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DAMIEN BINOIS

THE OBSTACLES TO AÇAÍ EXPORTATION IN BRAZIL

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Dissertation presented at the Escola de Administração de Empresas de São Paulo of the Fundação Getúlio Vargas as a requirement for the Mestrado Profissionalizante de Gestão Internacional

Field: International Business

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List of figures

Figure 1 : Brazilian market by state consumption (tons, 2001-2002).....	14
Figure 2 :Value of açai pulp exportations from the state of Pará, 2002-2010	15
Figure 3 : Dependence of pulp industries of the North of Pará and the Belém region to different markets in 2002 and 2010	16
Figure 4 : Production of palm heart and açai fruit from açai trees in Brazil from 1973 to 1995	18
Figure 5 : Evolution of tropical fruit areas planted with FNO financing in rural regions of the North East of the State of Pará (ha)	19
Figure 6 : Production of açai by municipality in 2009 (13 main producers)	23
Figure 7 : Theaçai productive chain	23
Figure 8 :Sambazon supply chain organized by the NGO FASE	26
Figure 9 :Açai fruit supply chain in the municipality of Abaetetuba.....	27
Figure 10 :Açai fruit supply chain in the municipality ofBarcarena	28
Figure 11 :Açai fruit supply chain in the municipality ofCametá	28
Figure 12 :Açai fruit supply chain in the municipality ofIgarapé-Miri.....	29
Figure 13 : Process of açai transformation to make frozen pulp	32
Figure 21. New Zealand Kiwifruit exports (thousands of \$NZ)	34
Figure 14 :Percentage distribution of fruit production of an açai tree during a year in the Belém region, State of Pará.....	43
Figure 15 : Evolution of the number of pulp companies in the North of Pará and Belém region	45
Figure 16 : Growth margin of pulp companies in the North of Pará and Belém region in 2002 and 2010.....	46
Figure 17 : Main difficulties faced by pulp companies in finding financing.....	48
Figure 18.Evolution of real prices in Belém wholesale market.Jan 2000-aug 2011.Values in R\$ of august 2011, corrected by IGP-DI (FGV, 2011).	62
Figure 19 :Average yearly price of 1kg of pulp at exportation (US\$/kg)	62
Figure 20: Seasonal price index in the wholesale market of Belém (R\$ per 28kg of fruits), 2011.....	63
Figure 22 : Interview outline for industries.....	87
Figure 23 : Interview outline for importers.....	89

List of tables

Table 1. Evolution of planted area, production, output and price, 1996-2009.....	20
Table 2 :Açaí production by state, 2003-2008	22
Table 3 : Price (R\$) difference between the average price paid by an intermediary for a 14kg basket of açaí and the price of a 13.5kg basket through organic açaí commercialization.....	27
Table 4 : Interviews conducted	37
Table 5 : Origin of açaí extractive production in the state of Pará	44
Table 6 : Transportation steps from açaí production fields to importer's factory	52
Table 7 : Cases of Chagas disease notificated to the Health department in 2007	55
Table 8 : Summary of actions to be conducted in order to facilitate açaí exportation	80

List of abbreviations

ANVISA	Agencia Nacional de Vigilância Sanitária
APEX	
Brasil	Agencia Brasileira de Promoção de importações e exportações
AVABEL	Associação dos Vendedores Artesanais de Açaí de Belém
BASA	Banco da Amazônia
CAMTA	Cooperativa Agrícola de Tomé-Açu
CIF	Cost, Insurance and Freight
CIN	Centro Internacional do Negocio
COFRUTA	Cooperativa de Fruticultores de Abaetetuba
CONAB	Companhia Nacional de Abastecimento
COOPAMA	Cooperativa Agrícola Mista Amazônica Ltda
COOPFRUT	Cooperativa Agroindustrial de Trabalhadores e Produtores Rurais de Igarapé-Miri
EU	<i>European Union</i>
FAO	Food and Agriculture Organization
FASE	Federação de Órgãos Pará Assistência Social e Educacional
FNO	Fundo Constitucional de Financiamento do Norte
FOB	Free On Board
GOCA	Guaranteed Organic Certification Agency
HACCP	Hazard Analysis and Critical Control Points
HS	Harmonized System
IBGE	Instituto Brasileiro de Geografia e Estatísticas
IBRAF	Instituto Brasileiro de Frutas
ICM	Imposto sobre a Circulação de Mercadorias
INCRA	Instituto Nacional de Colonização e Reforma Agraria
Inmetro	Instituto Nacional de Metrologia, Qualidade e Tecnologia
IPI	Imposto sobre Produtos Industrializados
MAPA	Ministério da Agricultura Pecuária e Abastecimento
MDIC	Ministério do Desenvolvimento, Indústria e Comércio Exterior
NCM	Nomenclatura Comum do Mercosul
PAS	Plano Amazônia Sustentável
PAVUC	Producing Added Value from Under-utilized tropical fruit Crops with high commercial potential
PIEBT	Programa de Incubação de Empresas de Base Tecnológica
PRODEX	Apoio ao Desenvolvimento do Extrativismo
SAGRI	Secretaria de Estado de Agricultura
SEBRAE	Agência de Apoio ao Empreendedor e Pequeno Empresário
SECTI	Secretaria de estado de desenvolvimento, ciência e tecnologia do Para
SEPOF	Secretaria de Estado de Planejamento, Orçamento e finanças do Pará
UFPA	Universidade Federal do Pará
UFRA	Universidade Federal Rural da Amazônia

Table of Contents

List of figures	5
List of tables	6
List of abbreviations	7
Abstract	9
Resumo.....	10
Introduction.....	11
Chapter 1: Açaí pulp market and productive chain, a literature review.....	13
I. Açaí demand.....	13
II. Açaí production	17
Historical background.....	17
Production geography.....	21
The productive chain.....	23
III. Learning from New Zealand kiwifruit industry.....	33
Chapter 2: Methodology	37
I. Procedure	37
II. Data analysis.....	40
Chapter 3: The obstacles to açaí exportation	42
I. Product availability obstacles to açaí exportation	42
II. Logistics obstacles to açaí exportation.....	50
III. Quality obstacles to açaí exportation.....	54
IV. Price obstacles to açaí exportation	61
V. Regulation obstacles to açaí exportation.....	64
Chapter 4: Recommendations for public and corporate action.....	71
VI. Public action	71
VII. Corporate action	77
Conclusion and limitations	81
References.....	84
Annexes	87

Abstract

This dissertation aimed at understanding hurdles that açai exportation faces on the supply side and giving recommendations to public authorities and pulp companies on how to overcome them. With a qualitative analysis based on interviews of the production and supply chain stakeholders, the study explained those problems through a framework of five main variables: Product offer, price, logistics, regulations and quality.

Açai, fruit of *Euterpe Oleracea*, has been at the core of local populations traditional diet in the Amazon estuary for centuries. Because of its nutritive properties it became famous in Brazil in the 2000's and demand boomed. Exportations started to be significant in the mid-2000's and have increased at a quick pace after. However the productive chain of açai is complex and raises many issues that hinder exportation.

Since offer has not managed to keep pace with demand boom prices have soared. This is explained by the fact that production is hard to increase, highly seasonal and the supply chain counts many intermediaries. Moreover, açai pulp availability is instable because pulp companies struggle to face seasonality problems, lack financing for investment and working capital need and tend to be poorly managed. Logistic is challenging because açai fruit is highly perishable and produced in remote regions. It therefore has to be processed quickly and transported frozen. Quality is a strong problem too: there is no clear control on product safety and concentration. Finally, açai is lacking a specific nomenclature for exportation and faces strong non-tariff barriers in importing countries.

To overcome those problems, public authorities should improve infrastructures in producing areas, intensify public research to develop performing plantations, increase productivity and develop new ways to conserve and transport açai products. The financing system should be improved, the quality legal framework must be stronger and a nomenclature should be defined for açai. Pulp industries should try to avoid intermediaries, to diversify their pulp production to fruits other than açai, invest in storage capacity, cooperate more with each other and be more market oriented.

Key words: açai - productive chain – exportation - pulp industry

Resumo

Esta dissertação teve como objetivo compreender os obstáculos que enfrenta a exportação de açaí do lado da oferta e dar recomendações às autoridades públicas e empresas de polpa sobre como superá-los. Com uma análise qualitativa baseada em entrevistas com as partes da cadeia de suprimentos, o estudo explica esses problemas através de um quadro de cinco variáveis principais: oferta de produto, preço, logística, legislação e qualidade.

Açaí, fruto da *Euterpe Oleracea*, tem estado no centro da dieta tradicional das populações do estuário do Amazonas durante séculos. Devido às suas propriedades nutritivas, tornou-se famoso no Brasil nos anos 2000 e a demanda cresceu. Exportações começaram a ser significativas um pouco mais tarde e aumentaram rapidamente depois. No entanto, a cadeia produtiva do açaí é complexa e levanta muitas questões que dificultam a exportação.

A oferta não conseguiu acompanhar o ritmo da demanda e os preços dispararam. Isto porque a produção é difícil de aumentar, altamente sazonal e a cadeia de fornecimento conta muitos intermediários. Além disso, a disponibilidade de açaí é instável porque as empresas de polpa lutam para enfrentar problemas de sazonalidade, falta de financiamento e tendem a ser mal geridas. Logística é um desafio porque o açaí é altamente perecível e produzido em regiões remotas. Por isso deve ser processado rapidamente e transportado congelado. A qualidade é um problema muito forte: não há controle claro sobre a segurança e a concentração do produto. Finalmente, está faltando uma nomenclatura específica para a exportação do açaí que enfrenta fortes barreiras não-tarifárias nos países importadores.

Para superar esses problemas, as autoridades públicas devem melhorar as infraestruturas em áreas de produção, intensificar a investigação pública para desenvolver plantações e aumentar a produtividade. O sistema de financiamento deve ser mais adaptado e acessível, o quadro jurídico de qualidade deve ser mais forte e uma nomenclatura deve ser definida para o açaí. Indústrias de polpa devem tentar evitar intermediários, diversificar a produção de polpa para outras frutas, investir na capacidade de armazenamento, cooperar mais entre elas e ter uma melhor visão de mercado.

Palavras-chave: açaí - cadeia produtiva - exportação - indústria de polpa

Introduction

Açaí, fruit of *Euterpe Oleracea*, has been a key ingredient for local populations in the Amazon estuary, especially in the state of Pará, for centuries. Since the beginning of the 2000's, its consumption has spread to the rest of Brazil, especially on the coasts of the states of Rio de Janeiro and São Paulo. Its coverage in the media and appearance in popular television series contributed to its fame, especially among people practicing sport and health conscience populations. In the middle of the years 2000, American surfers discovered the fruit in the North-East of Brazil and launched some açaí-based products in the USA, mostly in California. Açaí exportation started in 2002 and represented US\$2.12 million in 2003. Exportations then grew by 20% a year between 2003 and 2006 (Homma et al, 2006) and in 2005 they were worth US\$5.49 million. But they still only accounted for less than 2% of the overall demand (Santana, Carvalho, and Mendes, 2010). Açaí exportation thus remains very low and centered on the United States (US). This can be explained by customer non-awareness of the fruit and other demand related factors, but also by açaí supply hardships. The stakes are high because understanding the obstacles to açaí exportation will help overcome them and give açaí fruit a long-term space in international markets. Indeed, this fruit, with its exotic taste, purple color and strong health claims can pretend to enter into consumer food habits all over the world. A scenario similar to the one kiwi fruit experienced, passing from the status of unknown New Zealand fruit to world-known fruit, can be imagined. This scenario could help developing the North of Brazil, especially the state of Pará where 92% of the production is made. Açaí industry is indeed a key production of the North of Brazil, which is one of the poorest parts of the country. It is the main fruit in the fruit industry of the state of Pará: In Belém only, it employs 25,000 persons, directly or indirectly and represents 70% of the income of local populations along the Amazon river and confluents (Souza, and Bahia, 2010). A higher açaí production would help bringing new income to local populations and thus increase their level of life. Maintaining and developing this traditional product would stimulate valorization of local culture. A higher demand and production would boost local market and create jobs (direct and indirect). This could help improve sustainable exploitation of the forest and foster investment in research (Limal, Maia, and Silva, 2007). Exportation could bring new investors, from both Brazil and abroad that would bring funds and knowledge that could help local producers. But this growth would

have to be well managed because some already compare açai to latex, a product that was born in the same region. But production failed to go beyond extraction and the region faced competition from new producing regions that led it to its fall.

The goal of this study is to help giving açai fruit this international status and avoid mistakes that were done in the past with latex production. By understanding the whole productive chain in Brazil, the study aims at uncovering all the obstacles to açai exportation on the supply side. This study does not aim at studying açai exportation obstacles on the market side, ie all demand related factors that would explain low exportations. The study will be limited to Brazil and will not take into account production from other countries that is not significant.

Today, most of açai-related literature focuses on studying açai productive chain, especially on the fruit production side, with a strong interest in agriculture, ecosystems and social issues. There is little study on distribution and even less on exportation of açai. This issue is indeed relatively new as açai is still widely unknown in most parts of the world.

The research question will thus be: How can açai exportation be facilitated in Brazil?

The hypothesis is that strong açai supply hurdles exist for potential açai exporter, that are related to price, product offer, logistics, quality and exportation regulations. Public authorities can help tackle those problems by incentivizing production to loosen price tension, building infrastructures, implementing strong quality regulations and facilitating açai foreign trade.

After explaining the methodology used for this research, the first chapter will explain the current situation of açai market. It will describe demand patterns and especially the birth of an international demand. Then it will explain the production structure: its geographical and historical aspects and the productive chain, from fruit production to exportation. The second chapter will identify and explain the obstacles to açai exportation, following the frame of five variables defined in the methodology. Finally, the third chapter will propose actions to be implemented by public authorities and private companies to overcome those obstacles.

Chapter 1: Açaí pulp market and productive chain, a literature review

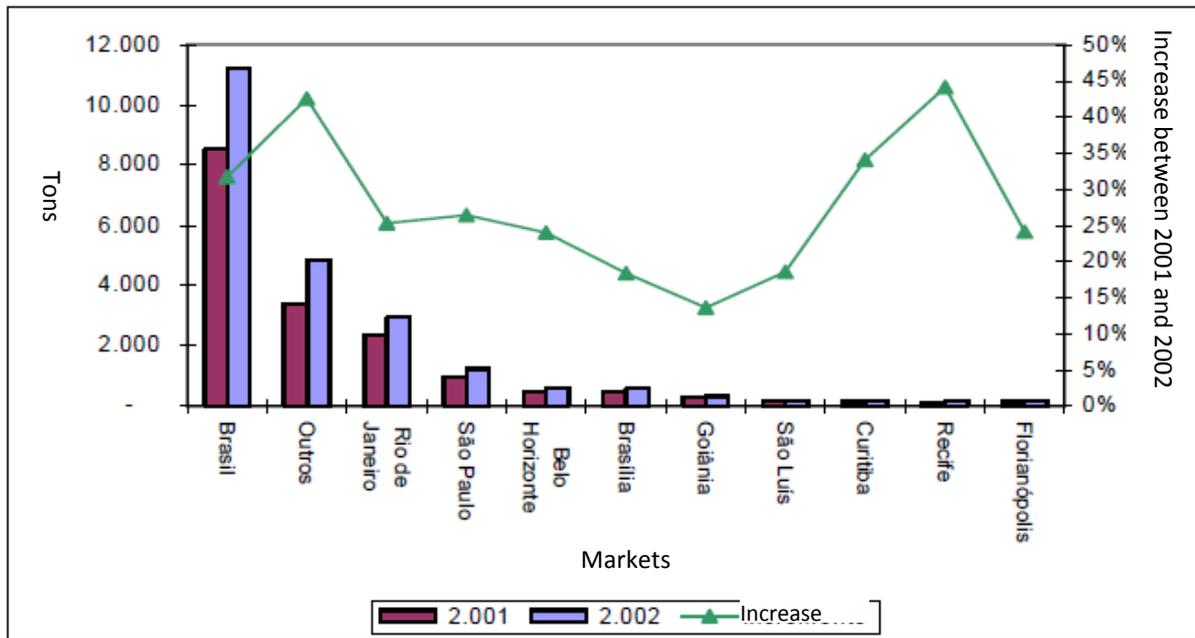
I. Açaí demand

a) Brazilian demand

Costa, Andrade and Silva (2004) explained that because of its natural abundance and nutritional qualities, açaí has been anchored in regional traditional food habits of the Amazon estuary since pre-colombian times. Along with fish and manioc flour, it got incorporated in the traditional basic diet of big parts of the population. In 2004, 80% of Paráaçaí production was made in the Amazon estuary. This is why Belém has always been açaí's main market and until the 1990's, the only one. At that time, açaí used to be a product for low-income populations. Santana et al (2010) indeed showed that until 1995, açaí had a negative income elasticity, which means that the richer the consumers the smaller the consumption.

The apparition of a national market in Brazil started to be perceptible in the 1990's but really started to soar in the beginning of the years 2000. At that time, the fruit started to get famous for its healthy and energetic properties and to be widely used in sport clubs. Santana and Gomes (2003) estimate that the national market went from 8,527 tons in 2001 to 11,231 tons in 2002, which is a 32% increase. The main markets outside of the state of Pará in 2002 were Rio de Janeiro with 2,945 tons, São Paulo with 1,220tons and Belo Horizonte with 595tons(Santana, A.C. de, Gomes, S.C., 2003).

Figure 1 : Brazilian market by state consumption (tons, 2001-2002)



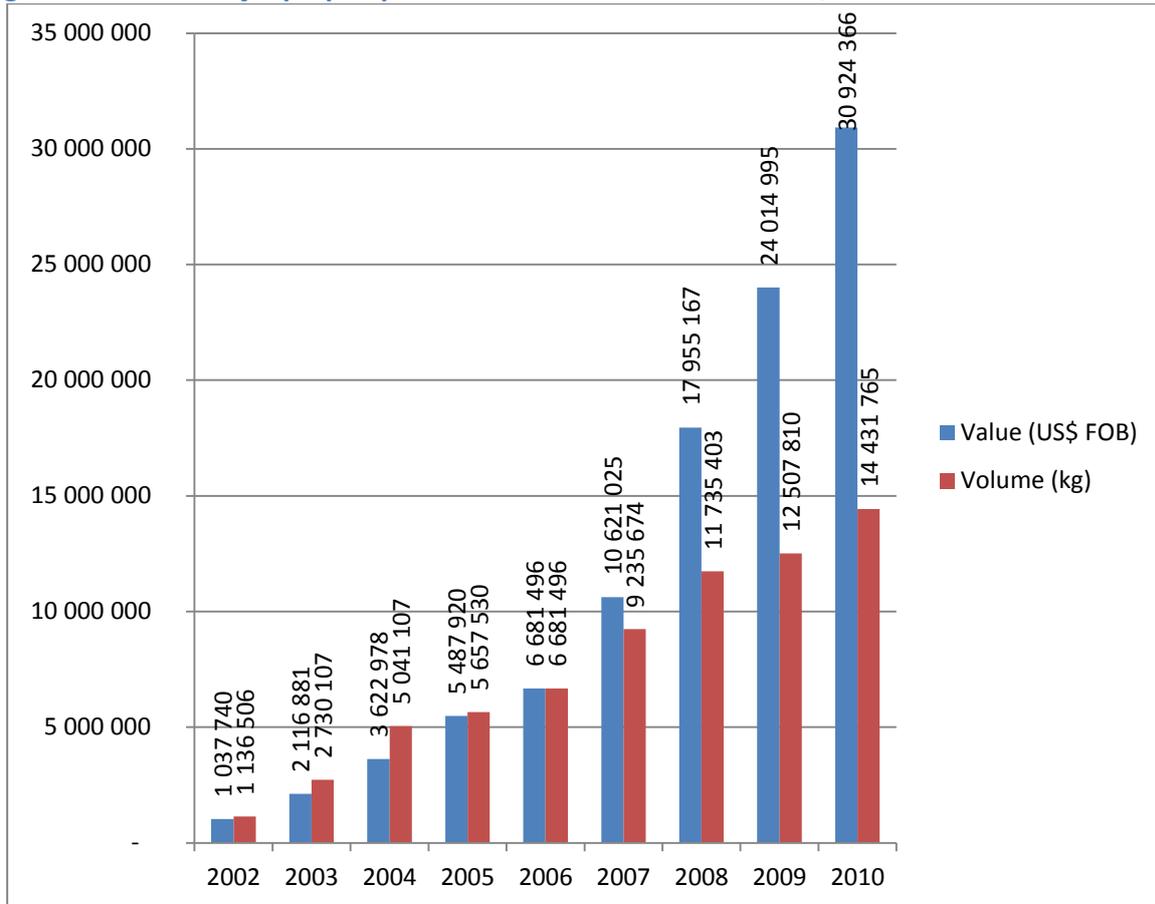
Source: Santana (2004)

Moreover, Nogueira, Santana and Garcia (2011) estimated income elasticity to be 2.359 in 2011, which means that açai can now be considered a luxury good: The richer the consumer the higher the consumption. The same study estimated demand price elasticity at -0.779, which means that açai is not very elastic to price: if prices increase by 10%, demand will decrease by 7.79%. This shows that most of açai production is still in its traditional consumption basin of the Amazon estuary, and that in this region açais deeply anchored in consumptions habits. The crossed elasticity of açai with other fruits was estimated at 0.314, which shows a relation of substitutability with other fruits. If other fruits prices increase by 10%, açai demand will increase by 3.14% (Nogueira et al, 2011).

b) Açai exportation

Açai exportation started in 2000 when the companies Polpa de Frutas da Amazônia and Muaná Alimentos started to export 32 tons to the US (Ferreira, 2000). Since that time, it has constantly increased until 2010, passing from 1,136 tons in 2002 to 14,431 tons in 2010 (Sindfruta).

Figure 2 :Value of açai pulp exportations from the state of Pará, 2002-2010



Source: Sindfrutas

International demand started in the United States (US), after some American surfers discovered it in Brazilian North-East and decided to export it to the US. After that it became famous as a super fruit, marketed for its nutritional properties (anti-oxidants, fibers, good fats, etc) and spread to other regions of the world such as Australia, Europe and Japan. The market of juices whose main ingredient is açai was estimated to US\$106 million in 2009.

Integration of industrial companies with international distributors has barely started because those markets are still unknown but penetrating the international market is now a priority for main pulp industry companies. Most of them still do not have technology to produce products that satisfy international quality standards and other market requirements (Santana A. , 2007) so only the main ones are on this market.

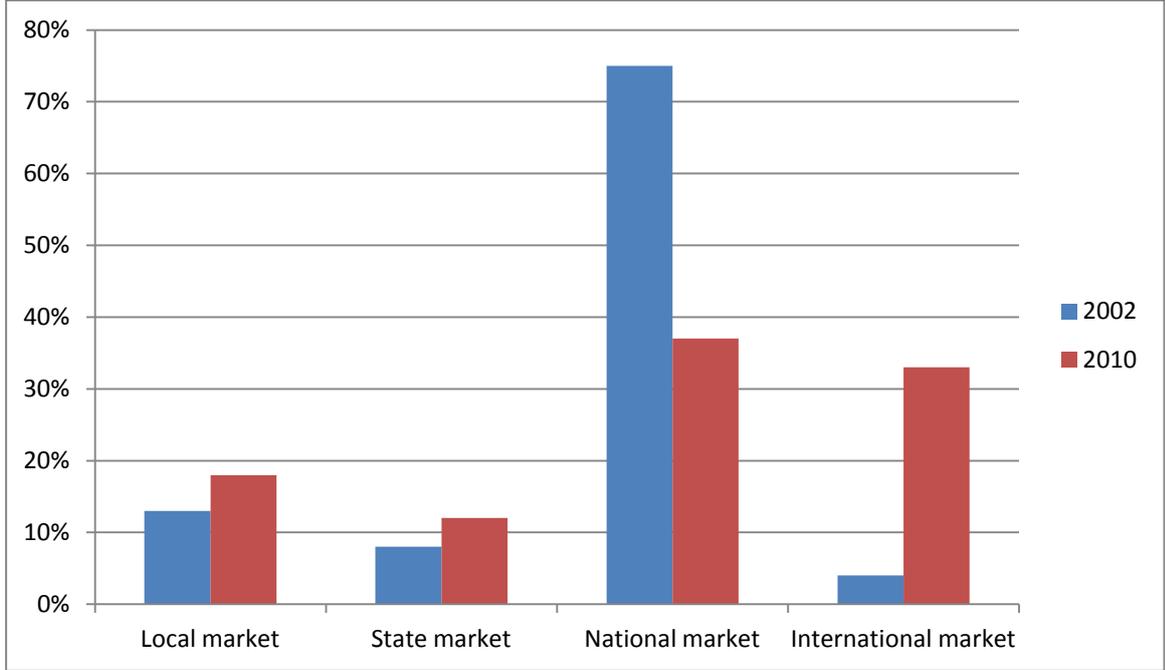
Açai is leading fruit production in the state of Pará. In 2005, açai exportation represented 52,1% of all fruit pulp exportations from this state (Santana, Santana, and Nogueira, 2007).

This is explained by the fact that the state of Pará is the center of this fruit production.

The whole demand for açáifruit was estimated to 300.000 tons in 2006 and expected to stabilize at 500,000 tons a year for the next 10 years. From those, 60,000 were estimated to go for exportation (Santana et al, 2010).

But since most of açáí fruit production is still consumed locally without being transformed by industries, figures on industrialized açáí (frozen pulp) are even more significant. Out of the 10,087 tons of industrialized açáí declared to the Agriculture Federal Superintendence (SFA) in 2007 in Pará, 29% were exported, 69% was sent to the national market, and 2% consumed locally (Santana et al, 2010). In the state of Amapá, 98.5% of the 2,200 tons produced in a year were exported. According to Costa et al (2011), the dependence to international market of the pulp industry of the state of Pará went from 4% in 2002 to 33% in 2011.

Figure 3 : Dependence of pulp industries of the North of Pará and the Belém region to different markets in 2002 and 2010



Source: Costa et al, 2011

However international market is still not stable compared to Brazilian national market. In those countries, açáí products are considered as extra products and are thus among the first to be taken of the cart when spendings have to be cut. This was witnessed since 2010 when açáí exportations dropped because of the international economic crisis. Açáí exportations for example dropped by 47% during the 4 first months of 2012 compared to the same period in 2011 (MDIC, 2012).

II. Açaí production

Historical background

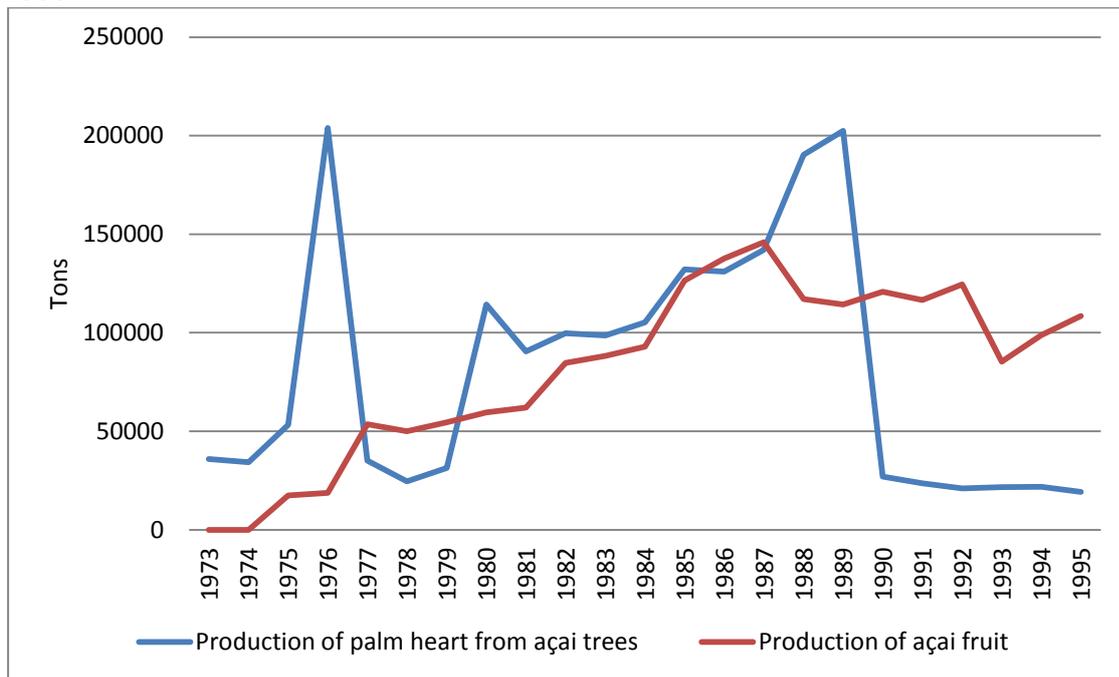
a) Fruit production

Açaí fruit has been a traditional basic ingredient in the North of Brazil and especially in the state of Pará for centuries. But until the 1990's, the açaí tree was mostly utilized for palm heart production. Açaí trees were cut to extract palm hearts.

Fruit production had always been extractive: fruits were taken from trees in wild areas with no or low management until the end of the 20th century when 95% of the production was based on this method. At that time a transition occurred and led to a commercial production shift.

Santana et Al (2010) showed that after açaí became a famous ingredient all over Brazil in the beginning of the 2000's, demand soared dramatically. The offer did not manage to keep the pace and prices increased. Local population thus stopped to cut trees to extract palm hearts and started to use açaí trees mainly to harvest fruits. This change was also pushed by international pressure toward protection of the Amazon forest. They also started to manage production. The intensive management aims at eliminating all vegetation to help light penetration, reduce competition with other species and thus increase productivity.

Figure 4 : Production of palm heart and açai fruit from açai trees in Brazil from 1973 to 1995

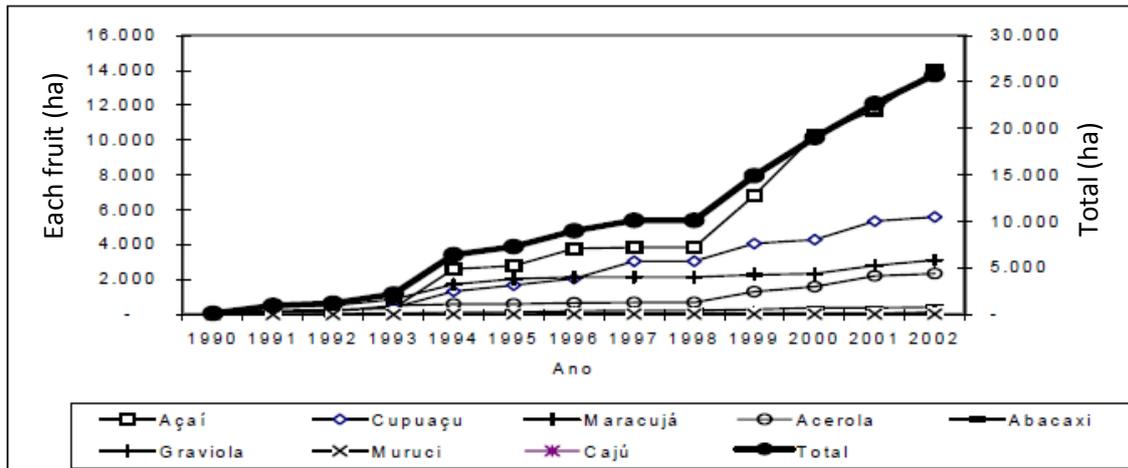


Source: IBGE, Anuários Estatísticos do Brasil, 1996

But this managed extrativism was not enough to satisfy demand so commercial production started on dry lands. This production uses modern agronomic techniques such as spacing, irrigation, herbicides and pesticides. Those techniques were implemented in many producing areas and in districts that used not to produce açai, especially next to markets and transportation facilities.

This move was encouraged by the Banco da Amazonia (BASA) through the Help to Extraction Development Program (Apoio ao Desenvolvimento do Extrativismo (PRODEX)) created in 1996 and the Constitutional Fund of Financing of the North (Fundo Constitucional de Financiamento do Norte (FNO)) created in 1989 (Grossmann et al, 2004). In total from 1990 to 2005 the BASA financed 8,288 projects for a value of R\$31.2 million, 59.6% of them between 2000 and 2005. Between 1996 and 2002, açai production received 60% of the R\$15,251,865 provided by the FNO in the Northeast of the state of Pará and Belém agglomeration (Costa et al, 2004). This was done according to the frame drawn by the Plano Amazônia Sustentável (PAS) which aims at lowering inequalities by helping small entrepreneurs and family business. This is why 99% of the contracts were signed with small producers (producing area smaller than 7ha). Those received 87.6% of the funds distributed between 1995 and 2006 (Pena, 2011).

Figure 5 : Evolution of tropical fruit areas planted with FNO financing in rural regions of the North East of the State of Pará (ha)



Source: BASA, in Costa et al, 2004

However those investments neglected agro industries. Those ones only received 4.89% of all industrial investment in the Amazon done by the Fund between 1989 and 2003. Only half of the industries studied by Costa et al (2004) had managed to receive long-term credit.

As a result, managed production overpassed traditional extraction and açai production dramatically increased. In 2000, açai managed production represented 5,207 tons, extracted from 727 hectares, accounting for 4.6% of the overall production. In 2004, it had reached 363,428 tons, from 26,671 hectares and accounted for 80% of the overall production (Santana et al, 2010). Between 1980 and 2001, açai production had stayed flat in both volume (101941 tons on average) and value (R\$54.6 million). In 2004, it reached 404,693 tons and R\$273.8 million.

Table 1. Evolution of planted area, production, output and price, 1996-2009

Year	Plantation area (ha)	Extractive area (ha)	Cultivated quantity (t)	Extracted quantity (t)	Total produced quantity (t)	Productivity (t/ha)	Price (R\$/t)
1996		1054	10366	103698	114064	9835	469.79
1997		933	7913	92021	99934	8481	350.84
1998		852	7278	110557	117835	8542	412.27
1999		690	4662	107663	112325	6757	472.86
2000		727	5207	112676	117883	7162	499.35
2001		627	4558	113744	118302	7270	558.99
2002		16115	242557	122322	364879	15052	642.08
2003	3097	18479	257282	134848	392130	13923	686.98
2004	8593	26671	363428	90643	454071	13626	699.96
2005	6297	34203	415921	89173	505094	12160	
2006	8041	49455	472040	88551	560591	9545	
2007	5249	51545	497591	93788	591379	9654	
2008	10303	59202	581290	100202	681492	9819	
2009	10667	61814	604805	104354	709159	9784	

Source: Secretaria de Estado de Agricultura

But today açai production still does not manage to match demand. Nogueira et al (2011) estimated price elasticity of offer at 0.937 which shows that offer is not elastic to price: If price increases by 10%, offer will increase by 9.37%. This means that production does not manage to increase significantly with price, showing that it is already at its maximum level. However it has been shown that offer has become more elastic to price in the last years, as technology allowed production to increase and adapt to price conditions (Nogueira et al, 2011).

b) The apparition of açai agro industries

Homma (2002) explains that the creation of the FNO in 1989 and the installation of the Program of incubation of technological companies (Programa de Incubação de Empresas de Base Tecnológica (PIEBT)) in the Universidade Federal do Pará in 1995 helped to develop agro industries in the region, especially those of dendê oil, orange, wood and coconut(Homma, 2002). Moreover, laws have been built to promote açai production: since

1996, açaí (as well as cupuaçu) is exempted of Imposto sobre a Circulação de Mercadorias (ICM).

The first factory to produce pulp from fruits was created in 1991 by the Cooperativa Agrícola de Tomé-Açú (CAMTA). Since that time it has developed a lot, first mainly with passion fruit, acerola and cupuaçu. Next were added orange, açaí, graviola, carambola, guava, cajá, mango, bacuri, muruci and pineapple. The first company to process industrially açaí pulp was Muaná Alimentos in 1998. This company was part of the Agro Industrial Itá Ltda. that had been producing palm hearts from açaí trees for 20 years (Homma, 2002).

The shift in demand described above had some important consequences for agro industries as well. The whole productive chain became more industrialized. Some traditional transformers industrialized their process and existing industries that processed other fruits included açaí in their production. The agro industrial landscape went from 8 companies focused on local market in 2000 to 40 focused on national and international markets in 2004. Some business men that used to export wood utilized their knowledge of foreign markets to start exporting açaí. In 2004, micro companies started to export (0.5% of their production), as well as medium companies that exported 8.5% of their production. However small companies only exported 5.5% of their production in 2004 compared to 9,5% in 2000 (Santana et al, 2010). This is explained by the strong demand pressure on the national side, cumulated with low quality requirements (pasteurization not needed). In 2007 there were about 60 processing company but it was estimated that only 70% of their processing capacity was used (Pagliarussi, Santos, Pessoa, and Kronig , 2011). This is due to a higher capacity needed to face higher influx of highly perishable fruits in peak times.

Production geography

Açaí is the fruit of the palm tree called Euterpe Oleracea, a plant that grows in humid and hot climates. It is found abundantly in the wild in the whole Amazon basin. It is especially present in the east of the region, namely the Amazon delta, where it can even be found in dry lands. However the density of tree is three times higher in flooded plains (“varzeas”) than in the acid and poor lands of small and shallow Amazon canals and rivers

(igapós)(Rogez, 2000). This has been the traditional pattern of açai trees presence and thus açai fruit production. However this scheme has changed with the apparition of cultivated açai trees. Indeed, as demand increased, prices followed and it became interesting to plant açai in dry lands. Some plantations thus appeared, usually closer to markets (mostly Belém) and transportation facilities.

The state of Pará has always been the main region for açai production, and today it accounts for 92% of the production.

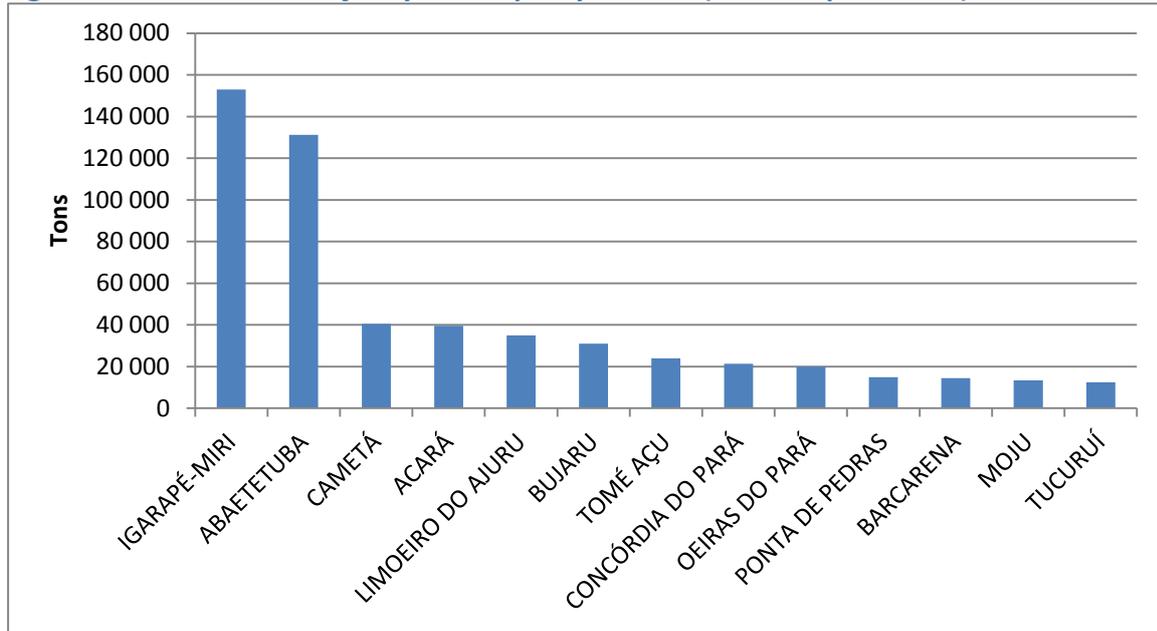
Table 2 :Açai production by state, 2003-2008

States	2003	2004	2005	2006	2007	2008
Acre	783	741	907	961	1459	1537
Amapá	1371	1390	1284	1160	1034	1294
Amazonas	1136	1134	1149	1172	1220	1274
Bahia					200	250
Maranhão	6372	7226	9380	9441	10198	9191
Pará	134840	90512	92088	88547	93783	107028
Pernambuco					2	
Rondônia	26	25	65	56	134	314
Tocantins	2	3	3	3	2	2
Brazil	144531	101041	104874	101341	108033	120890

Source : IBGE, 2009

Within the state of Pará, the main producing municipalities are by far Igarapé-Miri and Abaetetuba with respectively 153,000 tons and 131,250 tons in 2009.

Figure 6 : Production of açai by municipality in 2009 (13 main producers)

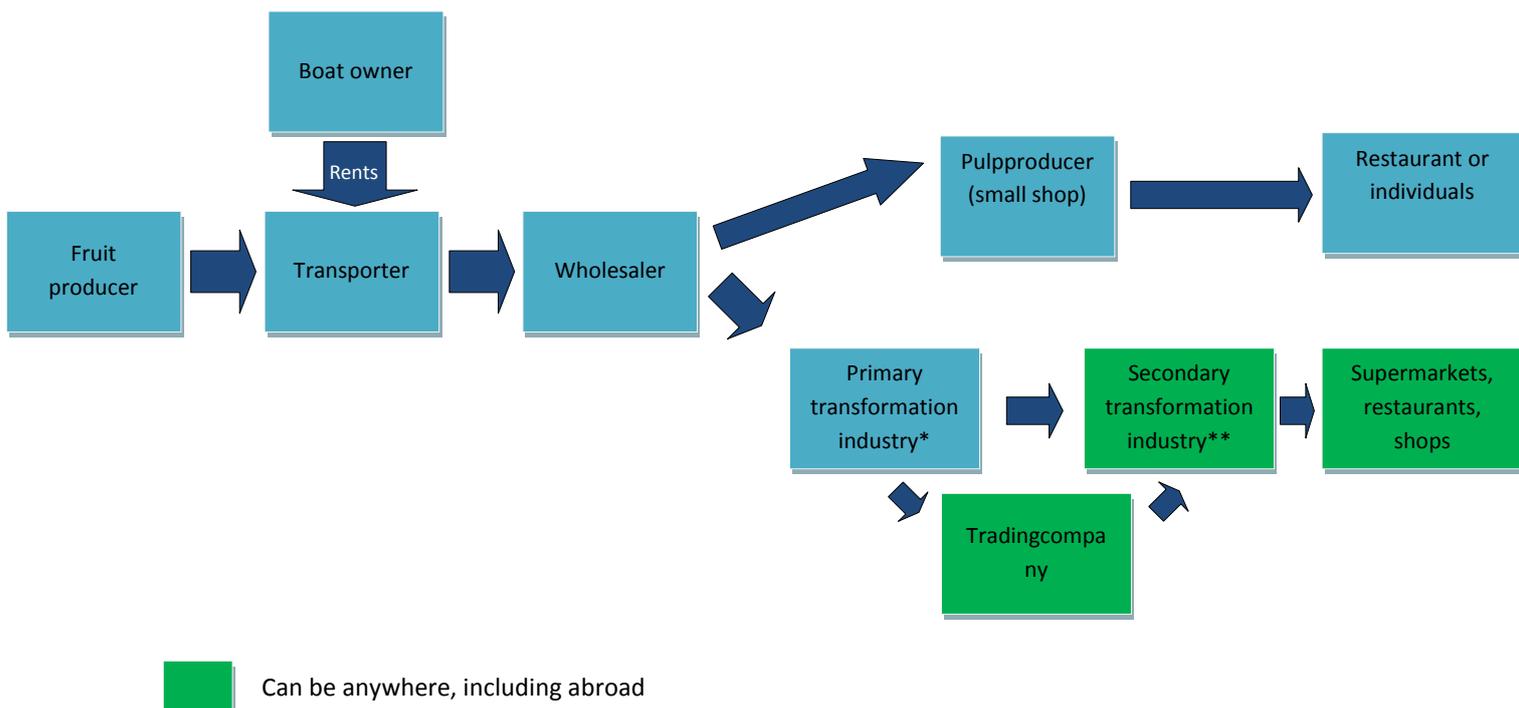


Source :SIGRA

The productive chain

Based on M.S. Pagliarussi et al (2011), Pinheiros and Ferreira (2010) and field study the açai productive chain can be described as following:

Figure 7 : Theaçai productive chain





Close to production fruit production areas

**Makes açáifrozen pulp*

***Makes extracts final products using frozen pulp.*

This section will describe the industrial productive chain of açáí, from açáifruit production, to the distribution and exportation of final good.

a) Fruit production

The palm tree starts producing fruits after 3 to 4 years. Fruits are gathered in bunches which contain hundreds of them. The quantity of fruits produced in a year by a tree depends on luminosity and soil fecondity. When fruitsare ripe they are dark red or green (for the “white açáí”). Despite investment that have been done to improve productivity, fruit production is still very manual, expensive and hard. Gatherers indeed have to climb trees that are usually 10 to 15 meters high. For this they use a short circle strap between their two feet. Then the climber cuts the bunch of fruits at its base and goes down, trying not to loose too many of the fruits it contains. An experienced climber can harvest between 150kg and 200kg of fruitsin a 6-hour working day (Embrapa, 2006). The harvest has to be done in the morning because the weather gets windy and rainy in the afternoon, making the picking even more dangerous. After this, fruits are taken off from the bunch and selected. Only ripe fruits can be kept. After this they are stored away from the sun in traditional baskets made of fibers from local plantsthat can contain 14or 28 kg of fruits (“rasa”). Those fruits will then be tranported at night to the marketto be sold to pulp industries.

Soares and Costa (2005) showed that producers started to organize themselves into associations and cooperatives after the 1970’s, when union movements started to decline due to dictatorship repression. With the establishment of democracy in the 1980’s those organization started to restructure themselves following a family agriculture model. Financing from the FNO helped to develop this family production. 14,677ha of plantations were financed by the FNO between 1990 and 2002 (Costa, 2003). The two municipalities of Cametá and Igarapé-Miri received 72% of this area in the last 4 years. The fruit growing complex appeared in 1999, when prices started to rise. The Cooperativa Agrícola Mista de Tomé-açú (CAMTA) was one of the main buyers, buying at different prices depending on the municipality, thus increasing competition between producers and maintaining low prices. This practice was bad for all of them. In this context the Non Governmental Organization

(NGO) FASE/Amazônia started discussions between producers to gather them in a consortium that would give them some bargaining power with buyers, the processing industries, higher production and thus more stable prices. In 2000, this consortium was born in the municipalities of Abaetetuba, Barcarena, Igarapé-Miri e Cametá. In 2003, 909 families were part of this consortium. With such organization, producers managed to get better prices, as production increased due to higher demand from a higher number of processing companies.

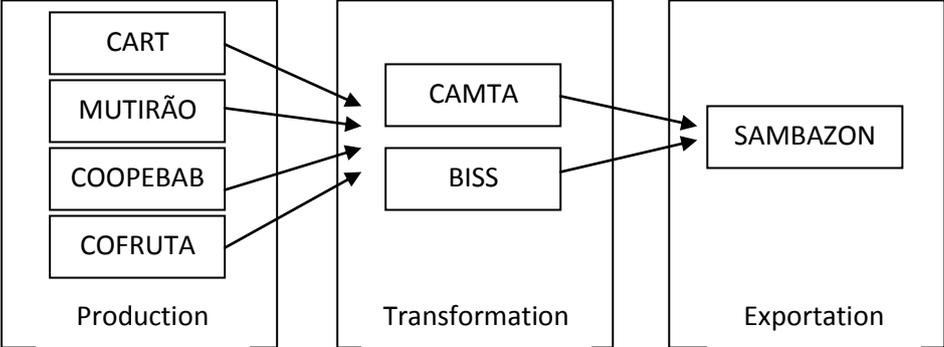
b) Transfer to industries

The fruit leaves the producing area at night to be brought to market places very early in the morning. Transportation is done at night because temperatures are lower, allowing better conservation of fruits during transportation. Since most of the production comes from the flooded plains of the Amazon, the main transportation used is boat. If the producer is close to the market, small boats that carry from 200 kg to a few tons are used. For producers that are further, more than 3 hours, bigger boats are used (10 to 20 tons). For production from dry fields, trucks or vans are used. During low producing season, the market in Belém is supplied by production from the state of Ámapa that comes by boat (2 to 3 days) and Maranhão that comes by truck (Embrapa, 2006). The price is constituted when the intermediary arrives at the commercialization place (the market). The opening price (the first one of the day) is always the same as the last one of the day before. As boats arrive, prices start to go down with the increase of offer or can go up if offer is scarcer than demand (Embrapa, 2006).

Costa et al (2004) showed that there are two kinds of processes in establishing a relationship between fruit producers and industries. Since most producers are small they have tried to gather in cooperatives and associations to have a higher bargaining power with pulp industries. In 2004 the main cooperatives were the Cooperativa Agrícola de Tomé-Açu (CAMTA) with 109 members and a capacity of 5000t/year, the Cooperativa Agroindustrial de Trabalhadores e Produtores Rurais de Igarapé-Miri (COOPFRUT) with 160 members and a capacity of 3780t/year, the Cooperativa de Fruticultores de Abaetetuba (COFRUTA) with 105 members and a capacity of 300t/year, the Cooperativa Agrícola Mista Amazônica Ltda (COOPAMA) with 25 members and a capacity of 500t/year (Costa et al, 2004). Organizations of rural producers usually help those players to meet. For example, the NGO Federação de

órgãos para Assistência Social e Educacional (FASE) gathered four cooperatives and associations of producers, with two processing industries to supply Sambazon, an American exporter of açaí pulp. Four cooperatives, CART, from Cametá, COFRUTA, from Abaetetuba, COOPEBAB, from Barcarena, and MUTIRÃO, from Igarapé-Miri provided raw materials. Those fruits were processed and packaged by two industries, CAMTA and BISS to be sold to the American company Sambazon, which would take care of exporting the pulp to the US. In 2003, the Guaranteed Organic Certification Agency (GOCA) audited the production and gave the certification to the cooperatives and associations. The auditing was paid by Sambazon the first year.

Figure 8 :Sambazon supply chain organized by the NGO FASE



Soares and Costa (2005) explain how the commercialization through cooperatives is done. In 2004, the average price paid by cooperatives to producers was of 10R\$/14kg basket. The quantity delivered is first weighted at the cooperative and then when delivered to the factory. There is usually a 500g per basket difference due to water lost by the fruit during transportation. This difference is registered and the sum of differences will be charged to the producer at the end of the season. 0.50R\$ per basket is charged to the producer by the cooperative for operational costs, ie meetings, gas, wages. On top of this is charged a 10% fee that goes to a fund that will finance cooperative activities such as new contracts, day to day activities. Finally a fee is charged by every director of area to finance transportation of fruits. So the further the producer, the higher the fee. In 2005, this fee was observed to be between 0.30R\$ and 0.70R\$ per basket. To summarize, in total about 20% of the price of a basket was paid to the cooperative. But as shown in the table below, the prices negotiated by the consortium for organic açaí were higher enough compared to those paid by traditional intermediaries to make it more advantageous for producers.

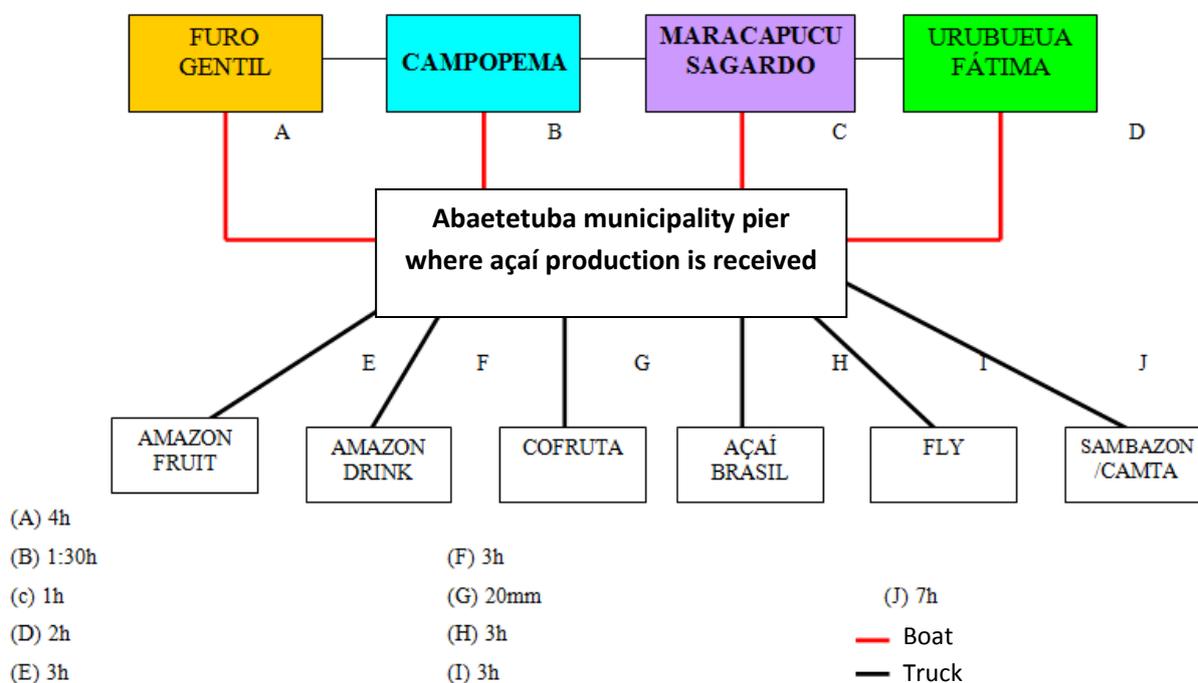
Table 3 : Price (R\$) difference between the average price paid by an intermediary for a 14kg basket of açai and the price of a 13.5kg basket through organic açai commercialization

Month	Intermediary Price		Organic Acai Price		Difference	
	Basket (14kg)	1kg	Basket (13.5kg)	1kg	Basket (14kg)	1kg
Aug 2004	8.51	0.61	13.00	0.96	4.49	0.35
Sept 2004	6.83	0.49	10.11	0.75	3.27	0.26
Oct 2004	4.65	0.33	6.68	0.49	2.02	0.16
Nov 2004	5.98	0.43	6.83	0.51	0.84	0.08
Dec 2004	6.88	0.49	10.04	0.74	3.16	0.25
Jan 2005	7.88	0.56	12.00	0.89	4.13	0.33

Source: Soares and Costa, 2005

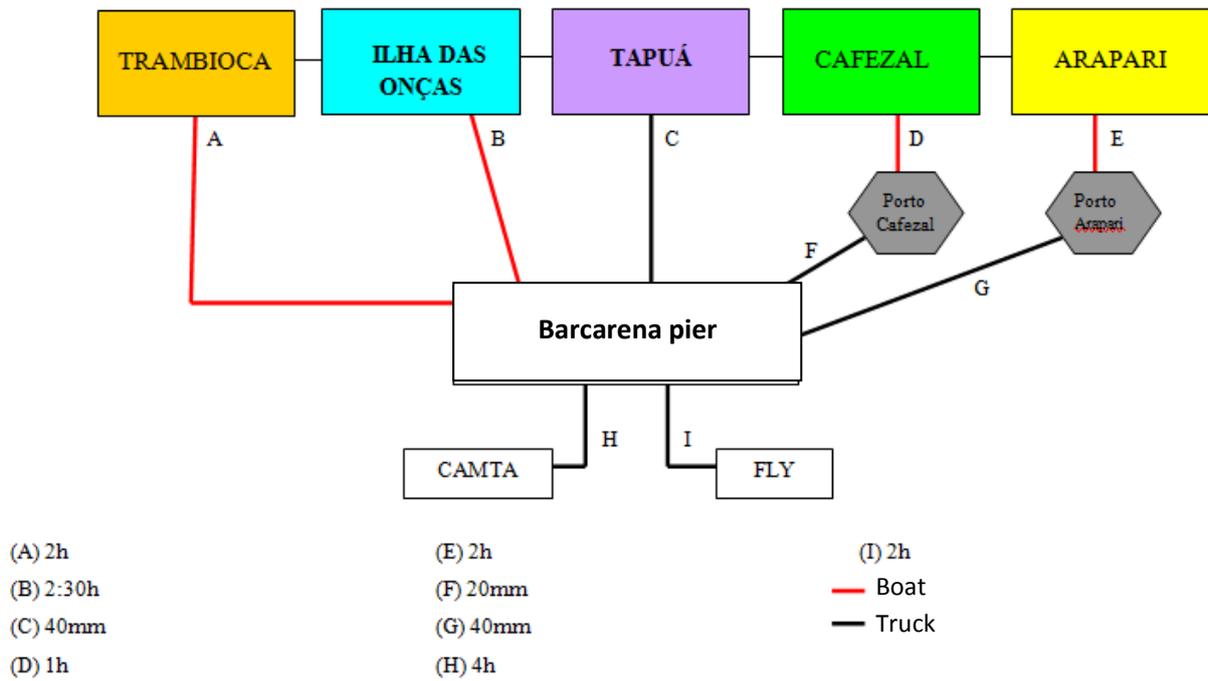
Because of poor infrastructures, transfer of fruits from plantations or extraction areas is long and expensive. The study done by Soares and Costa in 2005 in low Tocantins shows how complex and long are logistics between producers and manufactures. Every sector is constituted of 5 to 7 communities, each constituted of 4 to 5 families that deliver their production to the consortium.

Figure 9 :Açai fruit supply chain in the municipality of Abaetetuba



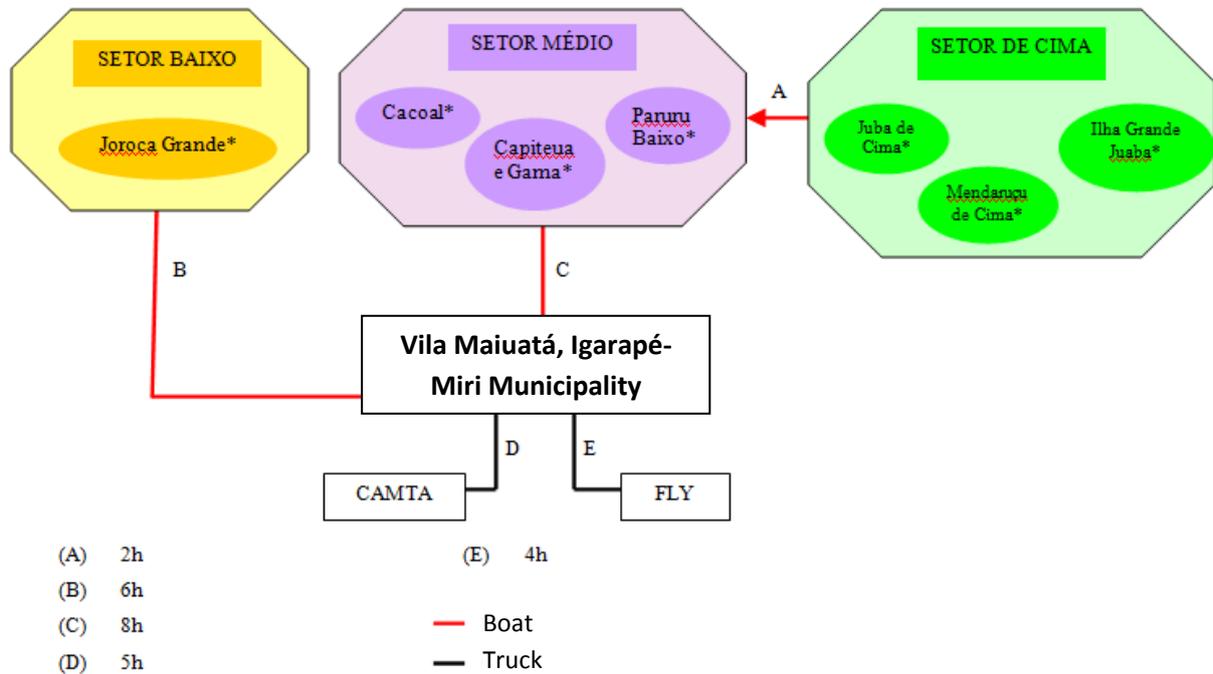
Source: Soares and Costa, 2005

Figure 10 :Açaí fruit supply chain in the municipality of Barcarena



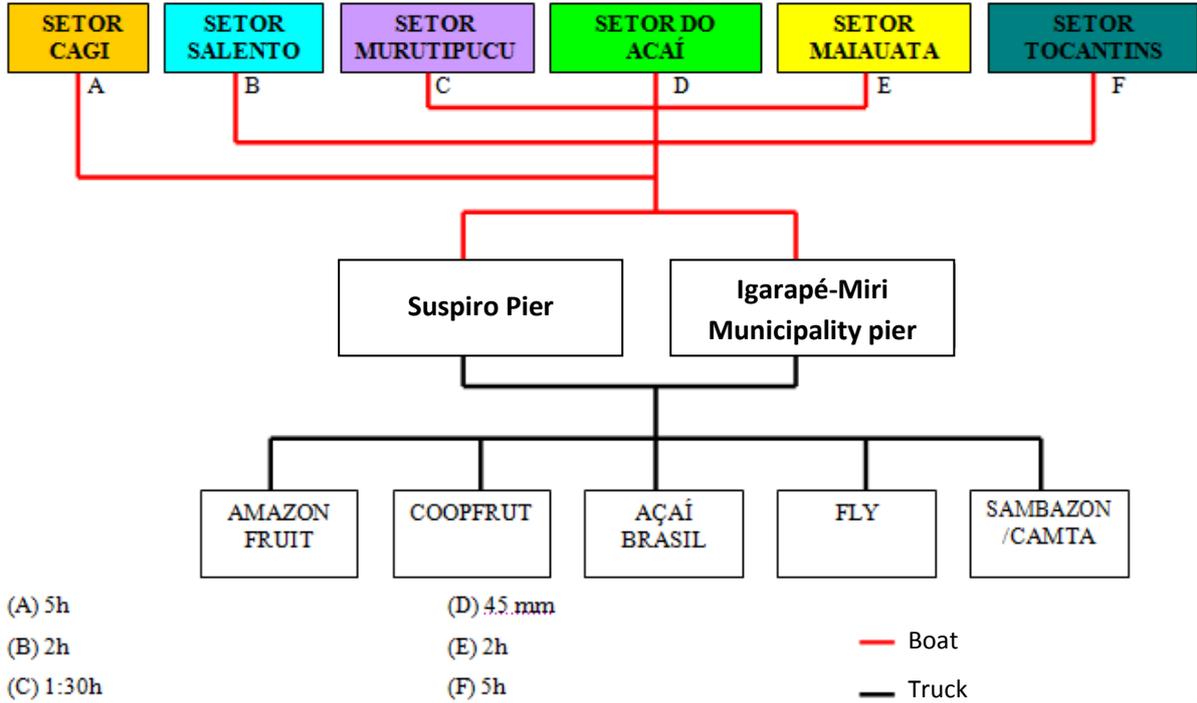
Source: Soares and Costa, 2005

Figure 11 :Açaí fruit supply chain in the municipality of Cametá



Source: Soares and Costa, 2005

Figure 12 :Açaí fruit supply chain in the municipality of Igarapé-Miri



Source: Soares and Costa, 2005

The boat transportation from producers to the port of the municipality is done by the cooperative and transportation costs are included in final price. Then transportation by truck from the port to the factory is done by the processing company that covers those costs. Observing the above process it can be noticed that the longer the transportation time from the producer to the port the higher the boat transportation cost. But this difference in cost has no impact on the price charged to the industrial company. The cooperative covers those differences thanks to the fees charged to producers. Even for producers who sell their production to intermediaries that will take care of transportation to the pier and not cooperatives, the price of transportation is proportional to the distance. That is why the closer the production is to the market (Belém), the higher the price paid to the producer. For example, prices in Barcarena(40mn to 2,5 hours) are much higher than in Cametá (6 to 8 hours).

The other kind of relationship that can be built is that of agro industries establishing contracts with many individual producers. Those agreements all have two main goals: reducing the time between fruit picking and processing to improve quality and to avoiding intermediaries to reduce transaction and production costs.

c) Açaí transformation

Most of the processing industries are located in Belém region to be close to the main market. According to Homma (2002), in 2002 there were 3000 açaí sale points in Belém. The proximity to the highway BR316 is also an advantage in distributing frozen açaí pulp to the rest of the country (Silva, 2004). The main açaí industrialized product is açaí pulp, pasteurized and/or frozen. In lower proportions are blends (açaí pulp mixed with other fruits), açaí powder, marmalade, liquor, juices...

The process to transform açaí fruit into pulp is the following:

Fruits arrive to the factory in baskets or plastic boxes. They are weighted and then conducted to the selection area. The selection is done manually on stainless steel tables with sieves which dimension keeps the fruit but allows impurities such as sepal parts, flower fragments and earth to pass. All green and damaged fruits are taken off. In some factories fruits are passed in front of a fan that's takes off all kinds of impurities.

Then fruits are taken through a process of 4 washes in a row. First they are immersed in water to clean them for impurities stuck to them. Second, they are immersed in water to soften their epicarp and mesocarp, to ease the depulping process. Water temperature and time of immersion depend on companies, according to provenance of fruits and ripeness. Temperature goes from ambient up to 60°C. Softening times goes from 10mn to 60mn: the riper the fruit the shorter the time. Those parameters are purely empirical since no research has been conducted to demonstrate whether there was a perfect theoretical time and temperature to soften perfectly the epicarp and mesocarp. The third wash is done in chlorine water for between 20 and 40mn. The water has to be replaced between every lot of fruit because its disinfectant power decreases. In the fourth wash, excessive chlorine is taken off with potable water.

Fruits are then transferred to the depulping machine through a carousel. First pulp is taken off by water injection. Seeds exit the machine through a screw for residues and pulp falls in the refining tank where it is filtered again to remove undesirable residues. The pulp is then transferred to the homogenization tank where it is homogenized.

At this stage the pulp can either be packaged and frozen or go through the thermic process for pasteurization. For this the pulp is sent into the heat exchanger where it is heated at between 80°C and 85°C for 10 seconds before being cooled immediately to reach 5°C. If it is

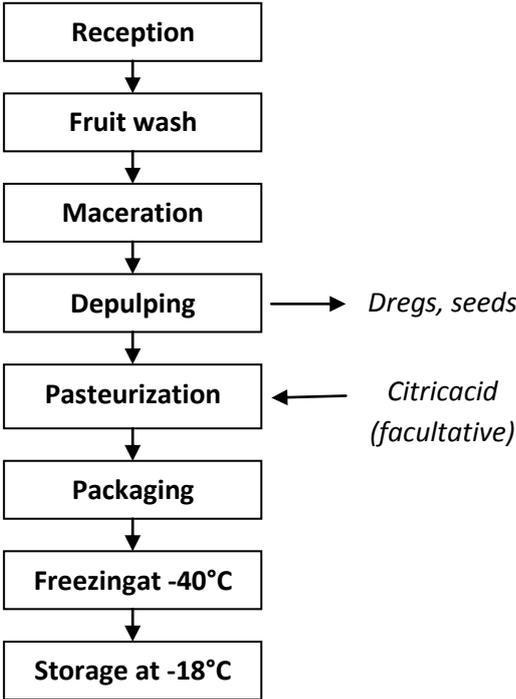
heated for too long or at a temperature that is too high, the pulp will lose its organoleptic and nutritive properties.

The pulp is then packaged in low density polyethylene bags of 100g, 500g or 1000g. Those bags are taken to the fast freezing tunnel where they are frozen at -40°C. This kind of freezing is better for açai quality because it prevents any kind of biochemical or microbiological change. The pulp is then stored in cold chambers between -18°C and -20°C (Embrapa, 2006).

When pasteurization is not required whitening is commonly used after fruit washing to deactivate enzymes, fix the color, remove gas from fruit tissues and decrease microbiological presence. The process consists of immersing fruits in hot water or steam. Time and temperature depend on the raw material, the initial microbe presence, the quantity of product to be treated, the heating technique and the kind of enzyme to be inactivated. After the treatment fruit have to be cooled immediately to avoid contamination by thermophile bacteria and to maintain fruit texture. Cooling is done by immersion in cold water or by cold water pulverization. For açai fruit it can be done for 10 seconds at 80°C, which reduces microbe presence without killing most thermoresistant enzymes. The time cannot be longer than 10 seconds if not it will separate fruit fats. On top of this, too strong whitening would change açai's organoleptic properties.

Açai pulp can also be dried. It is done with a spray dryer, which is the same process as for powder milk. Pulp is conducted to the drying chamber in drops that get in contact with hot air. The drying lasts between 1 and 10 seconds and the final product is a powder (Ribeiro , Silveira, and Araújo, 2010).

Figure 13 : Process of açai transformation to make frozen pulp



d) Açai distribution

Homma (2002) showed that in 2001, 4,500 tons of açai pulp was consumed every month in Belém, 500 tons in Rio de Janeiro, 150 tons in São Paulo and 200 tons in other cities, especially in Brasilia and the North-East of Brazil. To reach those markets, refrigerated trucks of 24 tons are used to transport frozen pulp.(Guimarães, 1998).

Santana et al (2010) explained that with the boom of national demand in the 2000's, the distribution system started to focus on the national market (and not only the state of Pará) and opened to the international market. This distribution shift is also explained by the fact that local demand suffered from the price increase. Another important change in distribution is that in 2001, supermarkets started to commercialize pasteurized açai pulp.

Costa et al (2004) showed that the main evolution in açai supply chain in the last years has been in distribution. Indeed, with the development of supermarkets and other modern retailing channels, the demand for new products appeared, namely products that would be consumed directly from the shop.

e) The exportation process

The business practice in Brazil is to sell most of products Free On Board (FOB), which means that the importer owns the product when it is on the boat. From that moment, it has to take care of transportation and bear the risk of the merchandise. So, once the order is done, the importer has to find a logistic company that will get the merchandise from the pulp company, take it to the dry port for verification of the merchandise and corresponding documents, and then take it to the boat and to the client facility. The importer also has to get insurance for transportation. However, some exporters with stronger international experience can also sell at a Cost, Insurance and Freight (CIF) price. In this case it is the exporter who will take care of transportation and insurance, but not the risk in the maritime transportation.

The exporting company, on its side has to take care of custom formalities. It can do it by itself if it has a dedicated department or contract a company specialized in this (“despachante aduaneiro”). It has to provide all documents required by the importing country such as sanitary documents, certificate of origin, etc... The merchandise is then liberated and the merchandise can leave to the boat and be exported.

Companies are encouraged to export: they are exempted of Imposto sobre Produtos Industrializados (IPI) if they export more than 40% of their production. Some interviewed companies said their target was to export 41% of their production in order to avoid this tax.

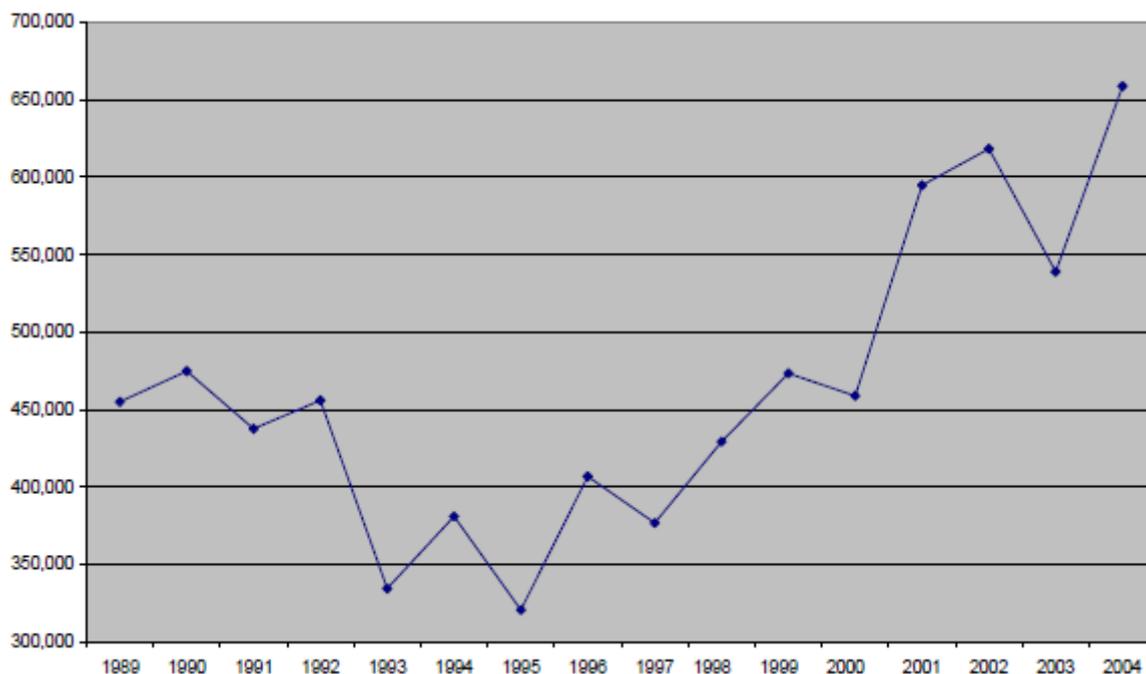
III. Learning from New Zealand kiwifruit industry

This part aims at introducing the case of kiwifruit production and exportation in New Zealand. Indeed, the kiwifruit is a healthy fruit that went from being unknown to having a strong place in international fruit markets and is thus a good model that could bring clues on how açai industry should develop. Even if today kiwifruit production is spread over the world, it is New Zealand that was responsible for building its fame. Today, 94 per cent of kiwifruit produced in New Zealand is exported (Kilgour M, Saunders C, Scrimgeour F, Zellman E, 2008).

a) History of the kiwifruit

The fruit (*Actinidia deliciosa*) finds its origins in the South of China. Some seeds were brought to New Zealand in the early 20th century by the principal of a College who had been travelling to China. The first plantation gave its crop in 1910. Hayward Wright developed the *Actinidia deliciosa* 'Hayward' cultivar in 1928, a new variety that is bigger, tastes better and has a longer conservation time than the original Chinese cultivar. This variety is still the dominant one today. Commercial plantation started in the 1940's and exports started in 1952 to the UK. For marketing purpose the fruit was renamed Kiwifruit. Exports soared in the late 1960's and the 1970's and in 1974 exportation exceeded local consumption for the first time (Zespri, 2012).

Figure 14. New Zealand Kiwifruit exports (thousands of \$NZ)



Source : (MAF, 2006)

b) The political environment

In 1977, the Primary Product Marketing Act 1953 established the New Zealand Kiwifruit Marketing Authority (NZKA). This organism licensed a number of exporters and coordinated

exports. The NZKA also set quality standards for the industry, controlled marketing and packaging, and funded research and development. In 1988, the Kiwifruit Marketing Regulations 1977 established the New Zealand Kiwifruit Marketing Board (NZKMB) that replaced the NZKA. The NZKMB is a single desk exporter under grower control. It was granted monopoly powers to purchase, distribute and market kiwifruit in all international markets except Australia. It also had to buy all fruit offered by growers that met export standards. This gave the industry unity and strength. In 1999, the Kiwifruit Industry Restructuring Act 1999 established the NZKMB commercial operations, Zespri, as a company with shares tradable among producers (Kilgour et al, 2008).

This structure incentivized innovation. For example, in 1992 Zespri launched the Kiwigreen programme, an Integrated Pest Management (IPM) system that aimed at producing greener kiwi as a requirement from European clients. Research was also developed towards the creation of new products. In the 1970's, researches started to create a new variety of kiwifruits and in 2000, the Zespri Gold, a large, sweet, yellow flesh kiwifruit was launched.

In the 1970's, the Kiwifruit Marketing Licensing Authority was formed to provide growers with control over their industry structure and regulate the activities of exporters. This structure enabled grade standards to be established and a coordinated approach to marketing undertaken.

In 1993, a new marketing strategy entailed new changes, building on the reputation of delivering the world's best kiwifruit. Zespri started to seek to sell its products at a price premium over its competitors. Its major markets are thus the few high-income markets that can support such premium prices, namely the EU-15, Japan, and the United States

c) The industry

The industry used to be structured around family businesses that managed both fruit production and packaging. But with the consolidation of the industry, growers now specialize on fruit production only. There are about 3000 orchards in the country and most of them are small (less than 5% are bigger than 10 ha). The post harvest operators are more

concentrated and rely on several orchards to ensure their activity. There has been a concentration of packhouses. There used to be 620 in 1988 and there were only 83 in 2006 (Zespri, 2006). The three main ones account for around 70% of New Zealand production. Most of them operate a coolstore. The necessity to possess this kind of storing accounted for the concentration. Another explanation of this concentration was the passage from the NZKMA to the NZKAMB in the 1990's. With the transition some cost were transferred to the packhouse (labeling for example) and thus justified a larger size to gain scale economies.

Innovation takes an important part in the industry. Some of it is led by Zespri Innovation Company, Zespri's research and development department. But most of it is outsourced to other companies, especially HotResearch. The three main research axis are developing new cultivars, environmental technologies and logistic technologies (Kilgour et al, 2008).

Chapter 2: Methodology

I. Procedure

The methodology used to conduct the study was qualitative. A field work was conducted in Belém region (North of the state of Pará) for one month to interview the different stakeholders of açai production and exportation. Two factories were visited to understand the producing process of açai pulp from raw fruits and transformed good (ice creams) from pulp. Four visits were done at the Belém Ver-o-peso açai fair to meet fruit wholesalers and understand the commercialization process of fruits. Interviews of açai importers and producers from other states were done by phone. The participants were the following:

- 1) Productive chain
 - a. Fruit wholesalers
 - b. Primary agro industries
 - c. Secondary agro industries
- 2) Foreign importers
- 3) Public organizations
- 4) Researchers

Table 4 : Interviews conducted

Type of interviewee	Number of interviews conducted
Fruit wholesalers	4
Primary agro industries	10
Foreign importers (including secondary agro industries)	4
Public organizations	3
Researchers	4

The fruit wholesalers were all met at the Belém Ver-O-Peso açaí fair. A list of primary agro industries was elaborated through the industry syndicate, Sindfrutas, and internet research. All the companies that accepted to be interviewed were interviewed. Sometimes several interviews were conducted within the same company: head manager, head of production, head of procurement, etc. Only companies that had an industrialized production were interviewed, no traditional bateidora was interviewed because those do not have any international exposure. A foreign importer list was created through internet research and information from their suppliers. All those who accepted to be interviewed were interviewed. Public organizations that were relevant to some aspects of the study were contacted: Centro Internacional do Negocio for exportation issues, Sindfruta for primary industry issues, etc... Researchers from the most reknown institutions on the subjects ere selected. They included the Embrapa and the Universidade Federal Rural do Pará (UFRA). Fruit producers were not interviewed because fruit production was not the main focus of the study and because of time constraints it has not been possible to visit production sites.

Questions were open-ended in order to get the information needed to answer the research question without missing potential conclusions that were not foreseen. The outlines followed to interview agro industries (primary and secondary) and foreign importers are in the Annexes part. Interviews of fruit wholesalers, researchers and public organization did not follow a standardized. The interviews conducted with those contacts were following a specific outline depending of the interviewee (field of research, kind of organization) and the information needed to complete the study.

Parallel to those interviews, information was taken from public organizations' publications and websites. They are the following:

1. Production

- Embrapa da Amazonia Oriental
- Universidade Federal do Pará (UFPA)
- Universidade Federal Rural da Amazonia (UFRA)
- Instituto Brasileiro de Frutas (IBRAF)
- Sindfrutas
- Secretaria de Estado de Agricultura (SAGRI)

- Companhia Nacional de Abastecimento (CONAB)
- Instituto Nacional de Colonização e Reforma Agraria (INCRA)
- Ministério da Agricultura
- Ministério do MeioAmbiente
- Banco da Amazônia
- Instituto Brasileiro de Geografia e Estatística (IBGE)
- Food and Agriculture Organization (FAO)
- Agência de Apoio ao Empreendedor e Pequeno Empresário (SEBRAE)
- PAVUC Program of the European Union (Producing added value from under-utilized tropical fruit crops with high commercial potential)
- Instituto PEABIRU
- Projeto AmazonFlavoursBrazil
- Superintendência do Desenvolvimento da Amazônia
- Secretaria de estado de desenvolvimento, ciência e tecnologia do Para (SECTI)
- Secretaria de Estado de Planejamento, Orçamento e finanças do Pará (SEPOF)

2. Exportation

- Agencia Brasileira de Promoção de importações e exportações (APEX Brazil)
- Ministério do Desenvolvimento, Indústria e Comércio Exterior (MDIC)
- Centro Internacional do Negocio (CIN, belong to the Federação das Industrias do Pará (FIEPA))
- Receita Federal
- Programa de promoção das exportações das frutas brasileiras e derivados
- BrasilGlobalNet

3. Health

- Política Nacional de Alimentação e Nutrição
- Agencia Nacional de Vigilância Sanitária (ANVISA)
- Instituto Nacional de Metrologia, Qualidade e Tecnologia (Inmetro)

II. Data analysis

From the data collected as explained above the researcher sought to understand the whole process of production and exportation of açaí products and determine everything that would hinder açaí exportation. The data was analyzed according to the following variables:

The dependent variable chosen is the obstacles to exportation. The aim was to evaluate what are those obstacles and to measure to what extent they hinder açaí exportation. This variable depends on the following dependent variables:

- Product offer
- Price
- Logistics
- Quality
- Exportation regulations

The assessment of those dependent variables allowed the researcher to determine whether those obstacles exist, what they are, to what extent they deter from exporting açaí and how they could be overcome. Product availability understood whether açaí products are reliably present in sufficient quantity to allow significant exportation. Price understood to what extent cost would deter potential exporter, including raw material costs, processing costs and logistic costs. Quality determined whether açaí product quality matches other countries standards and would therefore allow exportation. Logistics found all the constraints to açaí

logistics with current level of equipment and infrastructure. Regulations studied the current state of laws that regulate exportation of açai products.

From all the information gathered on açai production and commercialization, obstacles were identified. They were considered obstacles when quotes as such by interviewees. Those obstacles were then grouped under the different variables and detailed. When information from different sources was not matching the question was asked to more interviewees and the information that was quoted the most and the most consistent with the rest was chosen.

When those obstacles were accurately detailed and proved, the researcher started to look for solutions to those problems. Some solutions came straight from interviews. Others were found by the researcher according to his data analysis and challenged with interviews. Only solutions that were confirmed by interviews as relevant and feasible appear in this dissertation.

Chapter 3: The obstacles to açai exportation

I. Product availability obstacles to açai exportation

a) Fruit production problems

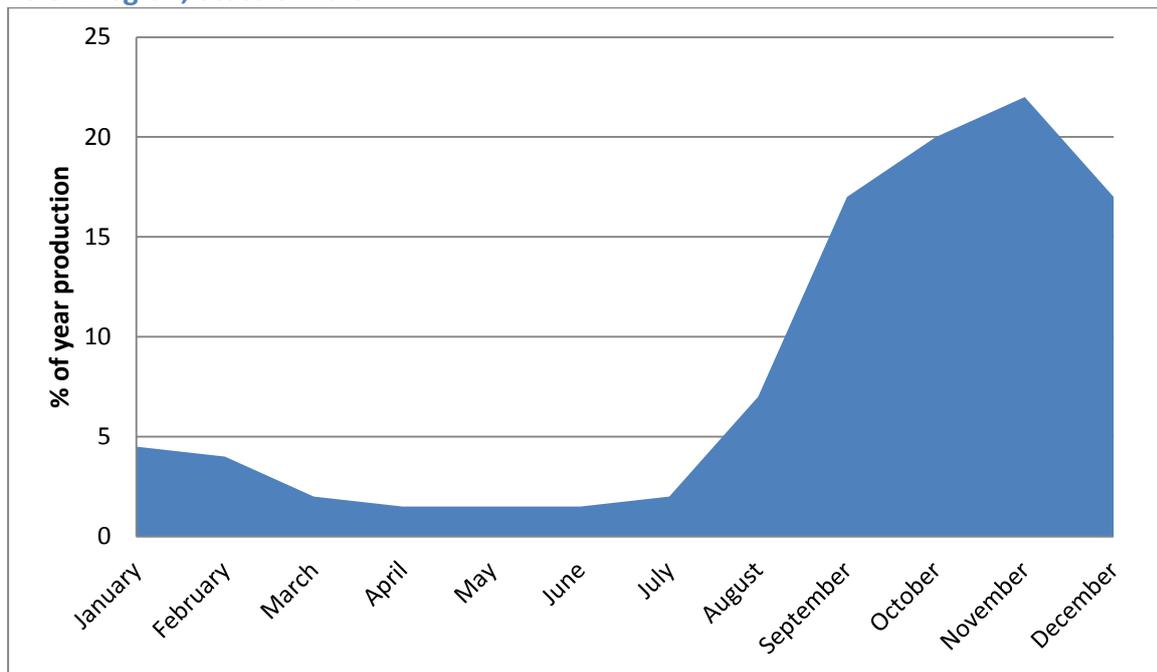
i. A strong seasonality that does not permit all year availability of the product

Hommas et Al (2006) explain that açai production is very seasonal, with abundance from september to december and scarcity the rest of the year. Indeed, in the Amazon estuary there are two distinct seasons for açai fruits production:

- The winter harvest, which is during the rain season. The fruit is picked at different stages of maturity, has a red-blue color and its overall quality is considered low.
- The summer harvest during the dry season in which production is two to three times higher than during the winter harvest. The bunches of fruits are more homogeneous in terms of ripeness, the fruit is dark-red and considered of higher quality(Embrapa, 2006).

92% of the production is done in the State of Pará and thus obeys to this frame with main harvest from june to december. The rest of the year the offer is very partially compensated by production from other states, especially Maranhão, Ámapa (January to june) and Amazonas (January to August). But this does not compensate the sharp fall in Pará because quantities in those states are not very significant. In dry land plantations, irrigation helps regulating production throughout the year but the technology is costly and not easy to implement and thus not widespread. Moreover, pulp is of lower quality during the winter harvest. This is not only due to fruit lower quality but also because in that period fruit producing areas are further than pulp industries, which entails a longer transportation and thus higher degradation of fruits. This is the case for the municipalities of Anajás, Mocoões, Arapixi, Gurupá, Macapá that require 2 to 3 days of transportation.

Figure 15 :Percentage distribution of fruit production of an açaí tree during a year in the Belém region, State of Pará



Source: Bastos et al., 1986

ii. It is difficult to intensify fruit production

Despite all the investments done by the FNO since the 1990's to improve managed extraction and commercial plantations, açaí production remains traditional and is still hardly mechanized, even in commercial plantations (A. Homma et al, 2006). Mechanization is indeed hard to implement given geography and trees. In most places, men still have to climb trees. Even though it is forbidden, children are usually the ones climbing to pick fruits. This is why this culture is very labor intensive. Santana et Al indeed showed that commercial production needs 273 direct employees for every 1000 hectares. It is therefore hard and costly to improve productivity in both commercial plantation and extractive areas.

On top of this, mass cultivation is very hard to implement in the region. Indeed, high pluviometry, high temperatures and soils that are poor in nutrients make monocultures highly vulnerable. Their vulnerability has two reasons: first the lack of nutrients and second the easy apparition and proliferation of diseases (Costa et al, 2004). So it has been observed that homogeneous and concentrated plantation suffer quick decrease in productivity. Moreover because soils are poor in dry lands and the plant needs a lot of water, fertilizers and irrigation are needed. This not only increases fruit price but also raises ecological problems. Indeed, water would have to be taken from the river and would threaten shallow

canals (“igapós”) and their unique ecosystems. Moreover, açai tree needs to be managed and many small family plantations have been failures because of lack of care for the plants. This is why today managed extrativism represents the biggest share of production. This also justifies diversification of the production with other fruits such as cupuaçu, passion fruit, graviola within small family production units. This diversified family fruit production has had troubles communicating with inflexible agroindustries. Indeed diversification is hard to handle for industries which are looking for sufficient volumes to reach their break even point. Because of their high volumes and high degree of specialization, industries tend to prefer contract with big and specialized producer. So on one hand the small diversified production does not manage to reach industries and on the other hand industries do not manage to get the quantities of raw material they need to be sustainably profitable (Costa et al, 2004).

Table 5 : Origin of açai extractive production in the state of Pará

Hectares	% of production
1 to 10	45.2%
10 to 100	48.7%
100 to 1,000	5.2%
1000 to 10,000	0.4%
More than 10,000	0.0%

Source: (IBGE, 1996)

But even in managed extractive production, a decline in productivity has been witnessed in the last years. There is still no clear explanation for this but the two main hypothesis are:

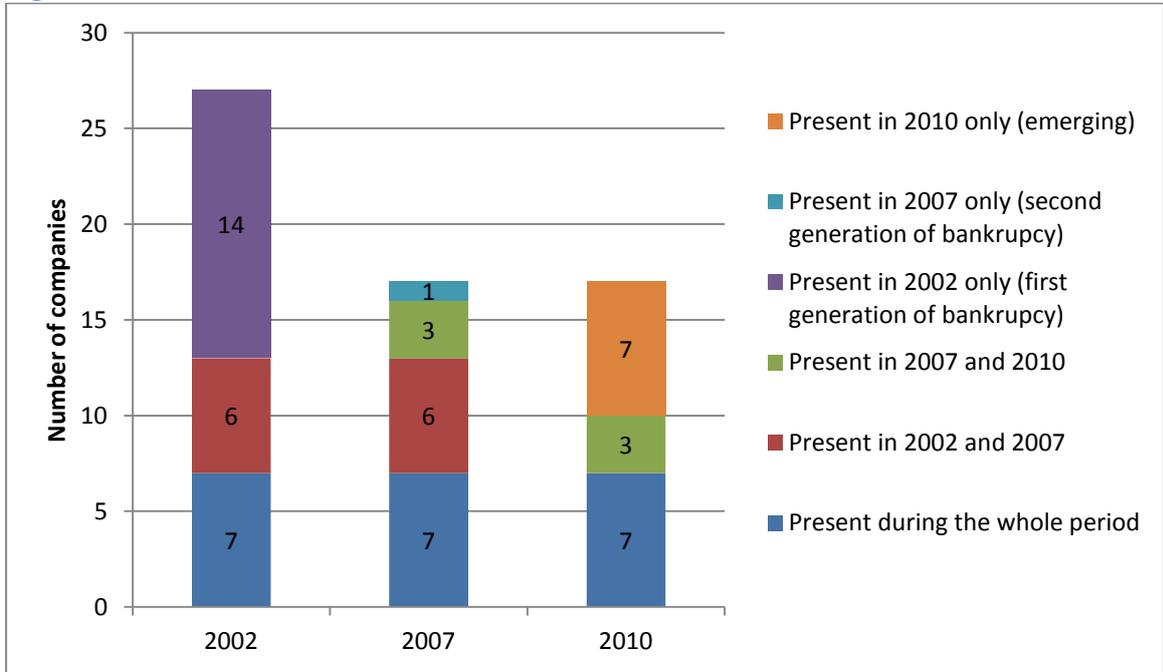
- In managed extractive areas, other species have been cut to lower biological competition but many new açai trees have been planted. So many extractive areas now look like plantations. The tree density is too high and exhausts soils. There is therefore a lack of nutrients that entails a lower tree productivity.
- The second hypothesis is that diseases and parasites start to appear. Some kinds of snails have been observed that eat part of the fruit. No pesticide can be used against them because in Brazil legislation defines which pesticide can be used for which plant. For now nothing had been authorized for açai trees.

Another obstacle to efficient açai culture is the lack of investment in research. Despite Emprapa technical support and research, in very few places those innovations have been implemented to improve fruit quality and cultivation productivity (Limal, Maia, Alves, Silva, 2007).

b) Industry problems

There is a high turnover in pulp companies. In the last years many companies have disappeared, been sold or merged with bigger ones. Only 7 pulp companies have been doing business constantly in the North of the state of Pará since 2002 (Costa, Fernandes, Nacif, Sousa, Costa, 2011). Today only 6 companies export açai pulp.

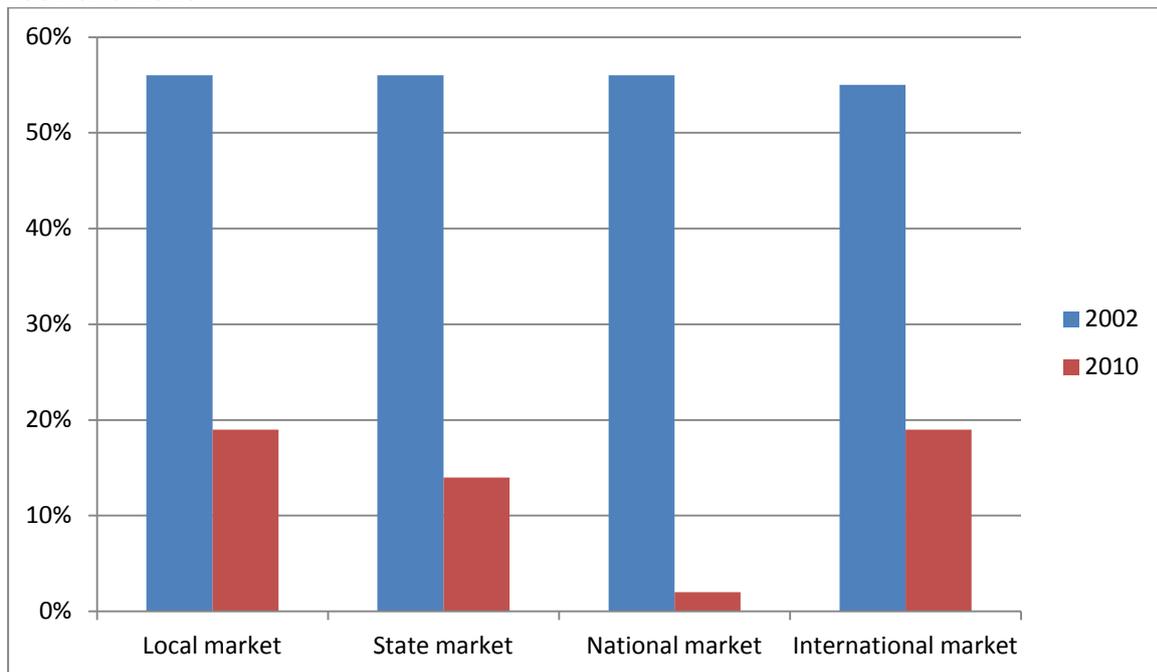
Figure 16 : Evolution of the number of pulp companies in the North of Pará and Belém region



Source: Costa et al, 2011

There are several explanations to this situation. The first one is that in the last years companies have led a dog eat dog competition with strong war on prices. In a context of booming prices of raw material, this hard competition has limited the increase in final prices. Between 2002 and 2010, in the pulp industry of the state of Pará, prices of raw materials increased by 15.5% per year and prices of final products increased by 5% per year (Costa et al, 2011). As a consequence, the margin of those industries has shrunk significantly and brought some to go bankrupt.

Figure 17 : Growth margin of pulp companies in the North of Pará and Belém region in 2002 and 2010



Source: Costa et al, 2011

The second main reason for those difficulties is the transaction exposure on international trade. Indeed, now exportations represent about 30% of the whole frozen pulp production. All the exportations are in US\$ and in the last years the Brazilian Real has been increasingly strong compared to the Dollar. So with cost in Real and sales in decreasing Dollar, margins have shrunk. This accounts for a big part of the difficulties of companies with strong exposure to international trade.

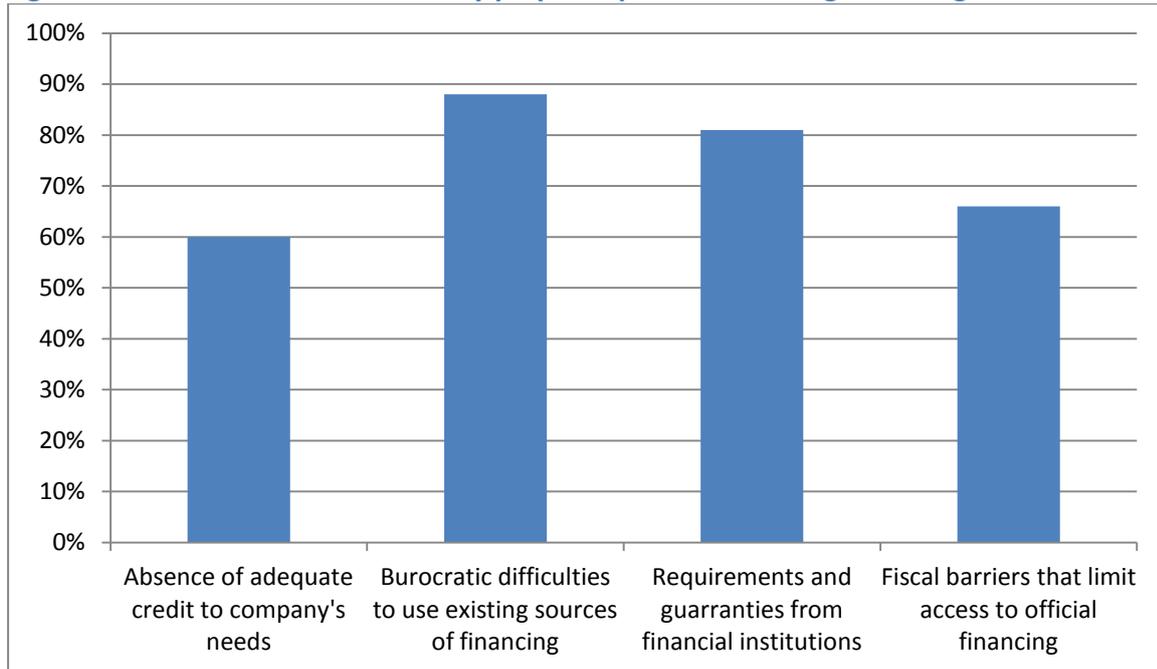
Moreover, Santana, Santana, and Nogueira(2007) showed how heterogeneous is the transformation industry in Pará: it is largely dominated by micro companies (turn-over below 244,000R\$ or less than 20 employees). In the overall pulp industry of the state of Pará, those micro companies represent 51.9% of all companies. 40.7% of companies are small (up to 1.2 million R\$ of turnover or less than 100 employees), 7.4% are medium (less than 35 million R\$ of turnover and less than 500 employees) (Santana, 2006). In 2004 only 8 companies mastered the pasteurization technology, most of them processed açaí only and no other fruit. Companies were also very heterogeneous in the market integration, be it local, national or international. They showed that in 2004, only one company was considered highly efficient, 3 were considered intermediate and the rest was poorly efficient. Only one company was able to produce more than 1,450 tons a year, all the others were producing less than 800 tons a year. One interviewee estimated that a company could not be

performing if it did not produce more than 1,500 tons a year. It is therefore easy to see that most companies were not efficient. On the other hand capacity was present: five companies had capacity to produce between 1,055 and 3,224 tons a year. So out of all those companies, only one was producing with an optimal capacity (Santana et al, 2007). Those companies therefore operate in a monopolistic competition, depending on the differentiation of products quality, packaging, distribution channels and management. Given high demand and low offer, there is low rivalry on the market. This market environment shows that it is still not mature and accounts for the low competitiveness of firms (Santana, 2007).

It is very hard for companies that process only açaí to survive because of the big irregularities in fruit supply. They usually have to close the plant half of the year. This raises problems especially with manpower because work legislation in Brazil is protective and makes lay-off very expensive for employers. Companies that focus on exportation find it hard to solve this problem because no other fruit in the region has strong international demand. Only industries that also attend local demand can process fruits like cupuaçu or bacuri which are not known abroad.

Another issue is the financing system that is poor and not connected to agro industries. Among all companies interviewed in Costa et al's study (2004), 76.9% had not managed to get any short-term debt in the previous 5 years and 50% had not managed to get any long-term debt to finance investments (Costa et al, 2004). This is explained by the fact that interest rates were too high and loan duration too short compared to those industries' profitability. Moreover, red tape issues and the fact that many small companies have no official status are other obstacles to getting credit.

Figure 18 : Main difficulties faced by pulp companies in finding financing



Source: Costa et al, 2011

This lack of financing explains that those industries were still lacking equipment (Silva, 2004). If industries had cold chambers, proper storage spaces, machines to pasteurize fruits they could have frozen pulp all over the year and avoid demand and production seasonality. Indeed, the peak season for demand in the south of Brazil, the main market (Rio de Janeiro and São Paulo) is during summer, especially with carnival. This period corresponds to the low offer period in between harvests. But cold chambers are very expensive (investment of R\$1.5 million to store 3,000 tons (Pena, 2011)) and most companies cannot afford such an investment. So açai has to be imported from other states (especially Ámapa) but this other sourcing option is not enough to compensate the gap between offer and demand in this period. This problem for pulp industries to get supply in raw fruits has led some of them to close.

Another problem is the lack of qualified manpower in both management and technical issues (Silva, 2004). Bad management, no awareness of market requirement, of techniques to conserve properly the fruit and to process it in respect of health imperatives is common in the industry. Most companies management are not market driven, they see manpower as a cost and not as an investment. This is why they do not want to hire qualified (and therefore more expensive) employees, even though local universities train many qualified engineers and managers. The bad management of some of the pulp industry companies entails

important problems such as long delays in delivery of orders. Some interviewed companies said they had several month delays with their supplier which for them meant two main problems. First the lack of the product that had to be explained to clients and provoked sales loss. Second the absence of the money paid (paying 50% at order placement and 50% when receiving the good seems to be the business practice) which made a much higher working capital financing need.

The fact that managers do not have a strong market vision entails another problem: All those companies do not have a strong brand that they could distribute abroad. They just produce pulp and export it to other industries that will transform it in a final product and thus get higher value. This means less added value and lower margins. Only Sambazon, the American company, has its own brand that is present abroad.

To conclude, açai pulp availability issues are of two kinds. First, raw fruits are not available in sufficient quantities all year long and overall offer is still way below demand. The irregular and low availability of fruits make it hard for pulp companies to maintain production all over the year and some have to close part of it. To make it worse, the lack of financing accounts for low equipment, especially in pasteurization and cold chambers, that would allow them to deal with this seasonality. Finally, bad management and unqualified staff explain low competitiveness and customer service level of some companies.

II. Logistics obstacles to açai exportation

a) From fruit production to fruit transformation

The areas where açai trees grow are not easily reached and the main transportation is boat. Plantations on dry land are still limited to big properties and the main part of the production by far comes from flooded areas. Those places are remote and all the logistics implemented to bring the product to processing places such as boats and fuel have a direct impact on final price (Limal et al, 2007). Fruits are transported in traditional baskets to motor boats that carry them on the Amazon river until the closest port where they are moved to plastic boxes and loaded in trucks. The fruit is very fragil so all those transfers must be done carefully not to damage fruits. Depending on how mature is the fruit and how long ago it was picked quality can vary a lot. Fruits also have to be protected from water that could fermentate them (A. Homma et al, 2006).

Limal et al (2007) explain that despite açai's huge economic potential for the region (the area of Marajó in the study), the exploitation of this fruit has still not brought significant wealth to inhabitants of the region. The main explanation put forward is the lack of infrastructure that hinders verticalization of the industry. As such, the main form of fruit commercialized is raw with no transformation. The fruit sales logistics depend a lot on boats that do transportation between different regions, and thus the price of freight and importance of intermediaries. The further the producer the higher the number of intermediaries. For example, a small boat will buy production from different producers and sell it to someone who has a bigger boat. This second intermediary will gather more merchandise and take it further along the river. This can be repeated several times depending on how far the producer is from markets and industries. At the end fruits will be sold by a wholesaler at the market or to a pulp company. All these steps increase significantly the price of the final product. One of the explanations put forward is that in the region, investment is not seen as necessary since for most of the local demand small embarcations of producers are enough.

A lot of the extrative production potential is still not exploited. Indeed, there are many regions where açai trees are abundant but not picked because nobody will buy the fruits. This is especially the case in further regions where boats are few and small. Intermediaries thus cannot buy the whole production. This is accentuated by the lack of infrastructure in

municipalities' ports. Producers cannot deliver their production to the closest port because there is not space to store the fruit or to deliver it to the market or industries.

b) The lack of storage capacity

The lack of decent storage capacity is a big problem for the açai frozen pulp supply chain. Indeed, since production is very irregular during the year, pulp industries would ideally produce as much as they can during the main harvest season and store the frozen pulp to be sold when needed, especially during high season in the South of Brazil where most of national demand is and during summer in the Northern hemisphere. But most companies have very low storage capacity, they lack cold chambers. Local ports are not equipped either in storage space, be it public or private. So during the peak season they cannot produce to their maximum capacity because they would not be able to store nor to sell everything, and they have to sell everything at this time. Very few companies manage to produce at maximum capacity in harvest season and making mixes or pulp from other fruits during the rest of the year, therefore managing not to close the factory. The obstacle to getting such equipment is obviously the investment needed. Usually, companies cannot provide sufficient guarantees to obtain loans with decent interest rates. The second problem linked to storage stated by interviewees is the energy cost entailed by cold chambers. Some said that the problem was not capacity shortage but the high electricity cost of maintaining a big stock all over the year. A company said that they accept to deliver during low season for the same price as high season when fruit is cheap but that clients have to order and pay 50% one year in advance.

c) Exportation

Most importers import frozen pulp either to sell it as it is or to transform it into final products such as juices, sorbets, powder, and supplements. The main logistic problem when exporting the frozen pulp is temperature. Indeed to keep all the properties of the fruit and not to be contaminated açai frozen pulp has to be kept at the different steps of exportation below -18°C. This generates extra costs. Since the practice in the business is to use Free On Board (FOB) incoterm, this cost is born by the importer. For example, sending a 40-foot refrigerated container from Belém to Europe costs about US\$4,000. Sending to the US costs

about US\$3,800. It is about 15% cheaper for a 20 feet container. The price depends on factors such as the time of the year or the cost of fuel. To this transportation cost must be added the port tax, which is around US\$700. On top of the cost issue, comes the availability of the service. It is indeed not always easy to get a refrigerated container. And depending on the destination of the pulp, routes of logistics operators have to be checked in advance. Since the ports of Belém and Vila do Conde are not very big, some lines are scarce. Importers sometimes have to make decision on whether they send it to the closest port, which may not be on the main lines and thus means waiting longer for the proper boat line, or getting delivered on a port that is further but will be delivered sooner. Most pulp companies do not allow sharing containers so importers either have to fill the container by themselves or not to optimize it. Sometimes containers have to be sent to ports in the state of Maranhão or even in Recife to fill containers that are not full. This problem is also due to the lack of organization of the industry. The industry’s syndicate could help companies to gather their orders and share containers. This would reduce costs and make the supply chain quicker. Transportation time depends a lot on the importers port, it lasts usually 50 days to send a container from Belém or Vila do Conde to Asia (Korea or Japan), and 18 to 40 days to sent to the US, depending on the place.

Table 6 : Transportation steps from açai production fields to importer’s factory

Tranport used	Time lengh	Açaí form	Conditioning	Description
Boat	1 hour-3 days	Raw fruit	Fiber baskets (with ice for longer trips)	From production area to the market or port (can have several intermediaries)
Truck	1 hour-4 hours	Raw fruit	Plastic boxes	From the market or port to the pulp factory
Truck	1 hour-4 hours	Frozen pulp	Refrigerated container (-18°C)	From the pulp factory to the port of Belém (20 feet containers) or Vila do Conde (40 feet containers)
Boat	18 -50 days	Frozen pulp	Refrigerated container (-18°C)	From the Port of Belém or Vila do Conde to the importing company's closest port
Truck	Few hours	Frozen pulp	Refrigerated container (-18°C)	From the port of the importing company to its factory

Source: Field research

d) Problems for the importer

Because of the seasonality of fruit production and the lack of storage capacity of pulp industries in the state of Pará, prices change a lot during the year and importers are highly encouraged to buy pulp during the season, that is to say, from July to January. Since most importers are from North hemisphere countries (US, Japan, Europe), they have a sale seasonality with a strong peak during the summer (June to August). They therefore have to bear the cost of storage of their pulp or goods until that time. On top of the storage cost, it is also an important working capital financing need. The time between the moment they pay the order and the time they sell the product is long and has to be financed by short-term debt.

To conclude, the main logistics problems to açai exportation are due to the fruit fragility and its seasonal production. The first factor obliges a quick transfer of the raw fruit from productions areas to pulp factories. This is all the more challenging as those production areas are remote and the lack of proper infrastructures makes the use of different transportations and of different intermediaries hard to avoid. Once pulp is extracted from the fruit, it has to be stored and transported frozen at very low temperatures. This increases significantly those costs that have to be mainly bore by the importer.

III. Quality obstacles to açai exportation

a) Sanitary problems

i. Risk factors

Açaí fruit is a highly perishable product: even when refrigerated, if açai has not been through the conservation process it has a shelf life of 12 hours (Alexandre, Cunha, and Hubinger, 2004). Bolores and levures are naturally present on fruit's skin whereas fecal coliforms, salmonellas and other pathogen microorganisms are due to inadequate handling of the fruit. Inappropriate picking, conditioning, transporting and processing methods account for high microbe presence on fruits. On top of those external factors, açai degradation also comes from enzyme actions, responsible for changes of its organoleptic and nutritional properties. The enzyme peroxidase is the most thermo-resistant and thus used to measure the thermic treatment efficiency (Ribeiro I.C.D.; Silveira A.C.; Araújo M.L.M., 2010).

Rogez (2000) summarized the factors that can lead to microbiological contamination:

- The substrate is propice to contaminants growth because it is neither acid neither sweet. Being alkaline, the pulp is favorable to fungus and bacteria proliferation (Homma A et al, 2006).
- The ratio of fruit surface in contact with air and the weight of pulp is very high: The pulp represents 15% of the fruit weight, it is less than 1mm thick.
- Açai palm tree grows in tropical environments that are humid and hot, which is highly favorable to microorganisms and insects reproduction
- The lack of care during picking and transportation brings extra contamination because fruits get in contact with contaminated surfaces (floor, plastics, etc.)

Considering all those factors, quality control must be done not only on the final product but on all production steps, from fruit picking to delivery to final consumer, including transportation, storage and processing.

ii. The main danger: the Chagas disease

Between 2006 and 2008, there were 85 cases of Chagas (tripanossomíase americana) disease in Belém agglomeration according to the Secretaria de Saúde Pública of the state of Pará. More than half of them were due to consumption of açaí juice. In 1996, the oral form of Chagas disease was classified national concern by the Public Health Department. On that year 115 cases of Chagas disease were diagnosed in Brazil, 94 of them due to oral contamination, and 50 of them were related to consumption of contaminated açaí (Farias, Vidal, and Almeida, 2009). Those contaminations especially happened in non industrial consumption of açaí pulp (the large majority of consumption in the state of Pará). Lana and Tafuri (2000) explain that it can happen that during the juice production some infected insects are pressed with fruits. Another explanation is that « barbeiros », the insect that carries the disease would be attracted by lights of embarcations during transportation and of selling point and would fall in either the fruit basket or the machine that makes the pulp (Homma et al, 2006)

Table 7 : Cases of Chagas disease notificated to the Health department in 2007

Municipality	Number of cases	Number of deaths	Transmission	Vehicle
Belém Pedreira	6	0	Oral?	Ignored
Ananindeua PAAR	4	0	Oral	Açaí
Belém Terra firme	4	0	Oral	Açaí
Ananindeua	4	1	Oral	Açaí
Belém	2	0	Oral	Açaí
Total	20	1	100	100

Source: (Faria et al, 2009)

Açaí is thus the main vector of contamination by Chagas disease. The main explanation is the lack of hygiene in juice preparation and in fruit handling from picking to delivery. High açaí consumption and low education in the region are factors that explain part of those contaminations (Faria et al, 2009).

The increase of açaí plantations can also explain the growing number of cases of Chagas disease. Indeed, local population have been encouraged to cut natural tree to plant açaí tree which has changed ecosystem. This eliminated some of the habitat of the *T. cruzi* (Chagas disease is a zoonose) which brought the insects vectors of the disease closer to domestic animals and men (Faria et al, 2009).

The only way to kill the protozoaire responsible for the disease is pasteurization. Freezing, even as low as -20°C is not enough. But pasteurization is still not compulsory in Brazil.

iii. Safety solutions

To limit contamination risks, good agriculture practices and good producing practices must be implemented. This means that measures must be implemented at the different steps of açai production, transportation and transformation to guaranty food safety. On top of those practices, techniques such as whitening, pasteurization, freezing, drying help decreasing sanitary risks (See description of those processes above in the “Productive chain” part). Whitening reduces microbe presence without killing most thermo-resistant enzymes. Pasteurization destroys vegetative cells of microorganisms present in the fruit. It is used with açai because any more rigorous treatment would affect their organoleptic and nutritive properties. Freezing inhibits microbe development and slows down or stops almost every metabolic process. For açai, frozen pulp has to be kept between -18°C and -20°C, in the whole supply chain, until the consumer, which makes it more complicated and costly. Drying consists of taking out all or part of water in the fruit by heating it. It limits microorganisms’ growth and chemical reaction. Another advantage of drying is that manipulation, transportation and storage of fruits are easier. Because all those conservation techniques alter fruit taste, color, and vitamin composition and are expensive, in the state of Pará, açai is still consumed just after processing. But for other national markets and exportation those steps are indispensable.

a) Quality regulations

On January, 2nd 2001, the ANVISA (Agencia Nacional de Vigilância Sanitária) implemented the resolution RDC nº12 that regulates microbiologic standards for food, especially for juices and pulps. It fixed a maximum limit of fecal coliforms at 10^2 NMP/g of pulp and the absence of salmonella in 25g of product. However there is still no legislation on mesophile bacteria and some of those organisms are pathogens. There is no regulations on ash content either (Eto et al, 2010). Anyways those laws are barely enforced. There is no real control on final products.

The MAPA (Ministério da Agricultura Pecuária e Abastecimento), with the Instrução Normativa nº1 of 07/01/2000, defined the PH of açai pulp to be between 4 and 6.2. The same law categorized açai pulp according to the concentration in solid of the pulp (Eto et al, 2010):

- When no water is added to the pulp and there is no filtration it is called açai pulp
- When the concentration of solid is higher than 14% it is called “grosso” or “especial”
- When the concentration of solid is between 11% and 14% it is called “medio” or “regular”
- When the concentration of solid is between 8% and 11%, it is called “fino” or popular

Açai pulp with no added water contains at least 40% of solid. But this has only been done experimentally and no commercial depulping machines can take the pulp without water addition (Neto, Vasconcelos, and Silva, 2010).

However this text is not a proper law and as such does not mean anything. Anything can be sold at whatever name with whatever concentration. Pasteurization is not required either for national market (it is for exportation). Açai seems to be going through the same process as other agro products in Brazil such as coffee or orange. Industrialization starts with no law and as business gets bigger laws are created. Regulations meaning higher safety measures would force investment and many of small pulp producers would disappear and only the bigger ones would remain (there are currently around 3,000 açai pulp producers in Belém). Those laws have therefore not been voted for a long time because they would have bad repercussions on local politicians. But associations like AVABEL (Associação dos vendedores artesanais de açai de Belém) lobbied to have financing to allow small açai pulp producers to get sanitary equipment such as pasteurization machines. Since 2011, laws have been created and enforced to guaranty hygiene. The business must be registered at the prefecture, water must be filtered, staff must wear a uniform, inox material has to be used, etc... This represents important investments for those small shops but they can get financing from national banks such as Banco da Amazonia or Banco do Brasil. But the problem with açai is that it is a traditional product. There are about 3,000 traditional açai pulp makers (“batedeiras”) in Belém and many of them are illegal, especially during the harvest season when many people sell açai pulp. So those regulations have already forced some of them to

close but they usually open again afterwards illegally. It can be estimated that about 90% of those shops are illegal.

But pasteurization is still not necessary for national market and very few companies master the technology. In 2011, 10 companies were able to pasteurize pulp in the state of Pará. Today three of them have disappeared and others have merged so there are 6 companies left able to produce açai pasteurized pulp. Other companies that would like to export pulp would have to outsource the operation to another company.

b) Current quality situation

The growing industrialization of açai productive chain helped improve quality. For example some companies (the bigger ones) are on their way towards international certifications such as the Hazard Analysis and Critical Control Points (HACCP) method (Santana, 2007). Costa et al (2004) explain that pulp industries are trying to gain market shares through quality improvement. This is especially done by getting closer to suppliers in raw material, both geographically and by reducing the number of intermediaries. Those companies are trying to hire more qualified employees and implement new industrial practices.

Quality and certifications are key to conquer foreign markets. For example, when Sambazon started to export açai to the american market it decided to sell it as a fair trade and organic product. It thus paid some guaranteed prices that were higher than market prices to producers (25% higher compared to prices paid by intermediaries according to Sobrinho (2005)) and also had to have the fruits certified as organic since they were produced without any chemical product. In 2003, the Guaranteed Organic Certification Agency (GOCA) audited the production and gave the certification to the cooperatives and associations (Soares, and Costa, 2005). Kosher, Halal, ISO 22,000, GMA Safe were other certifications cited in interviews. Moreover, since açai products are usually marketed as anti-oxidant products abroad, importing companies usually ask for a minimum antocionyne content.

However this kind of behavior still does not apply to the whole production and small companies do not manage to implement this kind of quality control (Homma et al, 2006). Quality is also hard to control because there is still no specific legislation on açai manufacturing and no efficient control (Homma et al, 2006). In a market that has become competitive, some companies get market shares by lowering prices, which is sometimes done at the depends of product quality. This is usually done by diluting pulp with water or

reducing the proportion of fruit solid parts in it. This is particularly the case in Rio de Janeiro and Sao Paulo where it is called “aguáí”. Low consumer knowledge of açai products and the strong color of the fruit that makes it look the same when diluted explain that such practices can exist without being noticed. This kind of practice is all the more widespread now that prices have increased a lot. In Belém, the pulp sold in small shop tends to be less concentrated in the low producing season, when prices are at least double of high season. The problem of pulp concentration is even sharper for exportation because with higher transportation costs, transporting useless water has a big impact on final price. But pulp dilution is less common with exportation because clients are bigger, pay closer attention to this and pulp companies charge more than for national market. Moreover not much research is done to improve pulp extraction techniques and avoid dilution. Techniques to produce high concentration pulp or açai powder have still met many obstacles. Water still has to be added to extract açai pulp and the powder that was developed has a short conservation time. All this entails a high price for exportation (Alexandre et al, 2004).

Studies have shown that sanitary problems are still many. In 1994, Veloso and Santos (1994) found levels of coliform concentrations higher than 2400 NMP/g in juices and in 2000 Rogez (2000) found concentrations higher than 1100 NMP/g when the legislation defined by ANVISA is of a maximum of 100 NMP/g. But the analysis done by Eto et al in 2010 on 6 samples of açai pulp did not find any salmonella nor coliforms, which may mean that quality has been improved through the years. However only 2 of the 6 samples studied on this research had a PH in the frame defined by MAPA and 3 had a concentration in solid in the pulp lower than 7% when the lower limit for açai “fino” is 8%. Physico-chemical analysis show evolution over time, which demonstrates that chemical reactions still continue.

Agro chemical are not a problem for now because they are very scarcely used in açai production. Indeed, even though some potential diseases have been observed on other palm species, açai trees have mainly stayed unaffected for the moment. This is most probably a matter of time because diseases usually appear after some time when production reaches a bigger scale. Parasites such as snails that eat açai fruits start to be observed but no chemical is used against them. Indeed, chemical use is closely regulated in Brazil and for a specific plant only a specific treatment can be used. For açai tree, nothing has been authorized for the moment. So the presence of agro chemicals on fruits is not a problem for exportation. However chlorine is usually used to wash fruits before pulp is extracted and

there is no regulation on chlorine limits in Brazil. This could create problems in other countries that have chlorine limitations.

To conclude, there are two main quality problems: sanitary problems and pulp concentration problem. The first one is the most important because it involves human lives. Because of fruit properties and the environment where it is produced, the probability that it will be contaminated are high. The solution exists: implementing good practices in fruit production, transportation and processing, and using treatments that will make the product safer such as pasteurization and freezing. Those solutions are not used by most players in the productive chain, especially because of lack of information and lack of regulations. Regarding the second point, the lack of control of pulp concentration and repression of companies that cheat on it explain those problems.

IV. Price obstacles to açai exportation

a) Price constitution

Açai pulp price is quite high. According to the field study, in 2011 average price for industrial pasteurized frozen “açai medio” pulp was around US\$4.10 a kilo. One of the reasons is the high number of intermediaries involved in the process. As explained above, even though some industries are now trying to have direct contact with fruit producers, the market is still dominated by intermediaries. They buy fruits to producers and take them to the market to be sold. They get a big part of the profit and less goes to the producer. The further the producer, the more complex the supply chain and the higher the number of intermediaries. More and more small local pulp producers (“batedeiras”) try to get in direct contact with producers to get lower prices. They rent their own boat or go with the car to the producer’s municipality to skip intermediaries. This is done to increase profit, especially in a time when safety regulations start to be enforced and mean high investment for those small producers. This means lower cost for those local producers but is no good news for pulp industries that already buy their fruits directly from there. Indeed supplier-customer loyalty is low so if someone offers a higher price, producers will easily switch to the customer that pays the most. Prices thus go up for industry and fruit availability is lower.

At the end of the chain, frozen pulp price is about the same for exportation and national market (could be a bit higher for exportation). But the main difference is between pulp industries and small local pulp shops. Indeed, since they are small, the “batedeiras” buy fruits that have been through more intermediaries and that are therefore more expensive. The pulp they produce can therefore be up to three times more expensive than the one sold by pulp industries.

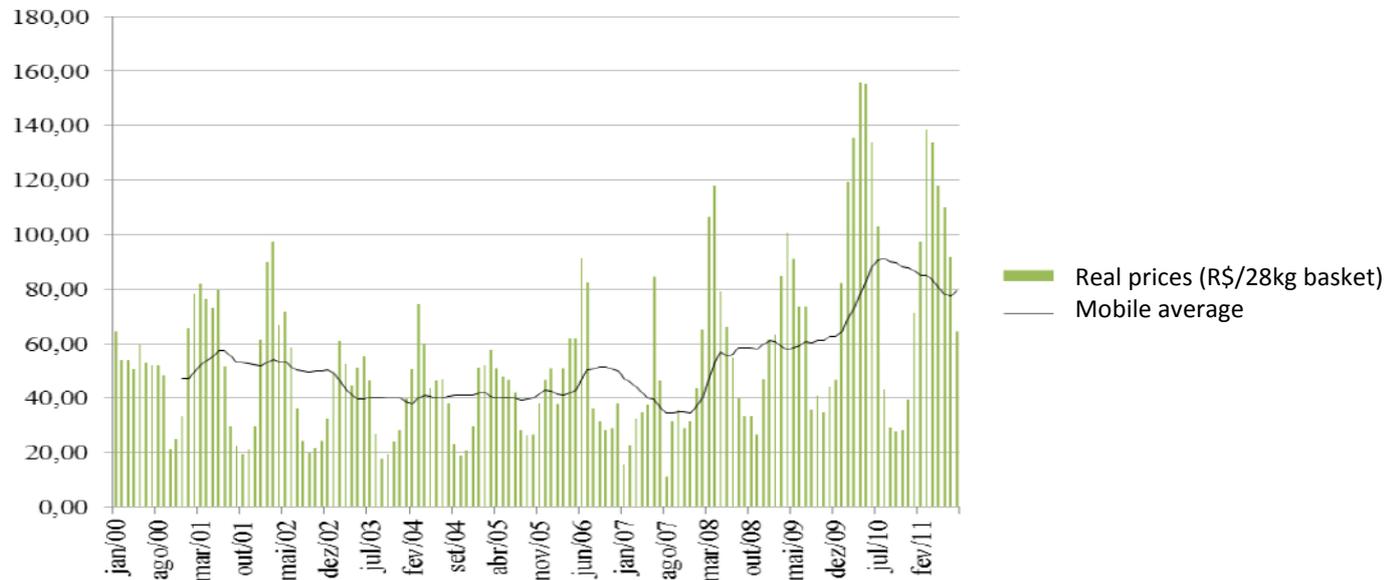
b) An offer that does not manage to keep the pace with demand

Aguiar and Santos (2011) have identified two price patterns: A long term rising trend and a yearly seasonal cycle.

As shown on the graph below this raising trend started in the beginning of the 2000’s and got steeper in after 2007. This trend is explained by the fact that the increase of the

production in the 2000's did not manage to compensate the growing demand and stop prices from increasing (Santana et al, 2010).

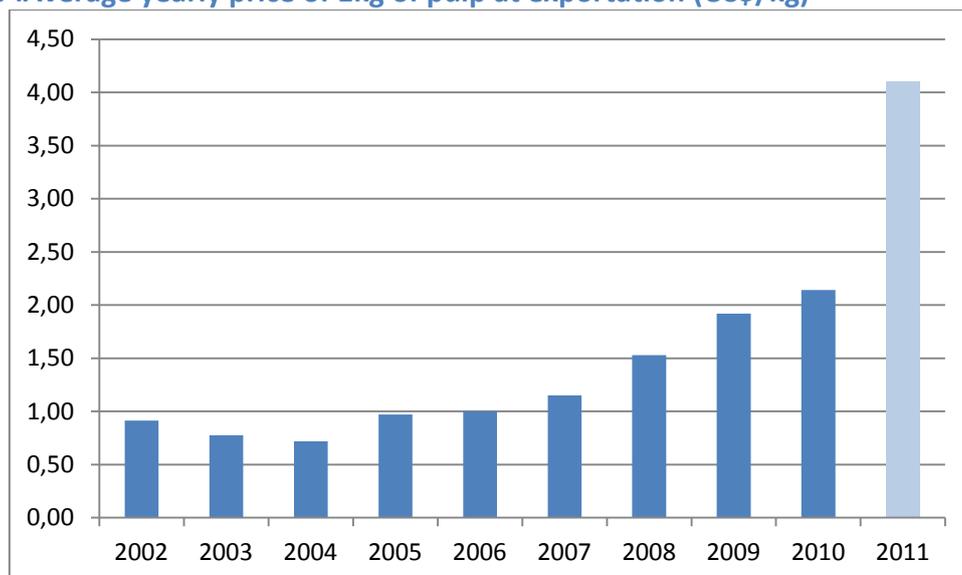
Figure 19. Evolution of real prices in Belém wholesale market. Jan 2000-aug 2011. Values in R\$ of august 2011, corrected by IGP-DI (FGV, 2011).



Source: Aguiar, and Santos, 2011

Costa et al (2011) show that the pulp prices have increased by 5%/year between 2002 and 2010 while the price of the raw material has increased by 15.5%/year. For international market the increase has been of 7%/year for processed pulp.

Figure 20 :Average yearly price of 1kg of pulp at exportation (US\$/kg)



Source: Sindfrutas, field study (estimation for 2011)

c) Strong price variations during a year due to production seasonality

The second pattern is visible on the graph below. This cycle is due to production pattern. The production is low during the first semester (about 20% of the yearly production) because it is the rainy season in main producing areas whereas most of the picking is done in the last months of the year (CONAB, 2012). As explained before, only irrigation (that remains scarcely used and production from other states (Maranhão and Amapá)) compensate marginally this cycle.

Figure 21: Seasonal price index in the wholesale market of Belém (R\$ per 28kg of fruits), 2011



Source: Aguiar, and Santos, 2011

To conclude, raw material prices follow two trends. The first one is due to the recent increase in demand that has entailed a raising price trend. Parallel to this, there is a yearly price cycle due to fruit availability. Price of raw material is accentuated by the important role played by intermediaries in the supply chain of pulp industries. However pulp prices from industries have increased much less than those of raw material because of increased competition between those companies.

V. Regulation obstacles to açáí exportation

a) Lack of a clear framework on açáí exportation

All merchandises have a code in the Nomenclatura Commun do Mercosul (NCM) that is in accordance with the international Harmonized System (HS). The code that is usually used for açáí pulp is 20098990, which is denominated as “Juice of other fruits, without fermentation, without sugar addition”. But exporters can choose other codes, if they mix açáí pulp with other fruits for example (mix with guarana syrup is common for example). For transformed products, other codes can be used, and some flexibility is allowed since a product can belong to different categories. For example a sorbet can be exported under different codes. The choice is usually made according to most favorable tax conditions for importer. The problem is that since açáí pulp does not have a specific code for itself, no public policy can be implemented to incentivize its exportation. If something is done it will target all products (namely other tropical juices) that belong to the code. However the creation of a specific code does not seem to be a priority. The process that allows creation of a new code is indeed complex and long. The Ministério do Desenvolvimento, Indústria e Comércio Exterior (MDIC) has to make a request that is checked by the Chamber of Commerce and then approved by the Conselho das Nomenclaturas.

b) Certifications

Certifications are usually necessary or at least a strong point when doing exportation. This represents extra cost for companies because they have to pay organizations to audit them and give them the certification. Since açáí production barely uses agro chemicals açáí products are usually marketed as organic products abroad, which need the proper certification. Kosher and Halal certifications are a plus for American market. GMA-Safe and ISO 22000 were also stated in interviews as certifications used to prove product safety.

c) Trade barriers

i. Import taxes

When a product arrives to the importing country, customs of this country will translate the code of the exporting country into a corresponding code in its national system. Since there is usually no specific code for açai products, taxes depend on the fiscal code chosen. Taxes are calculated on the Cost, Insurance and Freight (CIF) price.

The example of the European Union

In the European Union (EU), açai pulp now has a specific product code: 2009 89 79 85. It is defined as “Açai berry juice concentrate” and has the following characteristics:

- The fruit has to come from the specie *Euterpe oleracea*
- The pulp has to be frozen
- Not sweetened
- Not in powder form
- Have a Brix value (sugar content) between 23 and 32
- In immediate packaging of 10kg or more.

According to the regulation R1006/11, the import tax is of 16.8% (<http://exporthelp.europa.eu>).

ii. Non tariff trade barriers

Importations, especially of food products, are usually regulated by non-tariff trade barriers. Those are regulations on product safety, origin and other aspects that guaranty that products that enter a territory respect the laws of this territory. Exporters have to handle documentations to authorities in Brazil that will approve them and authorize exportation. This assures that the receiving country will accept the export. Since requirements are different according to each country, the exporting company has to do a research every time it exports to a new country to make sure its product is in accordance with that country requirements and to know what are the documents that will be required for exportation.

The example of the European Union (EU)

1. Control of contaminants in foodstuffs:

Council Regulation (EEC) No 315/93 regulates the presence of contaminants in foodstuffs in the EU:

- food containing a contaminant to an amount unacceptable from the public health viewpoint and in particular at a toxicological level, shall not be placed on the EU market and will be rejected
- contaminant levels shall be kept as low as can reasonably be achieved following recommended good working practices
- maximum levels may be set for certain contaminants in order to protect public health

Commission Regulation (EC) No 1831/2003 sets maximum levels for certain contaminants in food to be placed on the EU market(<http://exporthelp.europa.eu>).

2. Health control of foodstuffs of non-animal origin:

The general rules applicable to these products are as follows:

1. General principles and requirements of Food Law established in Regulation (EC) No 178/2002 of the European Parliament and of the Council
 - Compliance or equivalence: Imported food must comply with the relevant requirements of food law or conditions recognized by the EU to be at least equivalent thereto.
 - Traceability: The Regulation defines traceability as the ability to trace and follow food and ingredients through all stages of production, processing and distribution. Importers will be required to identify from whom the product was exported in the country of origin. Unless specific provisions for further traceability exist, the requirement for traceability is limited to ensuring that businesses are at least able to identify the immediate supplier of the product in question and the immediate subsequent recipient, with the exemption of retailers to final consumers (one step back-one step forward).
 - Responsibilities of food importers: Food business operators at all stages of production, processing and distribution within the businesses under their control shall ensure that foods satisfy the requirements of food law which are relevant to

their activities and shall verify that such requirements are met. If a food business operator has reason to believe that imported food is not in compliance with the food safety requirements, it shall immediately initiate procedures to withdraw the food in question and inform the competent authorities thereof(<http://exporthelp.europa.eu>).

2. General foodstuffs hygiene rules according to Regulation (EC) No 853/2004 of the European Parliament and of the Council

- General obligation on the operator to monitor the food safety of products and processes under his responsibility.
- General hygiene provisions for primary production and detailed requirements for all stages of production, processing and distribution of food.
- Microbiological criteria for certain products which are established in Commission Regulation (EC) No 2073/2005. Especially, unpasteurized fruit and vegetable juices must have less than 100cfu/g of E.coli (Escherichia coli, a kind of fecal coliform) according to the ISO 16649- 1 or 2 method. Salmonella should be absent in 25g according to the EN/ISO 6579 method.
- Procedures based on Hazard Analysis and Critical Control Point (HACCP) principles.
- Approval and registration of establishments (<http://exporthelp.europa.eu>).

3. General conditions concerning contaminants in food

- Maximum levels of certain contaminants in foodstuffs: Certain foodstuffs (including fruit juices) must not, when placed on the market, contain higher contaminant levels than those specified in Commission Regulation (EC) No 1881/2006. This Regulation covers four different categories of contaminants: nitrates, aflatoxins, heavy metals (lead, cadmium, mercury) and 3-monochloropropane-1,2diol (3-MCPD), etc.
- Maximum levels of pesticide residues in and on food: Member States may restrict the putting on the market within their territories of certain products containing pesticide residues if the quantity of these residues exceeds the maximum levels permitted presenting an unacceptable risk to humans. These

limits depend on the toxicity of the substance in question. Regulation (EC) No 396/2005 of the European Parliament and of the Council sets up harmonized maximum levels of pesticide residues for agricultural products or parts thereof intended for food to be used as fresh, processed and/or composite food in so far as they may contain pesticide residues.

- Maximum levels of radioactive contamination of foodstuffs: Council Regulation (EC) No 3954/1987 and Commission Regulation (EC) No 944/1989 lay down the maximum permitted levels of radioactive contamination of foodstuffs (either immediately or after processing) which may be placed on the market following a nuclear accident or any other case of radiological emergency.
 - Materials intended to come into contact with foodstuffs: Materials and articles intended to come into contact with foodstuffs must be manufactured so that they do not transfer their constituents to food in quantities which could endanger human health, change the composition of the food in an unacceptable way or deteriorate the taste and smell of foodstuffs. Regulation (EC) No 1935/2004 of the European Parliament and of the Council establishes a list of groups of materials and articles (such as plastics, ceramics, rubbers, paper, glass, etc.) which may be covered by specific measures that include a list of the authorized substances, special conditions of use, purity standards, etc. Specific measures exist for ceramics, regenerated cellulose and plastics(<http://exporthelp.europa.eu>).
4. Special provisions on Genetically Modified (GM) food and Novel food of Regulation (EC) No 1829/2003 of the European Parliament and of the Council and Regulation (EC) No 258/97 of the European Parliament and of the Council
- Genetically Modified food must get an authorization from European Food Safety Authority (EFSA)
5. General conditions of preparation of foodstuffs

- Authorized food additives and flavorings: The only substances which may be used as food additives are those included in the approved common lists and then only under the conditions of use mentioned in those lists (e.g. colorants, sweeteners, preservatives, emulsifiers, stabilizers, raising agents, etc...).
- Preparation and treatments of certain foodstuffs: There are also rules in relation with the manufacture, marketing and importation of foods and food ingredients that are subject to specific treatments such as Council Directive 89/108/EEC on quick-freezing or Directive 1999/2/EC of the European Parliament and of the Council on ionising radiation.
- Specific provisions for certain groups of products and for foodstuffs for particular nutritional purposes: Specific provisions are applied to certain groups of products (such as cocoa, sugar, etc.) and to foodstuffs intended for particular nutritional uses (baby foods, dietary foods, gluten-free foods...). These may include specific requirements on composition, hygiene, labeling (e.g. declaration of the energy value, carbohydrate, protein and fat content), list of additives, purity criteria, etc.

6. Official control of foodstuffs

- The competent authorities in Member States will carry out regular controls on imported food of non-animal origin to ensure they comply with the EU general health rules designed to protect health and interests of consumers. The control may apply to import into the EU and/or to any other stage of the food chain (manufacture, processing, storage, transport, distribution and trade) and may include a systematic documentary check, a random identity check and, as appropriate, a physical check(<http://exporthelp.europa.eu>).

iii. Products from organic production

The placing on the European Union (EU) market of live or unprocessed agricultural products, processed agricultural products for use as food, animal feed, seeds and vegetative propagating material, bearing a reference to organic production methods, must comply with

the rules laid down by Council Regulation (EC) No 834/2007. Those rules cover the following aspects:

- Production, processing, packaging, transport and storage of products
- Use of certain products and substances in processing of food (Annexes VIII and IX of Commission Regulation (EC) No 889/2008).
- Prohibition of use of genetically modified organisms (GMO) and of products manufactured from GMO in organic production
- European Union organic production logo (New from 1 July 2010). The logo and indications referring to organic production methods may be used only for certain products, which meet all the conditions laid down by Regulation.
- Inspection measures and specific control scheme to be applied for this type of products by the appointed authorities in the Member States.

Since Brazil is not part of the third countries included in the list of authorized countries established by the Annex III of Commission Regulation (EC) No 1235/2008, organic products have to be certified by recognized inspection authorities. So açai pulp producers must be controlled by those authorized organizations to be able to export their products as organic (<http://exporthelp.europa.eu>).

To conclude, a Brazilian açai pulp exporter faces two kinds of bureaucratic problems when exporting: internal and external barrier. Internally, the main problem is that açai, contrary to other fruits with significant exportations does not have any specific product nomenclature. This limits policies to incentivize this product, makes analysis more confused (açai products are mixed with other fruits in databases). Externally, the two main hurdles are tariff barriers and non – tariff barriers. As seen with the example of the European Union, developed countries have many regulations, especially on food products, and requirements are usually above Brazilian standards.

Chapter 4: Recommendations for public and corporate action

VI. Public action

a) The social dilemma of açai production

The main dilemma for public action regarding açai is about the scale it wants to give açai, especially considering potential social seamy sides. Indeed, right now açai production is centered on traditional extraction by local population along the Amazon River. This is the main source of income for those populations that live in remote areas. With such system, the present study has shown that açai production is limited and thus has limited international potential. If Brazil pretends to give this fruit a true international place, production has to be increased, especially through plantations. This could generate significant income for Brazilian economy but could also have a cost for those local populations. If plantations were to be implemented, production could switch from local small producers to big agro companies, thus taking away from the former their main source of income. However, this study tends to prove that the two systems of production could cohabitate. Indeed, as it is done with many other crops such as coffee in Brazil, there could be on one hand massive production from plantations that would have to use chemicals and poorer soils that would impact product high quality and on the other hand the current traditional production in varzeas based on organic, fair trade, high quality products. This is why even though one could imagine that developing plantations would threaten local small producers, this study still recommends developing plantations in order to boost international demand by lowering prices.

b) Develop infrastructures

Infrastructures in açai producing areas are very poor. This is explained by very hard nature conditions and low investment. Indeed with local constraints problems are many and costs are high: producing areas are far away, deep in thick humid rainforest, the river is

everywhere. Low population density usually does not justify heavy infrastructure investment. However, the situation could be improved and this would have a big impact on açai production. Indeed, the present study has shown that the main problem with açai is that offer has not managed to keep the pace with the demand boom. Even though the product commercialized to final consumer is açai pulp, the lack of pulp comes first from the lack of fruits. The first way to increase production is to extend managed extraction. Indeed it has been shown that in many areas, açai fruits are not picked because producers would not be able to sell them. The reason to this is that those places are remote and infrastructure to bring them to markets and industries are deficient. The only way of transportation is boat and since most villages are not equipped to receive those boats (pier, storage capacity) or are not linked to the road network; longer distances have to be done in boat. This means lower fruit quality because the fruit, which is very perishable, is damaged during transportation; it also means more intermediaries and thus a higher cost of raw material. So to improve fruit quality, increase quantities by making more distant production areas competitive and decrease price, investments in infrastructures have to be done. As a consequence, despite all the natural obstacles to building performing infrastructures, some more ports on the river could be equipped and roads could be improved so that pulp companies, industrial or not, can get fruits faster and cheaper.

Building such infrastructures would help solving another strong problem in açai production: its seasonality. Indeed, this study has shown that 92% of açai production is done in the state of Pará and that in this state the main production period is from July to December. This accounts for a fruit shortage during the rest of the year. But in other regions such as Amapá, Maranhão and Amazonas, the main harvest is at a different time. Developing production in those areas would equilibrate production and lower seasonality of açai fruit availability. The only solution to do so is again to develop infrastructures that will allow to quickly bring fruits to industries and markets.

c) Encourage research

Even though research and development can also be conducted by private companies, public institutions should support it, especially since companies in the sector keep being small and

with low investment capacity. Research should be accentuated in institutions such as Embrapa or Universities such as the Universidade Federal da Amazonia (UFPA), the Universidade da Amazonia (Unama) or the Universidade Federal Rural da Amazonia (UFRA). Those researches should have three main axes:

The first axis should be towards açai plantations. Indeed, as explained above, fruit availability is still low compared to demand. It has been explained that extractive areas could be extended, which is good because for now it is the most efficient way to cultivate açai. However, as it has just been explained, logistic problems are many. Having performing plantation would allow having fruits close to markets, industries and infrastructures. However the present study has shown that those plantations are still few because they face many hurdles: dry lands are poor in nutrients, thus making fertilizers unavoidable; irrigation has to be used, threatening ecosystems. On top of those ecological problems, plantations are more expensive because they need more manpower, more care, irrigation and fertilizers. But now that prices have boomed this kind of culture has become competitive. This is why public agencies such as Embrapa and universities should invest in research to develop species that would need less water and less nutrients. They should see if some water resources could be utilized without threatening ecosystems, if natural fertilizers could allow high productivity.

The second axis should be towards mechanization and growing techniques. The study has shown that açai production keeps being very traditional; fruits are extracted from the wild by men (sometimes children) who climb trees. Research should find ways to mechanize production, to optimize it. Some managed extraction techniques indeed start to show their limits in regions where productivity decreases. This is due to unsuited techniques such as too high concentration of trees. Moreover diseases and parasites are starting to appear. Those should be studied and solutions should be found to fight them. This study has shown that some of this knowledge already exists but many stakeholders do not know about it or do not implement it. Communication and training should be intensified.

The third research axis is about açai final product. Indeed for now only way used to conserve açai is to extract the pulp and to freeze it. The present study has shown that this frozen pulp

entails many logistics problems and cost for açaí distribution, exportation in particular. The two main solutions that can be contemplated for the moment are getting higher concentration pulp and producing açaí dry powder. But now no commercial machine can extract the pulp without substantial water addition and the powder that has been developed by Embrapa is very perishable. The field study has shown that there is no current research on those key aspects. Finding ways to export unfrozen or/and açaí pulp with less water would dramatically reduce logistic costs.

d) Help access to financing

It has just been explained that plantations, mechanization, improved managed extraction would increase production and reduce fruit availability seasonality. However implementing those innovations needs important investments: manpower, machines, chemicals, irrigation... And this study has shown that most of producers are very small, poor and do not have this investment capacity. And the field study has shown that one of the main reasons for the wave of pulp companies' bankruptcies in the last years is the lack to working capital financing: because they were not able to get short term debt to finance their working capital many companies went bankrupt. Current access to financing is indeed poor. Because they do not have guaranties, because a decent part of them is still informal, because interest rates are high compared to their margins, they cannot access short or long term debt. Institutions like Banco da Amazonia, Banco do Brasil, the FNO should start or intensify their loans to those producers to help them increase their production. Micro credit would be an efficient solution to the problems of those small producers.

The financing problem is the same for industries. Many of them do not have pasteurization machines, which are indispensable for exportation. Storage capacity is very low, which is why they have to sell everything they produce during the harvest season and face shortage during the rest of the year. Sufficient storage capacity would be a big solution to fruit seasonal availability. Storage also means higher working capital need and short-term financing. The study showed that the financing effort from the FNO was focused on fruit

production but many companies have closed because they could not get sufficient short and long-term debt. This is why banks should also give subsidized loans to those pulp industries.

e) Build a stronger quality legal frame

The present study has shown that açai product legal frame is very weak. This raises quality and safety problems in Brazil and is a hurdle to integration of this industry in foreign markets. This situation has to be improved.

i. Enforce existing laws

Since 2011, laws have started to be enforced in açai production. But problems persist. Indeed due to those policies a big majority of the traditional pulp shops in Belém are illegal. There is therefore a lot of work to do to regulate the situation. Other laws such as the resolution RDC n°12 launched in 2001 by the ANVISA that regulates microbiologic standards for food, especially for juices and pulps are barely enforced. There is not real control on final products. Various studies indeed showed that the level of fecal coliforms in some products was above the limit of 10^2 NMP/g of pulp stated by the resolution. Effort should be done to better control that products launched on the market actually respect existing legislation.

ii. Create laws to regulate producing, transporting and transforming processes

Current laws, when they exist, regulate the composition of final product. However since açaipulp productive chain is complex, the different steps should be regulated in order to maximize final product's quality. Most of açai contamination comes from inappropriate handling methods at those steps so implementation of good agriculture practices and good manufacturing practices would improve produce quality. Laws should thus be passed to regulate fruit production. For example:

- Fruits should not be let under the sun after picking
- Fruits should not be put on earth and close to livestock
- When fruits are taken off from the bunch, workers should have clean hands.

They should regulate transportation:

- Fix a maximum transportation time
- Force the use of ice for longer trips

- Forbid the presence of fish and other animals in the same boat

Pulp processing should be regulated too:

- Operators should have proper uniform and boots that are clean
- The washing process should be standardized
- The cold chain should be respected all along the distribution process
- Pasteurization or whitening should be necessary

Stakeholders of the açaí productive chain should be audited to make sure those standards are respected. For now only a few main industries that export have those quality standards for international markets and they have to pay for certifications. Implementing such regulations for everybody would increase product safety on national market and allow a larger number of companies to export.

iii. Create laws on fruit concentration and its labeling

The regulation on concentration is currently done according to the Instrução Normativa nº1 of January the 7th, 2000 of the MAPA. But this document is just an instruction so it has no legal power. It should be a law and the exact concentration of the pulp should be written on product packagings. For now it is only written açaí fino, medio or grosso, but since there is no law to back it up it does not mean anything to the customer. The customer trust pulp companies and distributors but studies have shown that dilution is a current practice, especially on the national market.

f) Give a nomenclature to açaí pulp

The main exported fruits in Brazil have their own NCM (orange, pineapple, passion fruit...) but açaí still does not. Now that this fruit has become significant in exportation; it is the main export fruit of the state of Pará, 30% of demand for frozen pulp comes from abroad; açaí need its own code. This would help exportation analysis and allow a specific treatment of the fruit that would encourage exportations.

g) Creating a “Açaí Zespri”

The first chapter introduced the model developed in New Zealand that allowed the country to build a strong kiwifruit industry. Considering the success of kiwifruit in the world, the açai industry in Brazil should try to draw lessons from this case. Without going as far as creating a one-desk exporter for all the production, creating a body to help developing the industry would be helpful. It could take the shape of a company owned by açai growers, pulp producers and the state. This structure could conduct research on the axis described above in this part. It could build marketing campaigns abroad to develop the image of açai and understand market requirements, just like Zespri did with the kiwifruit. It could set standards of quality that would help meeting foreign countries standards.

VII. Corporate action

There are many actions that pulp companies should conduct to be more competitive and thus offer lower prices and better products for exportation.

a) Avoid intermediaries

The present study has shown that the chain of intermediaries between fruit producer and pulp industry can be long, especially for remote producers. This situation significantly increases raw material price, which threatens exportations, especially in a context of increasing tensions between offer and demand. Moreover, those additional steps damage fruits and reduce pulp quality. Some industries have already managed to get in contact with producers or cooperatives to avoid intermediaries in order to struggle against the price booming trend. This practice should be extended to the whole industry. It would mean lower raw material cost, higher quality, higher margin and lower final price.

Açai pulp companies could even conduct sustainability policies such as the one Natura has been carrying out with its Ekos brand. This line of products created in 2000 aims at using traditional knowledge from local communities to create new products. Between 2000 and 2010 the company partnered with 19 communities gathering 1.714 families to exploit 14 different products (Natura, 2010). Natura establishes with those communities systems of agro forest management and low environmental impact. Through partnership with

communities, cooperatives, NGOs, research centers and government bodies, Natura guarantees that raw materials are extracted or cultivated sustainably all along the supply chain. Diversification and preservation of the forest is encouraged, which prevents erosion and desertification in areas where the forest used to be burnt or cut to make pastures. Natura not only buys the products of those communities at a fair trade price but also provides financing support and training. This kind of behavior should be encouraged among companies working with açai. It would improve product quality, help local communities and have a strong benefic impact on açai image.

b) Diversify production

One of the main problems faced by pulp industry is the seasonality of açai fruit availability. This makes human resource management particularly hard because plants have a strong decrease during the low fruit availability season. Some close the factory or can just keep a small part of their employees, which is costly. The solution to this is to produce pulp from different fruits such as cupuaçu, bacuri, camucamu, maracujá, graviola, tapereba, etc. Some of those fruits have a harvest period that is complementary with the one of açai and allows maintaining part of the activity. This makes even more sense, as those tropical fruits are getting trendy abroad and mixes of açai with some of them common.

c) Increase storage capacity

This fruit availability seasonality problem has another strong impact on frozen pulp availability for exportation. Indeed, almost all the frozen pulp is produced during half of the year and there is no sufficient capacity to store it during the rest of the year. So pulp industries have to get rid of their whole production during high season. If they were able to supply pulp during the rest of the year they would attract new clients and be able to sell at higher prices. Those two strong advantages should compensate electricity costs of cold chambers.

d) Be more market oriented

One of the main problems that have been unveiled from the field study is the lack of market orientation of those industries. Only very few of them have a strong market vision. Customer service is low: there are important delays without explanation; suppliers do not answer customers' requests. Some are not able to provide a price list, saying that prices change every day depending on raw material price.

Most of them keep selling frozen pulp only, thus making customer create final product abroad. Those companies should go up the value chain to create more added value. They should invest in marketing and create their own brand and sell it abroad. They should develop products that match foreign market demands such as juices, ice creams, supplements, energy drinks. They should invest in research and development to create those products and find solutions to exportation problems. For example, try to create higher concentration pulp or powder. Creating those new products would give them competitive advantages and higher margins. This situation would be much better for the whole industry than the current situation of price battle between producers that have exactly the same product.

One of the actions to be taken to reach those goals is to hire high quality executives, people who did superior studies in science and management. Those people should be able to realize that the goal of those pulp companies does not limit to produce frozen pulp forever but that it should differentiate from competition with creativity and research.

e) Improve industry organization

It has been shown that companies in the açai pulp industry have a low level of cooperation. Even though they have an active syndicate, it does not lead to concrete actions. Companies should cooperate towards the following actions:

- Building common storage capacity
- Merging their orders to offer container fractioning
- Lobbying for the creation of a NCM for açai
- Negotiating with banks and government to get better access to financing

Those objectives cannot be reached without cooperation.

The table below summarizes the actions that should be conducted to solve existing hurdles to açai exportation in Brazil.

Table 8 : Summary of actions to be conducted in order to facilitate açai exportation

Problem	Solutions	Actions
Insufficient fruit production	<ul style="list-style-type: none"> • Extend managed extraction • Develop plantations • Intensify production 	<ul style="list-style-type: none"> • Develop infrastructures • Research to improve production efficiency (mechanization, growing techniques) • Improve access to financing
Production seasonality	<ul style="list-style-type: none"> • Extend production to other regions • Develop plantations • Increase storage capacity of frozen pulp 	<ul style="list-style-type: none"> • Develop infrastructures • Research to make plantations sustainable • Improve access to financing • Invest in cold chambers
Pulp industry low competitiveness	<ul style="list-style-type: none"> • Diversify production • Be more market oriented • Avoid intermediaries • Improve industry organization 	<ul style="list-style-type: none"> • Produce pulp from other fruits • Hire better talented people • Create brands and new products • Make agreements with producers • Make the industry syndicate more active
High exportation logistics costs	<ul style="list-style-type: none"> • Develop higher concentration pulp and non-frozen conservation techniques 	<ul style="list-style-type: none"> • Do some research and development
Poor quality and safety frame	<ul style="list-style-type: none"> • Build a stronger law frame 	<ul style="list-style-type: none"> • Enforce existing laws • Create laws to regulate producing, transporting and transforming processes • Create laws on fruit concentration and its labeling
No specific designation for açai products	<ul style="list-style-type: none"> • Give açai products a specific designation 	<ul style="list-style-type: none"> • Create a nomenclature for açai frozen pulp

Conclusion and limitations

Obstacles to açai pulp exportation have been identified on the five variables defined. Many of them are not specific to the exportation process but to general problems in the açai productive chain. Most of those difficulties are linked one to another.

The main result of all those problems is that açai pulp is an expensive product to export, which makes it a high-end product. The first reason for this high price is the high price of raw materials. Indeed the recent and quick increase in demand has entailed a raising price trend. Production is hard to increase and this takes time so raw fruits are not available in sufficient quantities all year long and overall offer is still way below demand. This problem is accentuated by the strong seasonality of fruit production that makes fruit prices change a lot during the year. Price of raw material is accentuated by the important role played by intermediaries in the supply chain of pulp industries. However pulp prices from industries have increased much less than those of raw material because of increased competition between those companies.

This war on prices between pulp companies has led some of them to bankruptcy because this business faces many hardships. First, the irregular and low availability of fruits makes it hard for pulp companies to maintain production all over the year and some have to close part of the year. To make it worse, the lack of financing accounts for low equipment, especially in pasteurization and cold chambers, that would allow them to deal with this seasonality. Finally, bad management and unqualified staff explain low competitiveness and customer service level of some companies.

Açai is an expensive product to export for logistics reasons too. The main logistics problems to açai exportation are due to the fruit fragility and its seasonal production. The first factor obliges a quick transfer of the raw fruit from productions areas to pulp factories. This is all the more challenging as those production areas are remote and the lack of proper infrastructures makes the use of different transportations and of different intermediaries hard to avoid. Once pulp is extracted from the fruit, it has to be stored and transported frozen at very low temperatures, which increases significantly logistics costs.

In addition to those problems on the productive chain that increase the price of final product, there are important quality problems. These are of two kinds: sanitary problems and pulp concentration problem. The first one is the most important because it involves human lives. Because of fruit properties and the environment where it is produced, the probability that it will be contaminated is high. The solution exist: implementing good practices in fruit production, transportation and processing, and using treatments that will make the product safer such as pasteurization and freezing. Those solutions are not used by most players in the productive chain, especially because of lack of information and lack of regulations. Regarding the second point, the lack of control of pulp concentration and repression of companies that cheat on it explain those problems.

Finally, açai pulp exportation faces two specific kinds of regulation problems: internal and external barrier. Internally, the main problem is that açai, contrary to other fruits with significant exportations does not have any specific product nomenclature. This limits policies to incentivize this product and makes analysis more confused. Externally, the two main hurdles are tariff barriers and non-tariff barriers. As seen with the example of the European Union, developed countries have many regulations, especially on food products, and requirements are usually above Brazilian standards.

There are many ways to improve this situation in order to make açai products more competitive on foreign markets. To go this way, action should be taken by both public authorities and private stakeholders.

The priority is to increase production in order to put a break at açai price raising trend. Infrastructures should be improved in producing areas to allow remote producers to enter the market. This would increase production and lower product seasonality. Second, public research should be intensified. The three main axis of research would be to develop performing plantations, to increase productivity and to develop new ways to conserve and transport açai products. The financing system should be improved as well for both fruit producers and pulp industries. Indeed both need to invest to be competitive and have important working capital need (especially pulp industries). The current banking system is not adapted to their need because it is too bureaucratic and too expensive. The

quality legal framework must be stronger with rules that exist and are enforced. They should regulate the different steps of the productive chain and regulate pulp concentration information to customers. Finally, a NCM should be defined for açaí to show its important place in Brazilian exportation and help the export process.

Parallel to those actions that should be motivated by public organizations, pulp industries have many things to do in order to be more competitive and provide qualitative and good value products for exportation. They should try to avoid intermediaries and source their raw material from producers. They should diversify their pulp production to fruits other than açaí to avoid seasonality problems. For this same reason they should invest in storage capacity. The industry should cooperate more to optimize their business and lobby to get what they need from banks and public authorities. And more important, they must be more market oriented; they must innovate, create brands, understand their clients' needs and answer them.

This study has tried to identify problems that limit açaí exportations on the supply side. Further studies should be done to better understand açaí demand features abroad. This would help understanding if there is a significant potential international demand for those products and thus to what extent all the actions recommended in this study would be worth conducting.

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Annexes

Figure 22 : Interview outline for industries

I) Contato

Seu nome:

Sua empresa:

Seu cargo na empresa:

Seu e-mail e telefone:

II) Sobre a empresa

O que sua empresa produz?

- Tipo de produto
- Tipo de fruta

Qual é a quantidade da produção?

Qual é o número de empregados?

Data de criação da empresa

Primary industries

III) Fornecedores:

Que tipo de fornecedor você utiliza?

- Cooperativa
- Produtor individual
- Intermediário (que tipo?)

Quais são seus principais fornecedores?

Como você compra: A onde? Faz pedido todo dia?

Como entrega: tipo de transporte, de embalagem

Tem intermediários?

Qual é o preço do transporte?

Você tem problemas de logística?

Quanto tempo demora entre a colheita e o processamento na sua empresa?

Quais são as características importantes do fornecedor e do produto? Que problemas tem?

- Qualidade: fruta madura? Fruta danificada durante o transporte?
- Entrega
- Confiabilidade na entrega

Secondary industries

III) Fornecedores:

Que tipo de produto compra?

Que tipo de fornecedor tem?

- Distribuidora
- Atacadista
- Indústria primária

Qual é o seu nome? Quais são os principais fornecedores?

Como entrega: tipo de transporte, de embalagem

Tem intermediários?

Tem problemas de logística? Cadeia do frio?

Quais são as características importantes do fornecedor e do produto? Que problemas tem?

- Qualidade
- Concentração em açaí da polpa
- Pasteurização
- Entrega
- Confiabilidade na entrega

Tem legislação que garante a qualidade?
Consegue se fornecer o ano inteiro?
Como é definido o preço?
Como evolui o preço? Varia muito durante o ano?

Tem legislação sobre a qualidade?
Consegue se fornecer o ano inteiro?
Qual é a evolução do preço? Varia muito durante o ano?

IV) Produção

Que tipo de produtos sua empresa produz?

Existe sazonalidade na produção? Tem produção o ano

Que ingredientes são usados?

Tem problemas/regulações de qualidade/saúde?

- Tem legislação específica sobre isso?
- Você tem uma política específica para garantir

Quais são os fatores de sucesso?

- Tamanho
- Equipamento: Tecnologia chave?
- Matéria prima
- Velocidade
- Preço
- Oferta diversificada
- Concentração em açaí da polpa
- Pasteurização
- Mão-de-obra qualificada. Problemas para achar

Tem problema de financiamento para desenvolver a pro

V) Distribuição:

Mantem estoque (especialmente na entressafra)? Onde

Quais são os seus clientes?

- Distribuidoras
- Indústrias
- Supermercados

Quais são os nomes deles?

Tem mais desse tipo?

Tem sazonalidade nas vendas?

Como evolue a demanda?

- Quantidade, tipo de produto?
- Tipo de distribuição, inovação logística

Qual é a evolução do preço? Segue o preço da matéria prima?

Tem clientes estrangeiros/ exportações?

1) Se tiver

Que tipo de cliente?

- Indústrias

- Importadores

Nomes

País

Que tipo de produtos compram? Polpa, produto final?

Qual é o preço?

Como se exporta?

- Autorização de exportação, importação no país importador
- Tipo de embalagem
- Intermediário
- Modo de transporte
- Incoterms
- Pagamento
- Prazos de entrega

Que tipo de problema enfrenta?

- Taxas
- Regulações (qualidade, saúde)
- Burocracia:
 - Quanto tempo demora para ter autorização?
 - Que organismo controla isso?

Que evolução tem nas exportações? País, volume, preço?

2) Se não tiver?

Por quê? Que obstáculos você vê na exportação?

Conhece outras empresa que exportam?

V) Mercado

Principais concorrentes?

Tem novos?

Como evoluiu?

- Concentração
- Ainda muitos pequenos

Figure 23 : Interview outline for importers

III) Contact

Name

Company

Position

Email and phone

IV) The company

What does the company produce?

Volume produced

Number of employees

Date of creation

Countries where açai products are sold

V) Suppliers

What kind of product do you buy? Finished goods, pulp (kind of pulp)...

Kind of supplier:

- Pulp producer
- Finished goods producer
- Distributor

What's its name?

How did you find it?

What are the main suppliers?

How are you delivered?

- Steps
- Transportation: size of container, cost
- Packaging
- Size of shipments
- Incoterm
- Payment

Any logistics problems? Regarding the cold chain?

How long does it take between order and delivery?

What are the main aspects of a good supplier?

- Quality
- Pulp concentration
- Pasteurization
- Delivery

Have you had any problem with suppliers?

Are there any regulation issues? Fiscal code, certifications?

What is the importation tax on this product?

How long does it take to get importation license?

What are the main regulations in your country on this kind of product? Quality, hygiene...

Are you supplied all year long?

How does price change? Long term, during the year

VI) Production

What kind of product do you produce?

Is there seasonality?

What ingredients do you use?

VII) Distribution

Who do you sell to?

Is there seasonality in your sales?

Do you have an important stock given fruit and demand seasonality?

VIII) Market

What are your main competitors?

Are there new comers?

Do you see a growing interest for açai products?

Have you ever thought about expansion to other countries?

Have you ever thought about other açai products?
