

**FEASIBILITY PROJECT FOR IMPLEMENTATION OF LOGISTICS
SOLUTION FOR SHIPMENT OF GRAIN IN SANTANA PORT
DEVELOPMENT AND ZONING PLAN – PDZ**

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Brasília
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**FEASIBILITY PROJECT FOR IMPLEMENTATION OF LOGISTICS SOLUTION FOR SHIPMENT OF GRAIN
IN SANTANA PORT DEVELOPMENT AND ZONING PLAN – PDZ**

**Work submitted to ITL/SENAT / STC – ERASMUS UPT as a requirement
for completion of the Course International Certification in Waterway
Transport Management and Multimodal Integration.**

Brasília
2022

WE DEDICATE THIS PROJECT

To our family members, who supported and encouraged us to complete this path of development and learning.

OUR THANKS TO

All Professors, ITL/SENAT Team, our colleagues that helped us to prepare this project,
exchanging knowledge between different logistics chains.

ABSTRACT

This Project has been developed as a prerequisite for the completion of international certification in waterway transportation management and multimodal integration.

The study aimed to analyze the operational and financial feasibility of moving solid bulk cargoes, especially grains aimed at trading companies, which usually move large volumes under the CIF (Cost, Insurance and Freight) process. An attempt to increase cargo handling, shifting competitive margins from using a port closer to the entrance to the Amazon Basin for origination from the farm to the elevators (port facilities), where there is greater competition and added cost. Possibilities of increasing the competitiveness of the *Santana* Port, considering the longer transit time of the Santarem Port and *Itacoatiara* Grain Terminal, the inherent margin of gain with freight, less CO2 emissions, less vessel's daily hire, less bunker cost and the port costs involved in the operation of the Santana Port. The possibility of using the favorable spread on these costs to increase the lift of cargo towards the Santana Port. The Port of Santana has the lowest market share when compared to the river ports of *Itacoatiara* and *Santarem*, despite being the closest seaport, located on the left bank of the Amazon River.

Key words: costs, cargo operation, margins, spread, competitiveness.

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1. INTRODUCTION

The Group identified a possibility to promote the development of the Port of *Santana*, provide the Northern Arc grain exporting market with an attractive cost reduction per shipped ton of grain and at the same time offer one more option for ship loading in a region that demands logistic solutions due to the exponential growth of Brazilian grain production. The Port of *Santana* is located on the left bank of the Amazon River, only 4 hours away from the Atlantic Ocean, being the closest fluvial port to the sea in that region.

The dry bulk vessels named "Handymax and Supramax", with a loading capacity of 50 thousand tons, currently sail to the Port of *Itacoatiara* passing through the Port of *Santana*. In this round-trip journey it takes 6 days of navigation to complete the entire route, against only 8 hours of navigation to the Port of *Santana* for the vessel to reach the same point of location in the Atlantic Ocean en route to the next port of destination. Based on this big difference in navigation time between the two most used ports (*Itacoatiara and Santarem*) and the preference for verticalization of the chain, originating the cargo and using time-chartered ships, research of the freight components that could be saved if the Port of *Santana* were used: time chartering (hire), fuel (bunker), port costs, including navigational safety support (piloting).

This project will show that besides the cost and time reduction in the loading operation of the long-distance vessel, once the project is adopted, it will be possible to develop river barge transportation in the region considering that all the transportation and formation of the 50 thousand tons lots, from any point of origin, will occur exclusively by this transportation modal. Currently, there is only a small flow of grain transportation towards the port of *Santana* via barges.

It will be shown that the mode of shipment operation called "Barge to Ship" still very incipient in Brazil makes perfect sense in the region of the Port of *Santana* besides being a highlighted item in the demonstration of cost savings, including providing the attraction of cargo from nearby transshipment stations as *Miritituba*.

Considering that river navigation, the use of barges and the development of river ports were the main items of our course we understand that the content of our project is aligned with the course objectives and the teachings presented in class.

The group will present the results of the technical and economic feasibility meeting held with the Port Authority of the Port of *Santana* and research conducted with a professional active in the grain trading market that positively signaled the execution of our project.

2. PORT OF SANTANA

2.1. Port Information & Restrictions

Port Name	: Porto of <i>Santana</i>
Location	: <i>Amapa</i> State, Amazon River Left Margin
Code Name	: CDSA
Local Time	: GMT -3
Water Density	: 0.996
Tide Range	: 0.5 up to 3.5 meters of amplitude
Maximum Draft	: 11.50 meters
Maximum Airdraft	: 20 mtrs (loading of woodchips, corn, soyabeans, SPC, using the shiploader)
Maximum LOA	: 190 meters. (Berth 1)
Maximum LOA	: 220 meters. (Berth 2)
Maximum BEAM	: 34 meters. (Berths 1 & 2)
Bunker facility	: Not available
Fresh water	: available

Berthing/unberthing maneuvers only during daylight and during high tide flooding.



Figure 1 – Location of the Port of Santana

Fonte: Google Earth (2017). elaboração: LabTrans/UFSC (2018)

2.2. History

The Port of Santana (originally Port of *Macapá*) is an estuarine port located in the municipality of *Santana, Amapá*. The port is located 3 km from the center of Santana and 18 km from the center of *Macapá*, the state capital. It is administered by the Companhia Docas de Santana (CDSA), a public company that is part of the indirect administration of the Municipality of Santana.

The construction of the then Port of *Macapá* began in 1980 and had the original purpose of serving the movement of goods by river, transported to the State of *Amapá* and *Marajo* Island. However, due to its privileged geographical position, it became one of the main shipping routes, allowing connections with ports on other continents, in addition to its proximity to the Caribbean, the United States, and the European Union, serving as a gateway to and from the Amazon region. The official inauguration of the facilities occurred on May 6, 1982, shortly after the creation of the district of Santana, and it was renamed Port of Santana, where its current location is.

It is the main port of the state of *Amapá*, serving as an outlet for the *Amapá* Railroad, which connects it to the *Amapá* interior. The port exports mainly ore and wood, and imports basically industrialized goods and food.

2.3. Area of influence

The area of influence of the Port of Santana comprises the State of *Amapá* and the entire Amazon basin and its main ports: Port of *Trombetas*; Port of *Munguba*; Port of *Santarem*; Port of *Itacoatiara*; Port of *Manaus*, Port of *Porto Velho* and Port of *Itaituba*, ***Miritituba* Grain / Fertilizer Terminals**, the Para municipalities of *Afuá* and *Chaves*, located at the mouth of the Amazon River, northwest of *Marajo* Island.

Main and anchorage areas of the Port of Santana

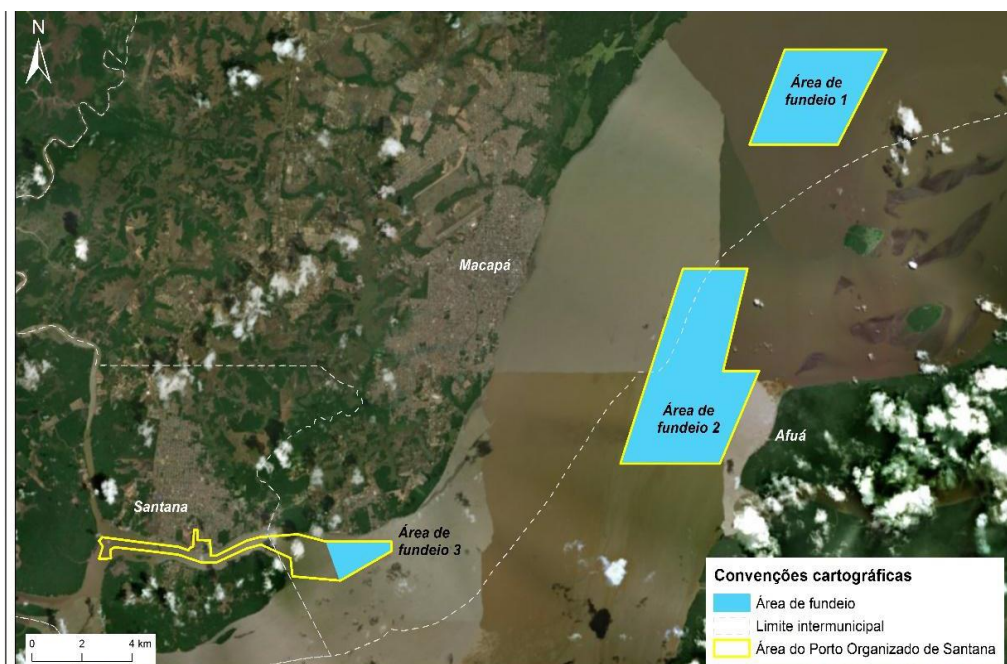


Figure 2
Anchorage areas
Source: Google Earth (2017).
Elaboration: LabTrans/UFSC
(2018)

The port has two berths for ships' docking:



Figure 3 – Mooring berths.
Source: Google Earth (2017).



Figure 04 – Pier 1 of the Port of Santana
Source: FEESC (2015).



Figure 05 – Port of Santana Warehouse location
 Source: Google Earth (2017). Elaboration: LabTrans/UFSC (2018)



Figure 06 – Port of Santana Location of yards
 Source: Google Earth (2017). \Elaboration: LabTrans/UFSC (2017)

3. PROJECT SCOPE

The project has in its scope the Barge-to-ship boarding modality, to avoid a lot of charges for the usage of port infrastructure, use of berths, electricity, use of shore equipment for loading the ship, among other common items of collection by the Port Authority and/or the Port Administrator.

In Brazil, the Barge-to-ship operation is relatively new and has authorization from ANTAQ (Federal Government) to take place. In the port of *Barcarena* there are records of operations of this modality and for the Port of Santana we propose an identical operation for grain shipments.

The barge-to-ship mode of shipment will be carried out with the ship anchored in a safe and suitable area to carry out such operation and preferably the vessel will be anchored when all Barges will be ready to commence the loading operation to the vessel, and thus avoiding if idle on days that may compromise the economically favorable result with losses of vessel's hire value attributed to the vessel at anchor without cargo handling on board.

Today, the main ports in the Region (*Itacoatiara and Santarem*) receive their cargo of Grain Commodity from different parts of the region. An important region is Porto Velho where there are some Inland Terminals for such commodity and that supply the Port of *Itacoatiara* through barge convoys in service of a large Exporter called *Amaggi* that has a road and river transport company. In addition to its own river terminal in *Itacoatiara* called *Hermasa* Terminal, in this case, other exporters do not have access to this Grain Commodity flow route developed and used exclusively by *Amaggi* and those with whom partnership agreements are signed (Bunge and Louis Dreyfus).

In this case, the Port of *Itacoatiara*, through the export logistical flow route described above, serves the interests of a single company that legitimately invested resources and time to develop such route.

It is important to point out that the long-haul vessel sails to the Port of *Itacoatiara* to load the exporter *Amaggi's* cargo and then returns throughout Amazon River passing through the port of Santana (again) to start sailing in the open sea.

The port of *Itacoatiara* is 597 nautical miles away from the Port of Santana and this information is very important for the understanding of our project.

Another port of origination and dispatch of Grain Commodity cargo is the River Port of *Miritituba*, located in the right bank of the Tapajos River in the municipality of *Itaituba* – State of *Para* which, with its various private terminals, in 2014 timidly began to receive part of the production Grains in the Midwest and South region of the State of Para. In 2014, 600 thousand tons of grain were shipped.

In 2021, with the completion of the paving of Highway BR-163 and several private investments in the terminals, the volume of grain flow through the various terminals located in the River Port of *Miritituba* reached the mark of 15 million tons. We observed that the river shipments that took place in this location were destined for the ports of *Barcarena* and *Santarem*, where the grain load is transhipped in long-distance vessels to fulfill the final export journey to several countries worldwide. We have no record of convoys of barges with grain that were destined for the Port of Santana for the same purpose.

Unlike the Port of *Itacoatiara*, *Miritituba* has several terminals from several private companies and basically serves all the large and well-known players in this operating niche.

The Port of *Miritituba* is 444 nautical miles away from the Port of *Santana*.

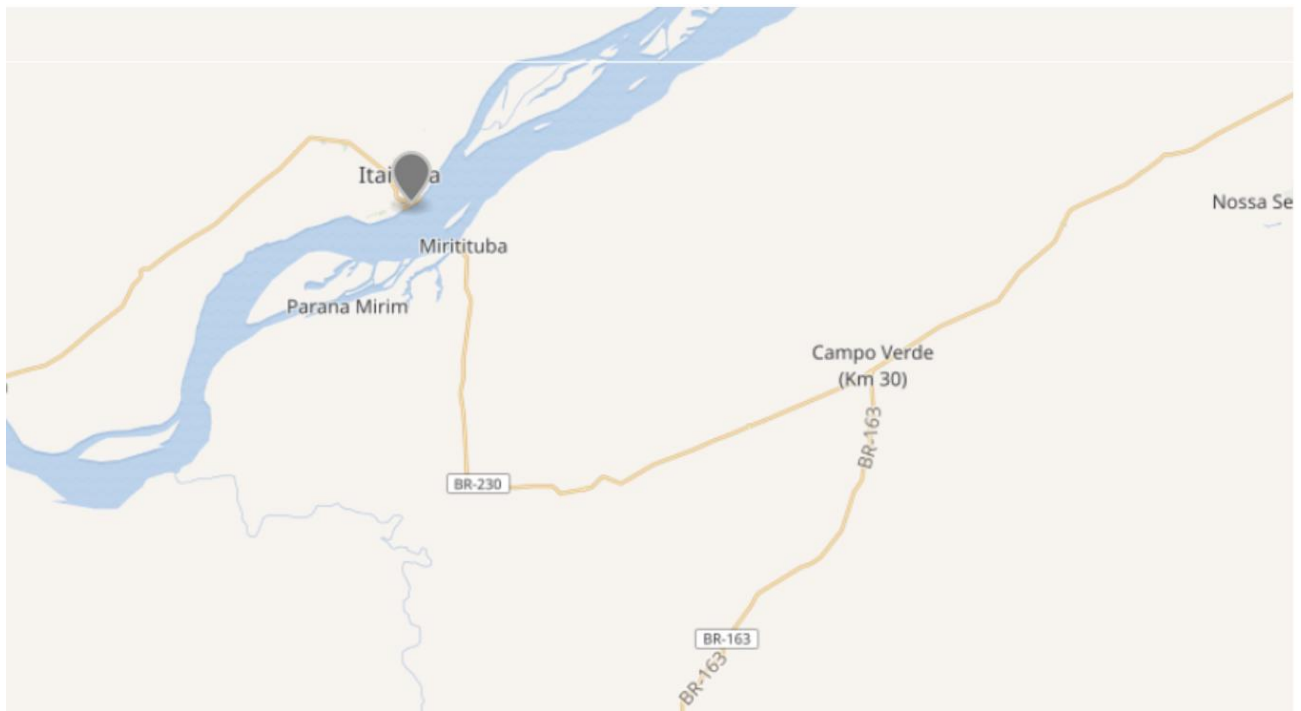


Figure 09 - road modality (BR-163 and BR-230) that supplies the river terminals of the Port of Miritituba with grain production in the Midwest and South regions of Para.

It is worth mentioning that the Brazilian government has worked hard to make the construction of FERROGRAO viable through a concession to the private sector for the construction of the railway and its commercial exploration for a period of 35 years. Today, the project is estimated to be in operation in 2025. This project and others for the region related to improving logistics will greatly contribute to increasing the flow of grain to the region of the ports of the Northern Arc and all options for loading vessels in that region will be demanded. It is worth mentioning that the BR-163 highway is being doubled, which will certainly provide an increase in the flow of Brazilian grain production towards the Ports of Northern Arc.



Figure 10 – rail and river network

The option to transport for the Brazilian grain production that grows every year and has increasingly demanded the ports of Arco Norte.

To illustrate our project and comparative purposes, we have the Port of Santarém, also located on the Tapajós River, which was inaugurated in 1974 and has been considered since then a strategic point for the flow of bulk and liquid imports and exports. Today, the port complex handles around 8 million tons of grains, in terminals leased by giants in the industry such as Cargill, Raizen, among others.

The port of Santarém is currently supplied with grain cargoes originating from Porto Velho about 70% and from the Port of *Miritituba* about 30% by the river modal (barges) which are transshipped in Long Haul vessels.

The volume of grains disposed of by the points mentioned above grows every year and estimates are that the Northern Arc should reach the movement of 30 million tons per year very soon.

We also emphasize that our project is not intended to be a direct competitor of the Ports above mentioned, since in our shipping modality we will never be competitive for large volumes and speed, considering the formation of each convoy and the transshipment operation (ship-to-barge). However, the increase in volume and occupation of the outlets mentioned above indicates a good advantage in our favor, offering the option of Port of *Santana* to shippers.

Our project aims to offer one more option of vessel availability for the flow of cargoes of 50,000 MT of grain with savings on the chartering side in an average of USD 2.10/MT. This availability would even be available to new players that do not have infrastructure in the region (terminal) or access to major players that legitimately impose their trade barriers. A new player will be able to contract the entire service directly with the managers of this project, considering that there are no major physical assets involved in its implementation.

After the above report on points that we consider important and essential for the understanding of our project, such as the continuous and growing expansion of Brazilian grain production that tends to be shipped through the Ports of Northern Arc, details on the Port of *Itacoatiara* that was developed to service of a single company, details about the Port of *Miritituba*, which is an important point of cargo transshipment to the Port of Santarém and its proximity to the Port of Santana, the explanation about the points of origin of the grain

load of the production (Center West, South of Para and North region) that arrive at the transshipment points in the Inland Terminals of Porto Velho, *Itacoatiara* and *Miritituba* and finally and most importantly, the explanation about the Port of Santana, our chosen Port that although it is still underused is the river port in the region closest to the ocean.

In order to understand our project from the point of view of costs and competitive advantage of the Port of Santana in relation to the final cost of the operation, we will demonstrate a drastic reduction, mainly regarding long-distance maritime freight. Before the financial model statements for a better understanding of all, we produced a Glossary:

Supramax Vessel: This model and size of vessel that we adopted for the accomplishment of this study with the capacity to transport 50,000 MT of grain in bulk, has its own crane that is essential for the cargo operation in the Barge-to-ship modality.

Time Charter Hire: The vessel chartering market defines its value or opportunity cost based on the supply and demand for vessels available. In our view this is a market that will probably be always hot considering the world need to grain transportation from producing countries to consuming countries, a SUPRAMAX ship is quoted in about USD 35,000.00 daily basis.

This information is sensitive in our project since in our cargo operation in the Port of *Santana*, instead of taking place in the Port of *Itacoatiara*, there is a saving of 12 days of navigation when the same ship is loaded in *SANTANA*.

Bunker Market: Diesel produced to move the large engines of vessels, Fuel for any and all vessels (being Diesel) is called BUNKER. In the same way as the daily cost of a Vessel (HIRE), the cost with BUNKER is a sensitive item in the composition of the value of long-haul maritime FREIGHT and the savings of 12 days of navigation that ceases to occur when the vessel is loaded in Santana is a positive point for our project.

Pilotage: In Brazil, as in several countries around the world, regulations require that when vessels approach ports, a pilot climbs aboard to safely drive the vessel to the berth and/or anchorage. The Pilot is the trained navigation professional who knows all the variables that occur in the region, being the most suitable person to drive the vessel in its entry and or exit with total safety. The practical is necessary, however in Brazil it has a cost that also impacts the final value of the freight. A vessel requires, on average, the use of pilotage for a berthing at the Port of Santana of a service of about 6 hours. This same vessel to dock at the Port of *Itacoatiara* requires a service of about 6 days of navigation in total, i.e., 3 days to arrive in *Itacoatiara* and then another 3 days to go the opposite way and arrive in the open sea to continue in its port of destination.

Port Tariffs: All Ports in Brazil and in the world have a port tariff applied to the Ship with several cost items varying according to the size, type and age of the ship, type of cargo, place of operation, use of the navigation channel, use of port signaling, use of terrestrial infrastructure, etc. In our project, all 3 ports mentioned have their Port tariffs, including the Port of *Santana*, however, as our loading operation to the ship will be carried out with it not moored in a berth, but with it located in an anchorage area in the Port of Santana, 90% of the items in the Port of *Santana's* port tariff table will not be applied to the cost of our operation, becoming another item to enable the operation with significant savings by adopting our model.

4. SANTANA PORT AUTHORITY INTERVIEW

The Port Authority of Porto de *Santana* received one of the members of our Group, Mr. Anderson Costa who presented the feasibility of our project and asked the following questions which we have included below with the answers obtained:

On October 26, 2022, in Santana City, AP, we had an interview with Mr. Edilson Barros, Director of Operations for the Port of Santana, to present our Scientific Project for such mentioned port, so as to obtain some information regarding this idea, how the port see this possibility to have transshipment at Santana Anchorage, what kind of tariff will be applied whether we bring a vessel for transshipment, whether port community would support it, how Santana Population would appreciate it, ETC...

First of all, Mr. Barros has told us that we are preparing an excellent scientific project and he believes that it will be implemented after approval by Professor, as this project will increase all services handled at Santana Port, having more jobs for the population, opportunities for training the next generation, less carbon emission, more cargoes to be loaded using this new system, possibility to discharge fertilizer and wheat using same system in the near future, and why not think on having a feeder service for containers using Port Structure already ready for it, with good stock area for containers.

He also said that he can see this project approved by Harbour Master and by Environmental Department, as there is no impact for the local environment.

Furthermore, regarding port tariff to be applied, he said that only Tariff I for solid cargo in bulk will be applied for such operation at anchorage, as the cargo will not use Port Access, warehouse, and their infrastructure. So, it will help us to minimize all costs, providing a good revenue for all players involved.

To conclude he told us that Port of *Santana* would like to know when this scientific project will be ready, as he would like to invite us to present it to the President of Port of *Santana* and other Authorities from *Macapa*, AP.

5. PROJECT DEFINITION

Our proposal is to reduce costs on the grain export from “Arco Norte” creating a new route for barges convoys, using *Santana* Port, Amazon River, Brazil, as one of the main ports for such logistic. The surplus to invest on the convoys should be generated by the allocation of the savings from using *Santana*, which has cheaper port expenses and a much smaller transit time, allowing the chartering desks to save important funds and directing them to the Origination area of the business.

6. PROBLEM IDENTIFICATION

The *Santana* Port region and the access to it by the Amazon River, from *Porto Velho* up to *Santana* route is inhospitable, jungle region, illegal mining area, riverside population containing several problems and challenges that an undeveloped region can contain.

In Brazil we have navigable rivers and not river routes (waterways) in the same way that we have in Europe and the United States, so in that region we have lacks several items and infrastructure in order to compare with other regions of the World.

In this line we have several problems and challenges to be solved such as:

- a) To test the ideal barge convoy transportation for grain from *Itacoatiara* to *Santana*;
- b) Identify the ideal anchorage area for mooring the convoy with 50,000 tons of grain to be loaded in the vessel;
- c) Will use *Macapa* Bay to anchor the vessel to wait cargo readiness, so as to bring the vessel to the *Santana* Port/Anchorage Area for loading operation.
- d) Carry out the transshipment operation (barge to ship) as faster as possible, to avoid Demurrage Payment.
- e) To have and maintain a trained team to carry out the operation, remembering that it is difficult to hire labor in the region.
- f) Adopt a Private Security to avoid Piracy in the region. Nowadays we have a lot of troubles close to *Santana* Port, as well as actions of miners who are always interested in barges and pushers.

7. BUSINESS PLAN

We have the following costs below showing the first reason to load grain at *Santana* Port, instead of loading at *Itacoatiara* Terminal: Table 1 – Operational Costs between ports of *Santana* and *Itacoatiara*

SANTANA PORT, ITACOATIARA PORT AND SANTAREM PORT COST COMPARISSION			
Service Items	Santana (USD)	Itacoatiara (USD)	Santarem (USD)
Pilotage In & Out	56.530	247.503	183.853
Towage In & Out	-	13.000	44.000
Mooring Lines Service	1.745	1.500	1.660
Launch Hire	600	600	2.645
Port Utilization Tax	14.623	-	42.826
Wharfage Dues	3.054	-	4.157
Clearance Expenses	980	980	980
Light Dues	2.250	2.250	2.250
immigration Tax	207	207	207
Free Pratique Tax	207	207	207
PSP Tax	400	400	400
Shipping Union Tax	120	120	120
Car Hire	600	600	600
Communications	600	600	600
Sundries/Postages	300	300	300
Agency Fee Tariff	16.950	16.950	16.950
Municipal Tax	848	848	848
Bank Charges	50	50	50
IOF Tax	381	1.088	1.088
TOTAL PDA (USD)	100.445	287.203	303.741

Table 1 – Operational Costs between ports of Santana and Itacoatiara

So, as can be noticed, there is a significant reduction on the export costs of about USD 187,000.00 per vessel in the vessel's PDA (Port's Disbursement Account).

The second reason, highly so important nowadays, as well as think as a greener country, is that loading grain at *Santana* Port we will reduce the CO2 emission as we have a short distance to navigate at Amazon River, as follows:

Amazon Entrance to Santana: 06 km

Amazon Entrance to Itacoatiara: 1,130 km

Amazon Entrance to Santarem: 544 km



Figure 11 – Route to Itacoatiara



Figure 12 – Route towards Santarém

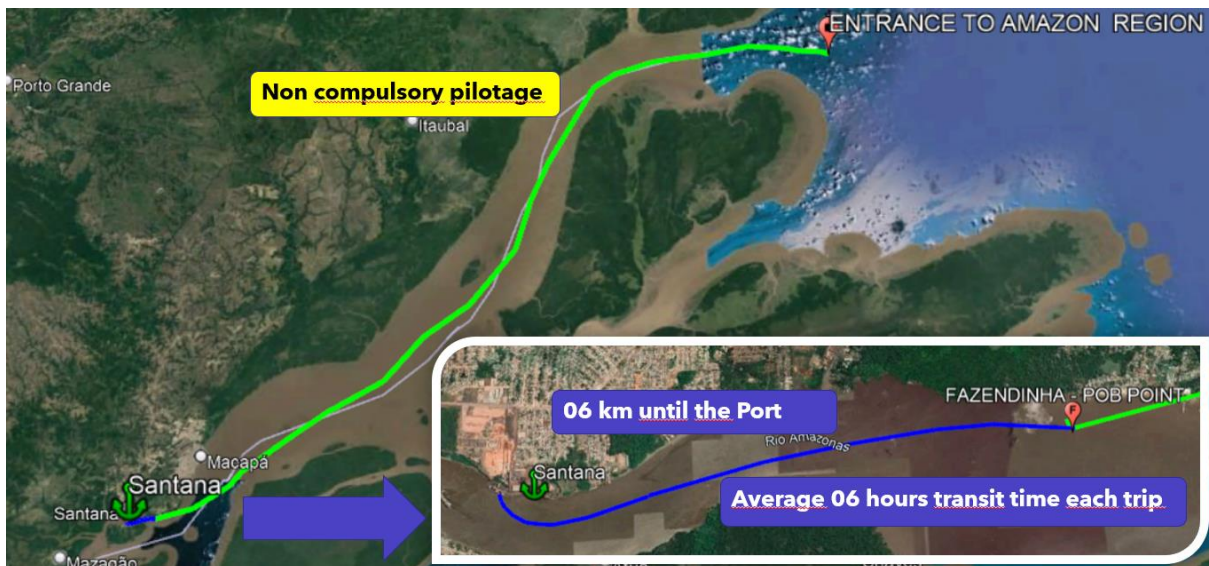


Figure 13 – Route towards Santana

Furthermore, we will have a reduction on the daily hire of the vessel in about 7 days. If we consider the actual daily hire of about USD 35,000.00, we are saying that we will reduce it in about USD 245,000.00 per vessel loaded at *Santana* Port.

So, the daily hire reduction plus the PDA-Port Disbursement Account reduction, we are talking about a reduction of over USD 400,000.00 per vessel's call in some cases.

8. BARGE TRANSPORTATION DEVELOPMENT

A new barge transportation route will be heavily invested to attend the new grain export demand via *Santana* Port.

According to the market search, the grain exportation of grain is increasing through “Arco Norte” every year. So, we believe that having a new barge route we will be very competitive, and it will be a profitable business in the near future.

9. SOCIAL DEVELOPMENT

This new business being developed for *Santana* Port will bring some important impact for the *Santana* city and to all population who lives close to this area.

We can see that all services belong to the Port will increase, resulting in more jobs for the population. New warehouses will have to be built as well, i.e., more investments and more investors.

Will be necessary a new education plan for all students, especially for the government schools, to prepare them for the future.

10. CONCLUSION

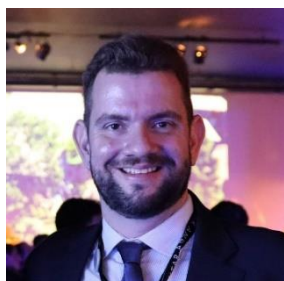
Our study has proven us that *Santana* holds a great potential if the grain players are willing to overcome the initial costs and difficulties to identify and develop the correct spot for a Barge to Ship operation project.

This is amplified if such companies are covering all steps of the CNF sales and have the open mind to shift the margins saved from the freight side to invest on the arrival of the convoys, reaching competitiveness in the price per MT for the final buyer, which should be the ultimate goal of the whole organization.

As the current uncertainties of the geopolitics can make the prices of the inputs vary dramatically and the Brazilian crops are constantly growing, another spot for this kind of operation, closer to the Amazon Entrance can mean the difference between the dispute among other grain supplying countries or a decisive factor to reduce demurrage costs.

11. REFERENCE

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