Panamanian ports. 2007

project will take into consideration all the food and beverages products required by the vessels.

1.5 Methodology

The methodology will contemplate the tools and methods used for providing the achievement of the proposed goals. The first step is the data collection that consists on direct observation, in depth interviews, and relevant documents. The second step is the analysis of the data using a business process modeling tool and a software for mapping cargo flows.

1.5.1 Data collection

The study “Panama as a Cruise Ship Resupply Hub” is designed to answer the following questions:

1. How is the process for resupplying cruise ships in Panama?
2. What is the amount of food required to satisfy the demand of cruise ships?
3. Does Panama have the capability to become a cruise ship resupply hub for the region?

An applied research design was used to examine these questions. Data was collected using three qualitative methods: observations, in-depth interviews, and collection of relevant documents.

Direct observation was done during the process of resupplying the last voyage of the season for the Ocean Dream vessel of Pullmantur on Colon 2000 cruise port. This method allowed the team to understand the process; get to know the equipment used to move the goods into the ship; and helped to identify some sources for the products supplied.

In-depth interviews were done with ship chandler companies like Mec Stores, Mercansa, Tagaropulos International; a shipping agency namely Associated Steamship Agents; Colon 2000 cruise port; Customs of Panama; Food Safety Authority of Panama (AUPSA); Cold Chain Secretary of Panama, trucking companies, and local producers.

The interviews to ship chandlers, the shipping agency, trucking companies, and local producers followed the general interview guide approach, where the team had defined the questions for each interviewee but with a degree of freedom and adaptability. However, in the case of AUPSA and Cold Chain Secretary the interviewee had prepared a presentation for the team; followed by a conversational interview.

Relevant documents were mostly used to answer the second and third questions. Documents used to collect data include past research in the same topic; literature published regarding demand for cruise ships, supply chain for cruise ships; statistics about local production from the Office of the Comptroller General of the Republic of Panama; publications about importing procedures and regulations, and others.

The team also obtained the description and volumes of food required for each voyage from a cruise line. The totals were divided by the capacity of the ship and the number of days of the trip to get the demand per person per day. These values were used to deduce the total demand for the two ships that depart from Panama: Grandeur of the Seas of Royal Caribbean with a total capacity of 3206, and Ocean Dream of Pullmantur with 1944. The voyages of both ships are within 7-days.

1.5.2 Analysis

There are currently two ways for resupplying cruise ships in Panama: with imported containers brought from Miami, and with local products. An alternative network could be bringing the products from the source directly to Panama for resupplying cruise ships that departs from the country. The last network explores the possibility of consolidating food for several voyages in Panama, and sending full containers to homeports in South America.

For each model the processes have been documented, and their product costs, transportations costs and lead times have been determined by researching in the internet, contacting trucking companies in Panama, using a freight calculator from www.globalshippingcosts.com and talking with local producers of the country. Processes will be described using xBPM, a business process modeling tool that allows defining locations, costs, time, and participants. These processes were mapped by following one product from its origin to its destination in the cruise ship. The product selected was an eggplant and it was assumed to be sourced from Mexico.

The cruise line contacted stated that they source everything in the United States, which leads to the assumption that the price they pay for the products include their transportation cost from the origin country to the United States. The cruise port of United States used for consolidation is located in Miami; we chose to use Port Everglades in Miami given that it is the most popular homeport for cruise ships that transit through Panama.

For the network where everything is consolidated in Panama some assumptions were made regarding sources and costs for the products. This was done by choosing the major exporters of America for the products required for a cruise ship, and obtaining the average product cost in the respective country. Local products were also considered in this network; we only chose to source from Panama products that were exported in last years in enough quantity to supply the demand for cruise ships supplied from Panama. The fresh products that comply with this requirement were bananas, pineapples, melons, and watermelon. This network also uses a refrigerated warehouse to store the products until their distribution; the costs for storage and handling for this type of warehouse were obtained with a local 3PL.

The last network of resupplying South American homeports were obtained by examining the cruise vessels that depart from ports like Buenos Aires, Valparaíso, Callao, Rio de Janeiro, and others. The ports that lead in vessel capacity and departures per season were considered for resupplying from Panama.

All of the networks flows were described using Supply Chain Guru, a network design tool for enterprise strategic planning. The use of this software allows visualizing the locations of the production, consolidations and consumption points for the resupply models.

Chapter II

Current Situation

The current situation is necessary to learn and comprehend the nature of the business of resupplying cruise ships. In this chapter we present the quantity and quality of food required by cruise ships; a detailed description of the resupplying procedure for cruise ships that departs from Panama; and an analysis of the products and logistics cost for resupplying cruise ships.

2.1 Demand of food and beverages for cruise ships

The estimate of demand for the cruise ships that depart from Panama were obtained by taking the volumes given by a cruise line, dividing them by the number of passengers in the voyage, and dividing the number again by the number of days of the voyage. The result is the consumption per person per day, and this number could be used to estimate demand for cruise ships by using the capacity of the vessel and the length of the voyage in days. An explanation of this formula could be found in Appendix 1.

Cruise vessels that embark in Panama obtain all their food supplies in United States; the major categories of products needed for cruise ships are meat, produce and groceries. The total demand per week for the two ships that depart from Panama is described in Appendix 2.

There is not a quality standard established for cruise ships in the world. One cruise line interviewed stated that suppliers must provide export quality products in order to be considered for the resupplying of cruise vessels. However, there are some specific regulations for United States flagged passengers vessels and for cruise ships with over 13 people that have a foreign itinerary with United States Ports. The project will assume these regulations must be followed for cruise ships departing from Panama as well.

An important guide for supplying food to cruise ships is given through the Vessel Sanitation Program Operations Manual published in 2005 by the U.S. Public Health Service, The Center for Disease Control and Prevention, and the National Center for Environmental Health. The chapter 7 is devoted to Food Safety, with the section 7.3.2.2 dedicated to regulations about food receiving conditions. This section establish the receiving conditions for refrigerated food (7°C or below), while for food that is cooked and received hot the temperature should be 60°C or above. It is important that potentially hazardous food shall be free of evidence of previous temperature abuse.

Food packages shall be in good condition and protect the integrity of the contents so that the food is not exposed to adulteration or potential contaminants. Canned goods with dents on end or side seams may not be used.

For beef there are specific regulations: Wholemuscle, intact beef steaks that are intended for consumption in an undercooked form without a consumer advisory shall be:

- (1) Obtained from a food processing plant that packages the steaks and labels them to indicate they meet the definition of wholemuscle, intact beef; or
- (2) If individually cut on a vessel, cut from wholemuscle intact beef that is labeled by a food processing plant to indicate the beef meets the definition of wholemuscle, intact beef, and prepared so they remain intact.

In the case of the milk, there are regulations depending on the source of the product. U.S. supplied fluid milk and milk products shall be obtained from sources that comply with Grade A standards as specified in law. Non U.S. sourced fluid milk and milk products shall be obtained from sources which meet or exceed the standards of the health authorities from the source Country.

Eggs and milk products shall be received as follows:

- (1) Liquid, frozen, and dry eggs and egg products shall be obtained pasteurized.
- (2) Fluid and dry milk and milk products complying with Grade A standards as specified in law shall be obtained pasteurized.
- (3) Frozen milk products, such as ice cream, shall be obtained pasteurized as specified in 21 CFR 135 Frozen Desserts.

- (4) Cheese shall be obtained pasteurized unless alternative procedures to pasteurization are specified in the CFR, such as 21 CFR 133 Cheeses and Related Cheese Products, for curing certain cheese varieties.

2.2 Situation of Panama for resupplying cruise ships

For resupplying cruise ships, homeports must need to have adequate infrastructure and equipment for an optimal practice. Panama as destination of cruise ships has several assets to make this procedure. These assets can be divided in three main categories: infrastructure, equipment and supplies availability.

First, the basic infrastructure required for the resupply process of cruise ships are ports and refrigerated warehouses. Ports are essential part of this process because is where the supplies are received to get loaded later on the cruise ships. Panama has developed modern ports in the Pacific and in the Atlantic capable of receiving provisions from all over the world. In the Pacific region is located Panama Ports Company which have been named the port with largest movement of merchandise of the pacific of Latin America and in the Atlantic region we have Manzanillo International Terminal (MIT) with the largest movement of TEUs of Latin America. In addition Panama has a homeport for cruise ships in the Atlantic region where supplies are loaded to the vessels. This homeport is Colon 2000 capable of docking one cruise ship at a time, and very close to MIT.

Refrigerated warehouses are crucial for resupply process because is where the perishable products are stored in regulated conditions. Panama has started to develop refrigerated warehouses and currently has several cold storages operated by 3PL companies; however it has not been their focus to enter in the cruise ship resupply business. Furthermore, Panama does not have a cruise port with a dedicated refrigerated warehouse for the resupply process.

Second, the equipment needed for resupply process are trucks, containers, pallets and forklift trucks. This equipment is for handling and moving the supplies from one point

to another. All of this equipment can be found within the ports and ship chandlers who have this equipment.

Third, the availability of supplies for this process could come from local or foreign suppliers. Panama is not a manufacturer country and has a shortage in some food categories for producing an adequate amount dedicated for the resupply process of cruise ships. In addition Panama lacks of a cold chain which lessens the participation of the local products in the resupply to cruise ships. Though, studies have been made for the implementation of cold chain infrastructure that will improve the production and quality of local product for future introduction in the resupply process of cruise ships.

Beyond these assets, Panama has the higher connectivity of Latin America and it offers a multimodal platform, enabling to handle and offer all types of logistics services. Panama can receive by air, sea, and truck any type of provision that comes from different parts of the world for resupplying cruise ships.

2.3 Description of current resupply

Cruise ships that depart from Panama could be supplied in two ways: with local products and with imported containers. The first option is provided by local ship chandlers, while the second one is directly provided by the cruise line.

2.3.1 Supply with local products

It is very unusual in Panama for cruise ships to resupply with local products. When this situation occurs, the cruise line will send an email to the ship chandler with the purchase order of the products the cruise needs. After the purchase order is processed, the ship chandler buys the products at the public market. Logistics costs and lead times for the transportation of fresh products from the production to the public market depend on the location of the production. For instance, for a farm located at 30km from Panama City, the logistic cost will be of US\$35 (transportation and handling in a refrigerated vehicle) and the lead time will be of 1.5 hour. However, most of Panamanian production

is done in the countryside provinces. For a distance of 350km from Panama City, the transportation cost will be US\$3.50 for each 50lb of product (non-refrigerated truck) and the lead time will be of 12 hours, including the loading of the truck.

Transportation to the ship chandler's warehouse has a logistic cost of US\$20 (transportation in a refrigerated vehicle) and a lead time of 1 hour. Afterwards, the products are transported to the port of Colon 2000 with a transit time of 2 hours and a cost of US\$40, using a refrigerated vehicle. In the port of Colon there is a cost of entrance of US\$15. A map of the process described could be found in the Appendix 3.

2.3.2 Supply with imported containers

Each cruise season, cruise lines plan the demand for their vessels and select their suppliers. According to the investigation, the cruise lines that depart from Panama source and consolidate all their supplies in United States, specifically in Miami. Then the products are shipped in full containers and sent to Panama and to other homeports that the cruise lines have in the region (See Figure 4).



Figure 4. Baseline Network resupplying cruise ships that depart from Panama

Although the products are sourced in United States they are obtained from a variety of countries. The model of supplying with imported containers will begin in the

origin country. For explaining the process eggplants from Mexico were followed from their origin country to Colon 2000 cruise port.

First, in order to export the eggplants, producers need to have a commercial invoice, cargo manifest and certification of origin in order to transport the product from the farm to the Veracruz Port. Making an assumption that it is same cost as it is in Panama, the freight cost would be US\$3.50 per 50 lb. of fruits. When it arrives to the entrance of Veracruz Port the container goes to customs clearance where the documentation is checked to make sure it complies with regulations and laws. After the documentation phase is cleared the container will go to the dock where it is transported by a vessel to port Everglades with a lead time of 2.98 days and a cost of US\$3812 per 40' container.

When the container arrives to port Everglades it is unloaded and it will pass to custom clearance to make sure the documentation and cargo are fulfilling the legal requirements. Goods are then inspected by USDA and the FDA. USDA will release a sanitary certificate and the FDA an entry notification in order to leave the dock area of the port. At that point the eggplants are consolidated with the other food supplies for the same destination in a 40' container; assuming that the warehouse is located inside the container port. The container will be loaded to the vessel and transported to Manzanillo International Terminal (MIT) in Panamá with a lead time of 3 days and cost of US\$ 1942 per 40' container.

Prior their arrival in Panama, some customs and food safety paperwork must be done. The arrival of the products should be notified in the website of Customs, its system is called SICE (Exterior Commerce Integrated System). The importer will need to pay the duty corresponding to the product imported. This fee should be paid in the National Bank of Panama in order to get the product freed. In addition, before the products get into the country the importer needs to get the sanitary certificate for the product in the Health Ministry of Panama. Then the product needs to be registered in the website of the Food Safety Authority of Panama (AUPSA). Once it is registered, the arrival notification should

be done, which should be completed at least 48 hours before the arrival. The notification needs to be printed and brought to the place where the product will enter the country. The documentation that the product should have to enter the country consists of a certificate of origin, a sanitary inspection certificate of the origin country, a commercial invoice and a bill of lading.

Each port of entrance of Panama has three offices: AUPSA, Quarantine, and Customs. In the office of AUPSA the importer needs to pay US\$2 for each SKU that has been notified to enter the country. Quarantine just put a stamp on the documents because food is not a risk product for this entity. After the container arrives to the port, it will go to customs to comply with Panamanian documentation requirements. The Decree #6 for transporting non-nationalized goods issued by the customs office is used by the shipping agency for taking the container out of MIT and transferring it to the Colon 2000 Port. The shipping agency has to pay US\$4 for the container's seal because it is considered as transshipment cargo. The container must travel with its bill of lading, cargo manifest, sanitary certificate, and certificate of origin until it reaches its final destination. Then, the container will leave MIT by ground to Colon 2000.

The container arrives to Colon 2000 with a lead time of .08 days and a freight cost of US\$250 per container, and then it goes to customs clearance for reviewing the documentation provided by the ground carrier. After everything is in order, the container will enter the port and wait for the cruise ship to dock in the port. At the moment of resupplying the cruise ship, the container is opened in the presence of an inspector of the Panamanian Authority of Food Security (AUPSA) and an inspector of Customs to examine over the goods and make sure they comply with the documentation provided. Finally, the goods are loaded on the cruise ships.

The process of resupplying the ship begins when all the people involved get to the container yard: shipping agent, customs agent, food safety authority agent, port agent, chef cook/officer, K9 (trained dogs) and second/third officer of the ship. The customs agent proceeds to take off the seal of the container. Then personnel of the port use two

forklift trucks to move the pallets out of the container. They move the pallets all the way to the cruise ship door, they place the pallet in the door and personnel from the ship take the pallet and store it. The distance from the container yard to the ship's door is about 50 meters.

Most of the containers used for resupplying are refrigerated containers; they are used to transport refrigerated food, frozen products, liquids and canned food. Dry containers are used to move grains and other dry products. The containers have high space efficiency; most of the pallets were stacked to the maximum height allowed by the container. They were all wood pallets and were shrink-wrapped to protect the goods. Some of the goods that were moved in the ship were pineapples from Costa Rica, mangoes from Nicaragua, frozen seafood from China, shrimp from Ecuador, melons from Honduras, and lemons and apples from United States.

The total process of resupplying the ship takes about 45 minutes, and it is done approximately two hours after the ship has docked. Cruise ships also resupply fuel, medicines, spare parts, and whatever they could need when they get to Panama. The process of resupplying ships with imported containers is detailed in Appendix 4.

2.3.3 Cost Analysis

The cost of the current network is divided in product cost and logistic cost. Product cost includes the cost of buying the product at the origin country and transporting it to the consolidation point, in this case Miami. The product cost for this network was inferred from data from a cruise line, resulting in a product cost of US\$9.4 million per cruise season. Logistic cost includes the handling and storage cost at the consolidation point and the transportation of the goods to the consumption point, in this case the cruise port in Panama.

Calculations about handling and storage requires an estimate of the number of pallets required per week for the two ships that depart from Panama, and knowledge about rates for storing and handling pallets in a refrigerated warehouse. Resupplying the demand of cruise ships that depart from Panama will require 264 pallets per week, and

approximately 1200 pallets will be moved per month. Storage rates are the charges per pallet position per month in the warehouse. These rates were assumed to cost the same in Miami than in Panama (\$48 per pallet per month); while the handling rates must be higher in United States due to higher labor costs. The handling cost refers to the cost charged every time the pallet is moved; for instance for a pallet stored in a single location there will be two movements: from receiving to storage, and from storage to shipping. Then, there will be two times 1200 handling charges for the cruise ships that depart from Panama. Handling rates in Panama are of US\$15 per movement, while in Miami they should be around US\$21. The costs associated for storage and handling goods in this network gives a total of US\$443,520 per cruise season, see Appendix 5.

Transportation from the warehouse in Miami to the cruise port in Colon includes two legs: movement from Port Everglades to a container port in Colon (MIT), and movement from MIT to Colon 2000 port. Adding up the storage and handling costs, the logistic cost totaled US\$900,000 per cruise season. The baseline cost is of US\$10.3 million per cruise season (Figure 5 and Appendix 6).

Product Cost	Logistic Cost	Total Cost
\$9.4 M	\$0.9 M	\$10.3 M

Figure 5. Baseline Cost-Consolidation in Miami to supply Panama homeport

CHAPTER III

Proposed Network Configuration

The Proposed Network chapter reveals our network configuration for resupplying cruise ships in Panama and South American homeports. It outlines a plan for replenishing cruise ships by consolidating cargo in a warehouse in Colon with local products, and importing dry and reefer containers from different countries. In addition, a cost analysis is presented that shows the products and logistic costs of the proposed network. At the end, we display a comparison of costs between the baseline and the proposed network configuration.

3.1 Description of proposed resupply networks

Panama could participate of the cruise ships supply chain by using a network that consolidates the products in Panama and distribute them to the homeports. Two networks will be examined in this section, the first one resupplies the two ships that depart from Panama during the cruise season; and the second one resupply Panama plus three South American homeports.

3.1.1 Consolidation in Panama for resupplying Panama homeport

This network will source in Panama and other countries; transport the cargo to Panama; consolidate the goods in a warehouse in Panama; and finally distribute them to Colon 2000 cruise port, see Figure 6.

The people interviewed during the research did not reveal the origin countries for the current resupply; consequently, some assumptions were done regarding supplier countries for this network. The countries were selected among the major exporters of each product category for the region. Once selected the origin countries, the major container port of the country was selected to ship the products to Panama. The products will arrive to MIT and then moved to a warehouse located at 40 km from the port. Most of the products will arrive in full containers, less than container loads will be consolidated

in full containers at the container port. Then the containers will be transported to the warehouse. This warehouse has enough space to hold up to 7000 pallet positions in a controlled temperature. Local products will also arrive to this warehouse. The selection of the local products that could be introduced in this network was based in statistics about past years exports. The selection criteria were defined as products that were exported years ago in enough quantity to satisfy the demand of cruise ships. Only tropical fruits like pineapples, bananas and melons were selected. Some statistics about these products are included in Appendix 7.



Figure 6. Proposed network consolidating and resupplying in Panama

All the products should be in the warehouse two days before the first cruise ship departs. For example, currently one vessel departs on Friday and the other one on Sunday; then the products must be in the warehouse by Wednesday. Supplies for each ship will be consolidated at the warehouse and transported in 40' containers to the cruise port.

The entire process for resupplying a cruise ship with imported products could be described by following an eggplant from Mexico to the cruise port in Panama. The process begins with the packing and shipping of the product in the origin country. The producer needs to ship the product to the port with its commercial invoice, cargo

manifest and certificate of origin. The product is transported to the port by ground transportation; in this case the port selected was Veracruz. This leg is assumed to have the same cost and lead time of the leg in Panama: \$0.11 per unit and a lead time of 0.5 day. In the port the products must pass Customs clearance and they need to be accompanied by the documents mentioned above. Once Customs approved the products the loading operations begin. In this activity one paper is added to the documentation: the bill of lading. The transportation from Veracruz, Mexico; to MIT, Panama cost US\$2196 per 40' container with a lead time of 3.4 days.

Arriving in MIT follows the same process as imported containers from Miami, the arrival should be notified to AUPSA and Customs, and the products enter the country in status of goods in transit (Decree #6). The containers are loaded into trucks and moved to the consolidation warehouse with a cost of \$300 per container and a lead time of 0.13 day. The contents of the container are unloaded and placed in the refrigerated warehouse. The consolidation is done by putting together products for the same voyage in 40' containers, the containers are moved to Colon 2000 by truck (\$300 per container, 0.13 day of lead time). The unloading operation begins with the presence of Customs and Food Safety Authority personnel. In this step, the goods should be accompanied by the bill of lading, cargo manifest, sanitary certificate, certificate of origin, Decree #6, and food notification to Panamanian authorities. Finally, the resupplying process is done by unloading the container's content and loading them into the ship by forklift trucks. The entire process described could be found in xBPM in Appendix 8.

3.1.2 Consolidation in Panama for resupplying South American homeports

A second model for consolidating supplies in Panama includes the demand of South American homeports. Several ports in South America serve as homeports for cruise ship passengers, some of them are: Valparaíso, Chile; Rio de Janeiro, Brazil; Buenos Aires, Argentina. For each port the departures per season, capacity of the vessels, and length of the voyage were calculated, see Appendix 9. The three leading homeports in departures and capacity were Buenos Aires in Argentina, Rio de Janeiro and Santos in Brazil. For these three ports the demand was calculated by using the consumption per

person per day obtained from the data of a cruise line. The demand was added to the one of the two cruise ships that departs from Panama, giving a total demand for Panama and South America per week, see Appendix 10.

This model consists of sourcing in origin countries, consolidating in Panama, and supplying Colon 2000 homeport and selected South American homeports. A graphical description of this network is located on Figure 7.



Figure 7. Proposed network consolidating and resupplying in Panama

The process to resupply the South American homeports is similar to the process of resupplying Panama homeport. The only difference is that instead of moving the products from the warehouse to Colon 2000 cruise port they will be moved from the warehouse to Manzanillo International Terminal. The lead time and transportation cost for this movement will be the same as in the last network, 0.13 day and \$300 respectively. Once in the container port the products must pass Customs clearance in order to be loaded in the ship. Transportation costs and lead times for the leg from MIT to the homeports depend on the location of the homeport but they are very similar. For example, moving one 40' container from MIT to Santos, Brazil costs \$5680 and the trip lasts 8.51 days. It is

assumed that the container port of the destination country is close to the cruise port where the products will be resupplied. The goods must pass Customs and Food inspection once they arrive in the destination country; once all the controls are approved the products could be loaded into the vessel. The mapping of this process is in Appendix 8.

3.2 Cost Analysis

These two networks use the same assumption of the baseline network: product cost which is the cost of buying and transporting the product to the consolidation point (Panama); and logistic cost includes storage and handling during consolidation and the transportation to the homeport.

Both networks will consolidate products in a warehouse in Panama, rates for storage and handling are an average of the rates currently used by 3PL providers in Panama. Storage costs \$48 per pallet per month and handling costs US\$15 per pallet. Storage and handling estimates for a cruise season are of US\$342,000 for supplying cruise ships that depart from Panama, and of US\$588,000 for cruise ships that depart from Panama and South American homeports due to the increase in the number of pallets. The calculations leading to these numbers are explained in Appendices 11 and 12.

The first model of consolidating in Panama for satisfying the demand of the two ships that depart from the country costs US\$9.2 million per cruise season, most of it is product cost, see Figure 8. A detailed table with the costs for this network is in Appendix 13.

Product Cost	Logistic Cost	Total Cost
\$8.5 M	\$0.7 M	\$9.2 M

Figure 8. Proposed network cost for consolidating and resupplying in Panama

The second model includes the demand of Buenos Aires, Rio de Janeiro and Santos homeports. Evidently, the costs should increase because of the increase in the demand. This model will cost US\$23 million per season; again most of the cost is incurred in buying

the products and sending them to consolidation, see Figure 9. The details of this cost are found in Appendix 14.

Product Cost	Logistic Cost	Total Cost
\$19.5 M	\$3.5 M	\$23 M

Figure 9. Proposed network cost for consolidating in Panama
for homeports in Panama and South America

In order to make a cost analysis the team compared the network where the supplies for Panama homeport are consolidated in Miami with the network where the supplies are consolidated in Panama. Product cost and logistic cost are cheaper in Panama than in Miami. Products cost is less because the supplies are sourced in countries where the volume of production is enough to drive costs down; besides, the network is sourcing some products locally which will reduce the cost of transporting them to the warehouse. Logistic cost are lower too because Panama has lower labor cost, consequently lower handling rates in the warehouse. In addition, consolidating in Panama means a lead time of less than one day to supplying the homeport in the Atlantic coast, which reduces the transportation cost. The results of the comparison are shown in Figure 10.

Panama could save the cruise lines more than US\$ 1 million per cruise season if the consolidation is done in the Central American country rather than in the United States. Savings per cruise line are of US\$680,000 per season for Royal Caribbean; and US\$410,000 per season for Pullmantur (see Figure 11).

Country of Consolidation	Product Cost	Logistic Cost	Total Cost	Savings
United States	\$9.4 M	\$0.9 M	\$10.3 M	\$1.1 M
Panama	\$ 8.5 M	\$0.7 M	\$ 9.2 M	

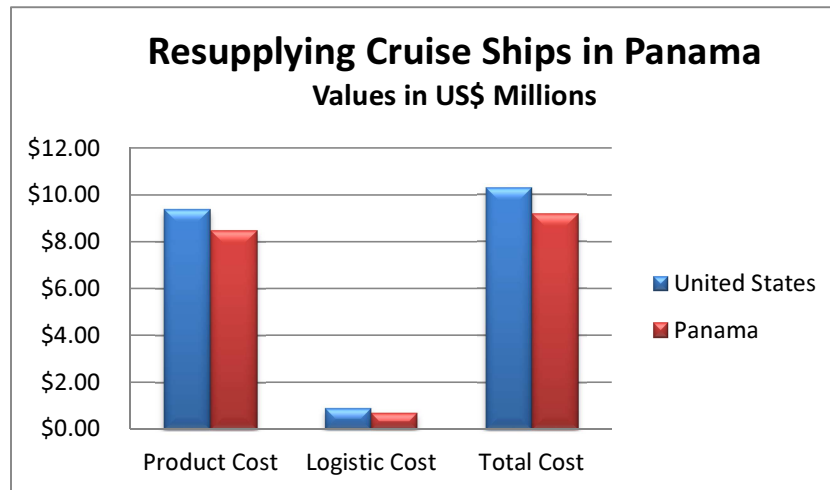


Figure 10. Cost comparison for supplying Panama homeport

Savings per season for each cruise line (US\$ million)			
Cruise line	Baseline cost	Proposed cost	Savings
Royal Caribbean	\$ 6.44	\$ 5.75	\$ 0.68
Pullmantur	\$ 3.86	\$ 3.45	\$ 0.41
Total savings			\$ 1.1

Figure 11. Savings per season for each cruise line

The existence of this potential savings leads the team to examine how the cost will behave when adding more demand to the network. The team included the homeports of Buenos Aires, Rio de Janeiro and Santos to the model. However, there must be a baseline cost for comparing the cost obtained in the proposed network. Storage and handling costs were obtained by estimating the additional pallets required for the network that consolidates in Miami, and using the rates of the American country. The results were storage and handling costs of US\$588,000 per season, see Appendix 15. This

cost was added to the product cost and logistic cost of the network, totaling US\$29 million per season, consolidating in Miami, for the demand of Panama and the selected South American homeports, see Appendix 16.

In this case of consolidating in Panama, the savings are of US\$ 6 million per season (Figure 12), mostly because economies of scale are achieved by transporting more volume from origin countries to the consolidation warehouse, and because the homeports served are closer to Panama than to Miami.

Country of Consolidation	Product Cost	Logistic Cost	Total Cost	Savings
United States	\$ 25 M	\$ 4.2 M	\$ 29 M	\$6 M
Panama	\$ 19.5 M	\$ 3.5 M	\$ 23 M	

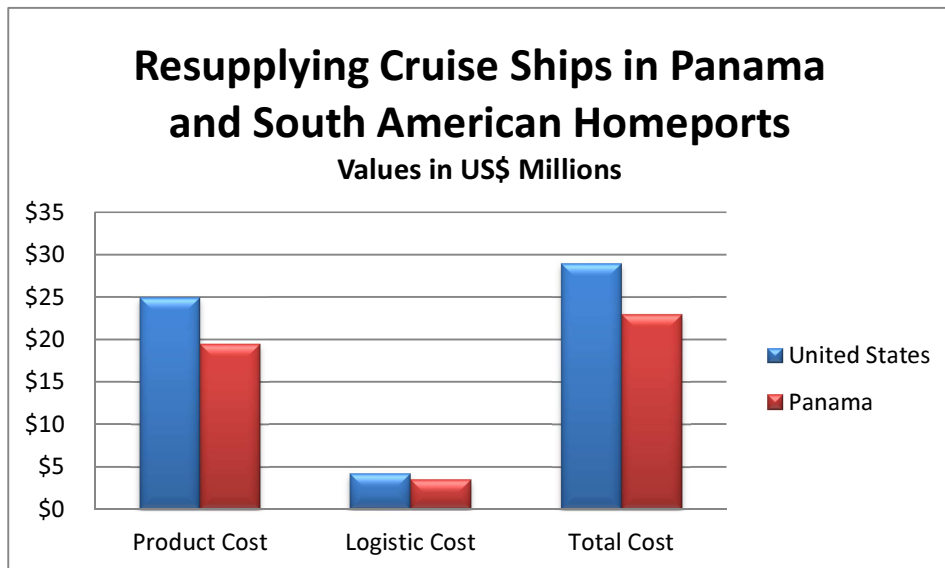


Figure 12. Cost comparison for supplying Panama and South America homeports

CHAPTER IV

Analysis

Panama has many assets that allow the establishment of a Hub for resupplying cruise ships. A clear analysis is needed for identifying the assets of the country and the potential barriers that will be faced during the development of the resupplying business. First, a market analysis will be done; using a SWOT analysis to identify internal and external factors for establishing a hub in Panama. These internal and external factors may favor or hinder Panama's participation in this industry. Then, a business analysis is described in order to identify current needs and required conditions to make a Hub in Panama.

4.1 Market Analysis

The SWOT analysis in Figure 13 depicts the major strengths and weaknesses of Panama to become a resupply hub and its major opportunities and threats.

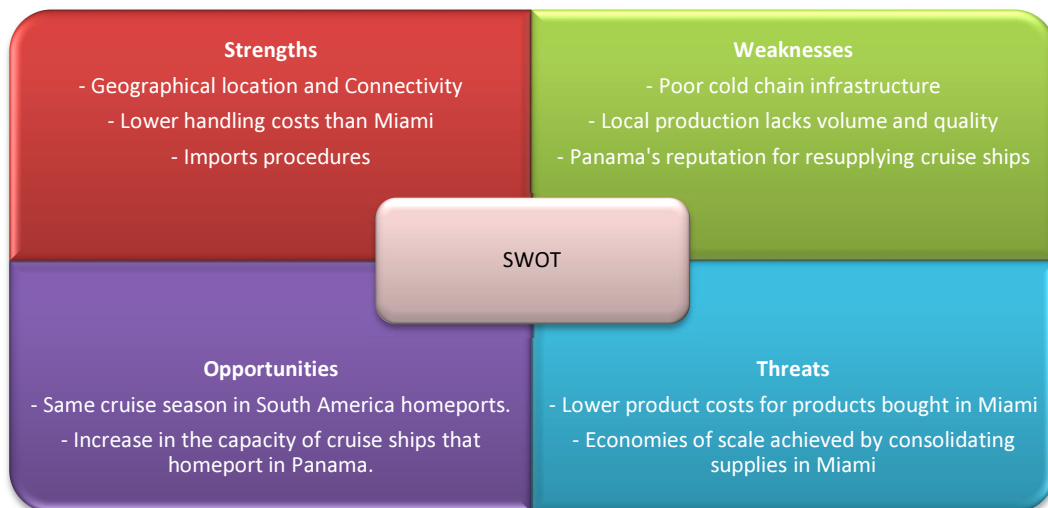


Figure 13. SWOT Analysis for establishing a Cruise Resupply Hub in Panama

The strengths of the country are concentrated in its geographical position and the benefits achieved from it; its labor conditions and the easiness to import products into the country. Panama is the country with the highest level of connectivity of Latin America (see Figure 14) allowing to handle and offer a wide range of logistics services to move and distribute provisions. In addition, Panama's strategic location allows the country to consolidate and transport provisions in a competitive way. Lower wage rates makes the country more competitive compared with the higher salaries and handling rates for warehouses in Miami. A third strength consists of the importing procedures of the country. Companies interested in importing goods to the country do not have to visit the offices of governmental agencies; they just need to enter the information in the websites of Customs and Food Safety Authority. In this way, the process is prompt and the products could be entered in the country without major inconveniences.

Country	Connectivity
Panama	41.09
Mexico	36.35
Brazil	31.65
Argentina	27.61
Colombia	26.13
Chile	22.05
Peru	21.79
Costa Rica	12.77

Figure 14. Liner Shipping Connectivity index for Latin American countries (2010)⁷

⁷ <http://unctadstat.unctad.org/TableView/tableView.aspx?ReportId=92>

Although having these strengths, there are some internal factors that could hinder the resupply business to cruise vessels. The first weakness is that there is no cold chain infrastructure in the country; therefore local products do not have the opportunity to have a major participation in this market. Besides almost all the production sector lacks the volume and quality required by cruise ships. A second weakness of the country is the reputation of Panama as a poor supplier due to high prices for products supplied in the country and poor availability of food supplies. This perception has caused cruise lines to overlook the country's potential as a hub for resupply.

There are two facts that represent opportunities for the country. Panama shares the cruise season with South America so the demands of both homeports could be combined to take advantage of economies of scales and also there has been a trend of increasing the capacity of vessels that homeport in Panama. Recently, Pullmantur announced they will replace the current vessel of 1422 passengers for a ship of 1828 passengers.

Nonetheless, there are some external aspects that could threat a potential hub in Panama. Historically the supplies have been consolidated in United States due to the circumstance that the cruise lines are American based companies; in fact, even the supplies for voyages in Europe are consolidated in the American country. An issue associated with this high consolidation is the achievement of big economies of scale caused by the combination of demands for many voyages.

4.2 Business Analysis

There are some key points that are essential to develop a distribution center for food resupply in Panama; these are:

- Availability of imported provisions
- Competitive cost of the network

- Ship chandler company
- Quality of local products

At the present time, Panama has already developed the first two points, while the other two need investment in order to improve their current state.

Provisions could be acquired by two ways: importing supplies from other countries or buying from local producers. Demand for cruise ships considers a major quantity of products that are not available in Panama; thus these products need to be imported from abroad. Importing goods require facilities and services for receiving, consolidating, and distributing the supplies to their destination. Panama has a strong leading multimodal platform that complies with this requirement. The multimodal platform consists of container ports in both coasts, 3PL refrigerated warehouses with capacity to store large volumes of perishable products, trucking companies capable of moving freight from warehouses to ports and more than 100 maritime trade routes to receive and distribute the supplies. Therefore, at this time Panama has the capability to supply imported goods into cruise ships.

The proposed network should offer some benefit to the cruise lines, otherwise it would be not considered as an option for resupplying. Logistics and handling operations in Panama have been evaluated and compared with Miami; and results revealed that operations in Panama are competitive enough to minimize the cruise line costs. However the reduction in costs could only be achieved by sourcing in countries where the volume of production is enough to drive down product cost.

Nevertheless, the business will need a ship chandler company with the capacity of supplying the high demand for the cluster of cruise ships. This company must be able to obtain the supplies from different countries with short lead times and competitive costs and must have the infrastructure and equipment needed which are a refrigerated warehouse and a fleet of trucks to move the goods; these assets could be leased or owned by the company.

Other issue is the quality of products harvested in the country. Panama could potentially take part of resupplying cruise ships with tropical fruits, fish and vegetables. However, some constraints obstruct Panama's participation in this market today. Local products are considered of low quality because of inadequate handling, transportation and distribution, which result in losses up to 60% of the production. The main reason of this problem is the absence of a cold chain in Panama. The situation might change in the coming years as for the government is currently designing a cold chain for local produce. The Panamanian government is in the planning phase of a cold chain. The cold supply chain will start from the post-harvest process of the fruit. Products will be handled with the required infrastructure and equipment for controlling and preserving the quality of the produce. Refrigerated warehouses and distribution centers will be located at strategic parts of the country and reefer trucks will be used for transporting all the products at a controlled temperature. Figure 15 illustrate the geographical location of the Cold Chain centers that will be built in the country. From this network the resupply business could use the post-harvest centers, public markets and the Logistic Center. Post-harvest centers might pack the products in the way requested by cruise lines and also serve as the first quality control for the fresh products. The network designed by the government includes transportation from post-harvest centers to public markets and one logistic center. The products for resupplying the ships could be sourced from the operating company in the logistic center and then transported to the consolidation warehouse.

The cold chain project will cause a great impact for the establishing of a hub in Panama for two reasons. First, it will increase the quality of fresh products making them more appealing for cruise ship resupply and possibly increasing local products market share of the business. Second, there will be less product wasted making more volume available for resupplying cruise ships.



Figure 15. Design of Cold Chain Network⁸

⁸ Conference: Evolution of the Cold Chain Project by Fernando Duque, Secretary of the Cold Chain.

Conclusions

Supplying food provisions to a cruise ship is a complex activity. Products are sourced in large quantities from a variety of sources, and the time allowed for loading the goods in the vessel is limited. Panama has established a homeport for two major cruise lines, but so far the country has not taken advantage from the resupplying business. Research has been done in the topic; however, there was not a quantitative analysis that quantifies the real demand of the cruise ships and examines it versus Panama's capacity for resupplying these vessels.

This project examined several resupply models. A comparison between the current network and a proposed network that consolidates goods in the country provides savings of about one million USD during a cruise season. This outcome indicates that Panama is competitive enough to provide a resupply service to cruise lines; but it also leads to question if there is a way to be even more competitive. Adding demand from other homeports to current demand of Panama could increase the savings of the network. Cruise lines could save up to six million USD per season only by changing their consolidation location from United States to Panama for resupplying cruise ships in Argentina and Brazil.

Though, some conditions must be met in order to achieve these savings. Panama has the potential to be a hub for resupplying cruise ships with these conditions:

- Products should be sourced directly to Panama from countries where the volume of production is enough to drive down product cost;
- Offering the service for cruise vessels that depart from Panama and major homeports in South America.

Recommendations

In order to develop a hub in Panama, the country needs to take advantage from its geographical position and high connectivity; work to improve local production and assure its proper handling; and find a way to achieve economies of scale similar as the ones achieved by the United States. Panama should increase their touristic advertising and marketing campaigns for attracting more cruise lines to use Colon 2000 as a homeport, therefore the ship chandler would have to buy more provisions for cruise ships while benefiting from economies of scale.

What needs to be done for consolidating food supplies in Panama are the following:

- Establishment of a ship chandler that will be responsible for the sourcing of products and consolidating them in the country. This company should meet the specifications of infrastructure and equipment to handle the volumes required by cruise lines.
- Development of a cold chain to increase local products market share in the cruise resupplying business.
- Creation of more touristic excursions and showing all the facilities and amenities that Panama can offer to cruise passengers, will definitely be appealing for cruise lines for establishing more cruise ships in Colon 2000 homeport.

Further Research

The results of this research could be expanded in several ways, there is still a wide range of opportunities to evaluate and enrich our understanding of the potential of Panama. This section offers an outline of some studies that could contribute to add more value to the present project.

First, the effects of the cold chain deployment might be studied. In the next years the network of handling and consolidating centers for temperature-sensitive products will be completely implemented. In that point a research to examine the volume and quality of products handled by the cold chain could be conducted. The research will provide a clear understanding of how the quality of the products has improved and what volume is available for resupplying cruise ships. Products that comply with volume and quality requirements of cruise ship could potentially be introduced in the resupplying business.

Second, cruise ships require large volumes of processed products. Nevertheless, Panama does not have a strong industrial sector, thus all of these products should be imported to the country in the proposed resupply model. An analysis of business opportunity for establishing processing plants is highly recommended. Manufacturing processed products in the country could possibly increase Panama's market share in the resupply business.

Finally, additional research might identify others regional homeports that can be potentially supplied from Panama. A deep analysis could identify dates of departure per cruise season, frequencies of departure, demographics of passengers, among other details that serve to better understand the characteristics of South American homeports' demand. The addition of other regional homeports would help cruise lines to achieve even more savings.

Glossary

1. **Homeport:** is the port where cruise-ship passengers board (or embark) to start their cruise and also debark (or disembark) the cruise ship at the end of their cruise.
2. **Port of call:** is an intermediate stop for a ship on its sailing itinerary, which may include up to half a dozen ports. Passengers do not begin nor end their voyage in a port of call.
3. **Ship chandlers:** retail dealers in special supplies and equipment for ships. Ship chandlers distinguish themselves through their ability to fulfill the ship's needs within the short period of time that the ship is in port.
4. **Shipping agency:** a person or company whose business is to prepare shipping documents, arrange shipping space and insurance, and deal with customs requirements.
5. **Freight forwarding agency:** a person or company that organizes shipments for individuals or other companies and may also act as a carrier. A forwarder often acts only as an agent, in other words as a third-party (non-asset-based) logistics provider that dispatches shipments via asset-based carriers and that books or otherwise arranges space for these shipments.

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