

**LOGISTIC CHALLENGES IN THE AMAZÔNIA LEGAL (LEGAL AMAZON):  
An Agro-Industry Case Study**

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**ABSTRACT**

*The study proposes to present the big logistic challenge of XYZ Agroindustry in the context of the Legal Amazon, which is historically the poorest region in the country regarding infrastructure, as its physiographic characteristics challenge the organizations. The research was carried out through a single case study. It was possible to identify that after improvements to the infrastructure, for example, the asphaltic paving of MT235 road, there was a substantial reduction in travel time, which considerably diminished load transportation maintenance costs, making it possible to adopt strategies to close “intermediary warehouse” activities at the Manaus-AM Industrial Center in 2009. These measures allowed XYZ to increase their agro-industry trade volume by 41% in 2011 over 2010, of 11% (2012/2011), and of 4% in (2013/2012), and managed to reduce logistics costs in relation to its gross revenue, and also compared to Brazilian companies average logistics costs. It was concluded that the strategic measures adopted regarding logistics activities took into consideration their characteristics and peculiarities contributing to keeping the company competitive.*

**Keywords:** *Logistic, Country Infrastructure, Organizations*

**1. INTRODUCTION**

Brazil lost in 2013 twenty important positions in the World Bank global logistics ranking. The position held by the country which was already bad (45<sup>th</sup> place) got even worse; Brazil is now in the 65<sup>th</sup> position, the lowest level since the beginning of the survey in 2007. Among the Latin America countries, Chile (42<sup>nd</sup>), Mexico (50<sup>th</sup>) and Argentina (60<sup>th</sup>) all hold better positions. Among BRICS countries (Brazil, Russia, India, China and South Africa) Brazil also holds the worst position (O ESTADO DE S. PAULO, 2014).

The goal of logistics, in a country of continental size as Brazil, is to generate the lowest cost possible to keep the sustainability of production activities, especially those of the agro-business sector, which is essential to the national economy development and characterized by products of large volume and low value added (SILVA; MENDES, 2008).

In regard to the Legal Amazon, there are several hurdles related to the supply of goods, including subsistence items, brought about mainly by the nonexistence of industries to supply local demand. Thus, the supply is done by suppliers from other regions in Brazil. Therefore, to reach the end user, the products' delivery undergoes delays and interruptions causing problems to the whole chain of supply. This logistics deficiency results in

costs up to 40% higher than in other parts of the country and in the need to keep large inventories as everything comes from outside (CARGO AND LOGISTIC NATIONAL TRANSPORTATION ASSOCIATION, 2014).

This work is the result of a qualitative, descriptive study, with a case study scope. Based on this approach, the purpose is to investigate how a sugarcane and alcohol agro-industry from the state of Mato Grosso modified its logistics to remain competitive in the agro-industry market, in their case the sugar sector, after closing their intermediary warehouse in the Manaus Industrial Center, where the sugar was stored and traded to meet the demand.

This context gives rise to the following problems: i) how logistics can play its role in the agro-business companies' value chain taking into consideration the existing deficiencies in the several modals which overly encumber their purpose? ii) How can these companies improve performance in comparison to other production chains and therefore develop a sustainable competitive advantage?

## 2. THEORETICAL FRAMEWORK

Historically speaking the Legal Amazon is the poorest region of the country regarding infrastructure for the flow of goods both consumed domestically and exported. Road conditions are precarious and although there are long stretches of potentially navigable rivers, only the waterway formed by the Madeira and Amazon rivers present navigational conditions (O ESTADO DE S. PAULO newspaper, 2013).

The physiographic characteristics of the legal Amazon challenge the possibilities of transportation once they align long travelling distances with deficiencies in the several transportation modals which over encumber this logistic activity (BRINGEL, *et al.*, 2010). It is important to highlight that road conditions can influence freight price. Poorly maintained roads can increase vehicles maintenance costs making transportation activity slower besides increase accidents probabilities (MARTINS; CAIXETA-FILHO, 2009).

Taking into consideration such distances, the cost of moving cargoes in the Legal Amazon reached approximately R\$17 billion in 2013. This amount could have been reduced in R\$1 billion if the waterways potential of the region had been optimized (CARGO AND LOGISTIC NATIONAL TRANSPORTATION ASSOCIATION, 2014).

The geographic location of a value added activity can affect its cost, in the same way that its location in relation to other value activities. Logistic costs almost always depend on the location. Location in relation to buyers affects external logistic costs (PORTER, 1989). The location of installations in relation to one another affects transshipment, stock, transportation and coordination; location also determines the means of transportation and the communication available to a company, which may also affect final costs. Therefore, location has some influence on the cost of almost any value activity but, it is not always included in the impact. There are usually opportunities to reduce costs through the relocation of value activities or the implementation of new location standards for the facilities in relation to one another.

In the State of Mato Grosso, for instance, there is a total of 6,440km of federal roads, 3,647.7 of them paved. State roads total 30 thousand km, only 5 thousand of them paved, half of them were built in the 70s, 80s, and 90s, and need repair (LACERDA, 2012).

These roads are susceptible to weather conditions which create potholes and muddy areas, damage fragile wooden bridges and directly affect the lives of the people, as well as compromise the flow of the agricultural production of the country's Center-West region (PIMPÃO, 2014).

In this scenario, the big logistic challenge is to provide a good level of services to the customers and to deliver the product they want with the quality, the conditions and at the time they expect at a reasonable cost (SIMON, 2011).

Thus, the need for new competitive strategies, seeking the integration of the transportation modals, targeting at the reduction of costs related to this stage in the productive chain (SILVA; MENEZES, 2008).

For such, Porter (1989) describes External Logistics as activities associated to the collection, storage and physical distribution of the products to buyers, such as storage of finished products, handling of materials, delivery vehicles operation, order processing and scheduling.

In order to reduce costs, studies show that such analyses usually concentrate in manufacturing costs, neglecting the impact other activities, such as logistics, services and infrastructure have on relative costs (PORTER, 1989).

According to the concepts already discussed regarding this matter, after defining the research methods, the advantages obtained by a certain agroindustry to remain competitive will be presented.

### 3. RESEARCH METHODS

This work is classified as a qualitative, descriptive research, developed from a case study (YIN, 2010). The company in the case was chosen by convenience sampling. The selection criterion was the geographic location, which meant greater proximity and easier contact between researchers and the company.

The research tools used for data collection involved documentary research and individual interviews, with a semi-structured approach (MALHOTRA, 2006).

Recordings, reports, spreadsheets, graphs and inventories were consulted for the documentary research besides other documents related to production follow up, billing, logistics costs and the volume of products traded by the company. Another way to collect data was the field research where individual narratives and interviews were gathered.

According to Yin (2010) the in depth individual interviews are based on a script. In the agroindustry, target of this study, the interviews were carried out between March and April, 2013, with an update done in February 2014. The company's logistics coordinator and the commercial supervisor were interviewed. The interviews were recorded and lasted approximately 45 minutes. After that, to make the analysis and interpretation process easier, the interviews were transcribed and checked against the audio version as a means to ensure precision, fidelity and interpretation of the data (FLICK, 2004; GIBBS, 2009).

For the validation of the data collected, a triangulation was used between interviews and documents provided by the company in order to gather the positive aspects of each approach to better understand the research problem (MARTINS, 2012).

In regard to confidentiality, and for strategic reasons, the names of the company and the respondents will not be disclosed. The company was referred to as Agribusiness XYZ.

#### 3.1 The Company under study

The present study was carried out at XYZ Agroindustry (sugar and ethanol industry), located in Campo Novo do Parecis, in the countryside of the State of Mato Grosso (400 km Northwest of Cuiaba), which has been for over 30 years producing sugar and ethanol (fuel alcohol). XYZ Agroindustry has a total cultivated area of 32 thousand hectares producing 65 thousand tons of unprocessed sugar and 174 million liters of ethanol per year. The company generates approximately 1,400 direct jobs in the harvest season, which goes from April to October, and 800 jobs during non-harvest periods – November to March. XYZ Agroindustry trades its products in five main markets: Cuiabá, the capital city of Mato Grosso, and in the state countryside, and in the cities of Rondônia/RO and Manaus/AM, and also in the state of Acre.

### 4. CASE STUDY

#### 4.1 Opening of the Subsidiary in Manaus Industrial Center/AM

In August 2002, XYZ Agroindustry started activities in Manaus Industrial Center to better cater to customers' needs. An intermediary warehouse was opened in that state for prompt delivery of the products.

According to Ballou (2010), to reach a reasonable degree of product availability it is necessary to maintain stock to work as a "buffer" between supply and demand. The extensive use of stock makes them responsible for approximately one to two thirds of the costs related to logistics, turning stock maintenance into a key logistics activity. However, high costs associated with maintenance of stored products correspond to 25% to 30% of the product value per year, requiring careful management. The administration of stocks involves keeping levels as low as possible, but at the same time meeting customers' demands accordingly.

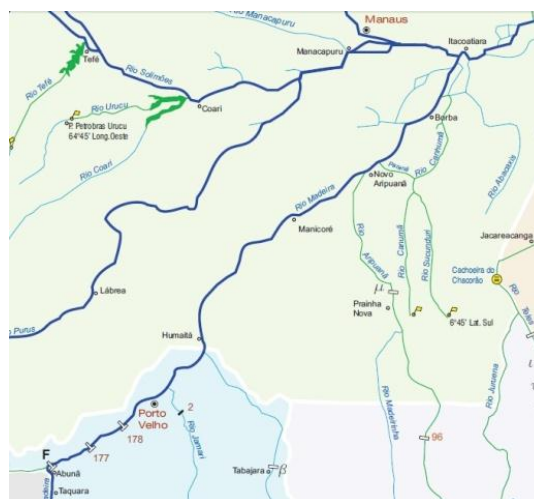
The great challenge faced by XYZ Agroindustry was to be able to meet demand throughout the 12 months of the year. The company had to, through logistics, develop strategic competitive actions to keep products anticipation stock in the intermediary warehouse and forecast the volume to face weather conditions and plan to meet the susceptible peculiar weather conditions of the Midwest and Northern Brazil every year. That is because for approximately four months, with the intensification of rain in this period, the access from Campo Novo do

Parecis/MT to Road BR-364, the main flow road for the agribusiness products in the Midwest and Northern Brazil areas, is done via MT-235 Road, whose 60.8 km long become impassable at this time increasing transportation time and costs considerably. Picture 1 illustrates the poor traffic conditions.



PICTURE 1 - MT-110 and MT-100 terrible traffic conditions. Source: Associação dos Produtores de Soja e Milho do Estado de Mato Grosso (2014).

The alternative to flow agroindustry products in that region is to transport them up to Porto Velho, the capital of the State of Rondônia, where there is a river port used for loading, unloading and transportation of products through the Madeira River Waterway, a tributary on the right side of the Amazon River. The Madeira River is key to the agricultural products flow from the states of Rondônia and the West of Mato Grosso, thus representing the lowest logistics costs, being the most competitive alternative compared to external and internal markets (Brazilian Northern and Northeast Region) and contributing to the development of the Amazon region due to its strategic position. Picture 2 presents an overview of the Madeira River Waterway.



PICTURE 2 – A map with an overview of the Madeira River Waterway. Source: Departamento Nacional de Infraestrutura de Transportes, s.d.

It is also worth mentioning that river transportation has some peculiarities due to the 03 months of drought (low waters), when the level of the river lowers forming sand banks and making it impossible to navigate with large barges as shown in Picture 3. This way, the alternative is to use smaller barges, which lead to longer transportation time, 7 to 25 days on average, besides reducing load capacity per barge, increasing logistics process costs.

The waterway service has limited reach for several reasons. The domestic waterways are confined to the inland waterway system demanding, therefore, that the user be located on the margins or use another transportation modal (BALLOU, 2010).



PICTURE 3 – The drought in the rivers in the Amazon region leaves the local population with a shortage of food, potable water, fuels and schools for the children. Source: SOS Rios do Brasil (2010).

The aspects reported were the motivating factors that took XYZ Agroindustry to install a subsidiary (intermediary warehouse) in Manaus Industrial Center to meet the demands of the customers located in the country's Northern region.

#### 4.2 Change in Strategy for the Market in Manaus/AM

Considering the impacts of the 2008 global economic crisis (SATO, 2009) the directors of XYZ Agroindustry requested to their commercial and logistics department an economic feasibility study regarding the intermediary warehouse installed in Manaus Industrial Center targeting mostly at reducing logistics costs.

After data gathering, analysis and results of this study, in 2009 the intermediary warehouse in Manaus was closed, and the activities were centralized in the plant located in Campo Novo do Parecis/MT. This centralization was motivated by the conclusion of Road MT 235 paving. Another action was to use the Pareto Principle (SLACK; CHAMBERS; JOHNSTON, 2009) to segment the customers who would be catered for by XYZ Agroindustry but instead turned from small retailers to wholesalers and distributors. In this scenario, customers started to buy higher volumes which turned into complete loads, reducing the costs and making the receiving of the products in the Porto Velho River Port viable and, from this point on, the transportation of the products up to the final destination became the buyers' responsibility.

#### 4.3 Strategies adopted by XYZ Agroindustry

To consolidate the strategic change, XYZ Agroindustry implemented the following strategies:

- Change in road freight contracts: XYZ Agroindustry used outsourced trucks to transport sugar and the contracts were signed with fixed values, regardless of the distance covered monthly. It was observed that a considerable length of time was wasted by idling trucks, which remained available for possible cargoes to be transported, a situation called truck on the shell. This model was replaced by charging per ton/km transported, considerably improving the performance of transportation and the optimization of the fleet.
- Delivery time reduction: products started to be delivered in Porto Velho, in less than 24 hours after the order was confirmed in the commercial department of the company.
- Allocation of bales in big bags: the bales are placed in bag containers making storage and handling easier, providing a better use of the transportation equipment.
- Maximizing the physical space: R\$70,000.00 were invested in the purchasing of a forklift, which made it possible to increase lifting capacity and product storage, and the replacement of the pallets. Before of the use of big bags, the accommodation of the products was limited to three floors of storage, which added another level, representing a 1/3 increase in storage room, improving its volumetric occupation.
- Stock cost reduction: with the closing of the intermediate warehouse in Manaus/AM and the concentration of this activity transferred to the plant in the state of Mato Grosso, the products that were kept in the intermediary warehouse until they were traded, were forwarded to their destinations in several consumer market, delivering in a shorter period of time, making the company more competitive and flexible to the needs of the customers, eliminating stock maintenance cost.
- Reduction in response time to the customer: the customers' orders in Manaus region began to be placed directly to the commercial office located at XYZ Agroindustry, reducing the response time to the customers and improving feedback between the production sector and logistics, making a customized service available with an exclusive commercial representative to cater to the customers in the Northern region of the country.

## 5. ANALYSIS AND DISCUSSIONS

In line with the strategic changes implemented, XYZ Agroindustry redefined its cash flow structure with customers paying for purchases before the delivery of the products. This way, authorization for transportation started to occur after payment confirmation. Thus, XYZ Agroindustry had a significant gain in liquidity, eliminating prepaid freight. According to the logistics manager, the costs for the transportation of sugar had a reduction of around 50% as they are now taken only as far as Porto Velho. The implementation of the new logistic modal (waterway) resulted in a reduction of 65% in logistics costs compared to the previous modal (road) as it eliminated expenditures with the building rent, handling and storage equipment, administration, stock related costs, intermediary warehouse management system, manpower, waterway transportation up to Manaus Port, loss or damage, thefts, insurance, port charges, loading and unloading, delivery time and geographic issues.

It is noteworthy that, when it comes to competitive strategies, cost reduction becomes contradictory:

Companies in general try to reduce costs in contradictory ways. They seek to gain market share to benefit from economy of scale while, at the same time, eliminating economy of scale through a proliferation of models, locating their facilities close to the buyers to save on freight costs. (PORTER, 1989, p. 107)

XYZ Agroindustry managed to pass onto customers a reduction of 15% to 20% in sugar price and the customers, in turn, take on the responsibility to pay for the waterway freight, and XYZ Agroindustry is to deliver the cargo in Porto Velho. The advantage for the buyers (wholesalers and distributors) to pay for the freight lies in the reduction of the global costs of their business, as they are able to dilute the costs with other products they resell. The manufactures, most of them located in the Southern and Southeast region in Brazil also deliver their products in Porto Velho, making it possible to transport the goods up to Manaus.

## 6. FINAL CONSIDERATIONS

In the current economic scenario, a factor of major importance for companies not only to survive, but also to develop competitive advantage is how to use their knowledge to contribute to competitive corporate success between chains of business competitors. The geographic location is a way of optimizing activities and maintaining relationships with customers and suppliers. Better access to suppliers and customers generates significant cost advantages.

This study identified that XYZ Agroindustry adopted significant strategic alternatives that enabled a new competitive perspective, stemming from the changes in road freights, reduction in delivery time, allocation of bales in big bags, maximization of space, stock cost reduction and a decrease in response time to customer. These strategies were adopted in face of the decision to end the activities carried out in the intermediary warehouse in Manaus. Even with the end of the activities in the intermediary warehouse, XYZ Agroindustry remained competitive in Manaus market, without jeopardizing revenues, even with the competitors' warehouses. The company also presented growth in the bale volume traded from 42% (2010/11); 11% (2011/12) and 4% (2012/13) respectively, accumulating 1,562,139 bales in sugar trade, using 30 kg bales, favoring a better integration with their customers.

In the last four years, between 2010 and 2013, the percentage of logistics costs in relation to revenue remained below 13.14% and below the average result of logistics costs in Brazilian companies (FUNDAÇÃO DOM CABRAL, 2012).

As for the roads, the paving of Road MT 235 is an example of how important it is to have roads in good conditions, thus reducing travel time and maintenance of cargo transportation considerably. These factors confirm the results of the survey by Fundação Dom Cabral (2012) making it clear that the factors that tend to increase logistics costs in Brazil are mostly "bad road conditions". In the state of Mato Grosso only 16.7% of the state roads are paved (LACERDA, 2012).

From this analysis it can be concluded that the internal strategies adopted by XYZ Agroindustry took into consideration its characteristics and peculiarities. The results of this study allowed other issues regarding the research that support the findings of Amboni; Silva; Andrade (2012), who state that investing in logistics is vital for competitive strategy with focus on differentiation, as well as financial controls and commercial contracts signed with suppliers, leading the company to align costs and benefits. In other words, the solutions and responses to problems depend on specific characteristics of each business and the strategy adopted to maintain return and profitability above competitors' and above sector average. In the case of XYZ Agroindustry, the reduction in logistics costs stands out as a major factor, making it possible to increase its profitability. On the other hand, XYZ Agroindustry is considered to have two competitive performances: cost and delivery as competitive priorities of major importance.

It is expected that the results presented may have a management application as a business redirection alternative for similar companies and for other economic sectors.

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