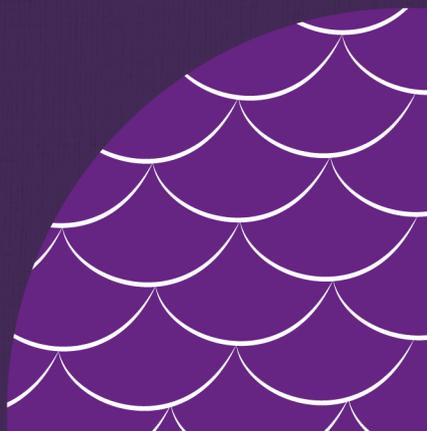




FAS
Fundação
Amazônia
Sustentável



Final Memo: Team Brazil



Partnership:



UNIVERSITY OF
NOTRE DAME

Mendoza College of Business





Final Memo: Team Brazil

Foundation for Amazon Sustainability (FAS)
Manaus - AM
2022

Partnership:



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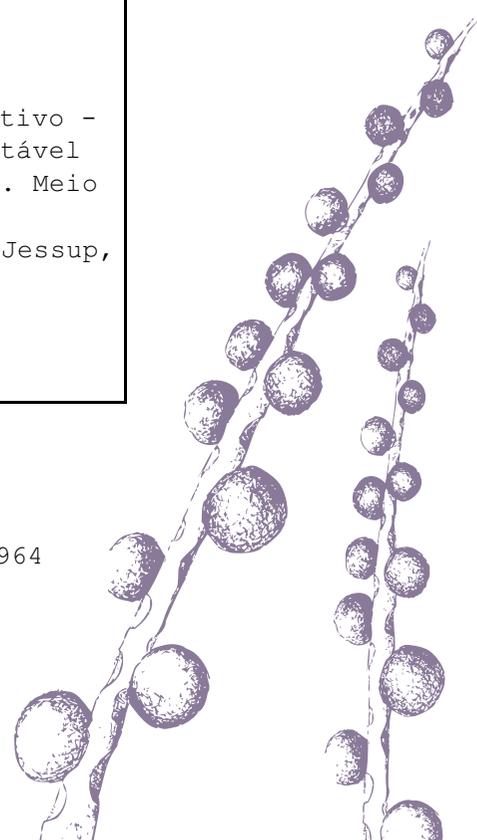


TABLE OF CONTENTS

Executive Summary	06
Economic Impact of the Current Acai Value Chain	08
Current Challenges in the Acai Value Chain	11
Overview of Potential Recommendations	15
Increasing Harvest Quantities through Improved Methodology	18
Sell Acai Berries to Corporate Buyer	23
Sell Acai Berries To Cooperative	37
Sell Acai Berries to Local Schools	43
Summary of All New Potential Buyers	48
Potential Future Option Within Moving Up Value Chain	49
Assessing Recommendations and Suggested Implementation	53



EXECUTIVE SUMMARY

In the fourth year of the partnership with FAS and the University of Notre Dame, we were faced with a global pandemic that prevented us from meeting face to face, but through Zoom, Google Meet, and WhatsApp, we were still able to connect and work together to serve the river communities. Through the hardships we have all endured, we are thankful for the opportunity we have had to learn and bring value to the Acai production businesses. Although we may not have been able to travel to Brazil this year, all of us here at Notre Dame will one day be proud to visit knowing that we were able to serve FAS.

This report presents the current issues facing the extraction and sale of Acai berries located in RDS Juma, RDS Rio Madeira, and RDS Rio Amapa. In addition to the key takeaways from this report, please refer to the financial models, interview notes, appendices and other relevant studies included.

The current extraction and sale of Acai in the river communities is being heavily reliant on middlemen who capture large shares of total value. We explore opportunities for the river communities to participate in alternative value chains in order to capture more value and earn higher income per kilogram of berries. To successfully transition to these alternative value chains, the following actions will be integral to success:

- Collective Organizing of the RDS Communities
- Implementation of Sustainable Harvest Management Techniques and Practices
- Continued Relationship Building with Potential Buyers
- Confirmation of Contract for Sales
- Purchase of Transportation and/or Processing Equipment
- Scaling of Extraction and Participating Families

Transitioning into new value chains will require FAS to navigate significant risks, however, through maintaining and building upon key relationships, FAS can choose from several different pathways towards potential success in serving the river communities.



Photo: Dirce Quintino

ECONOMIC IMPACT OF THE CURRENT ACAI VALUE CHAIN

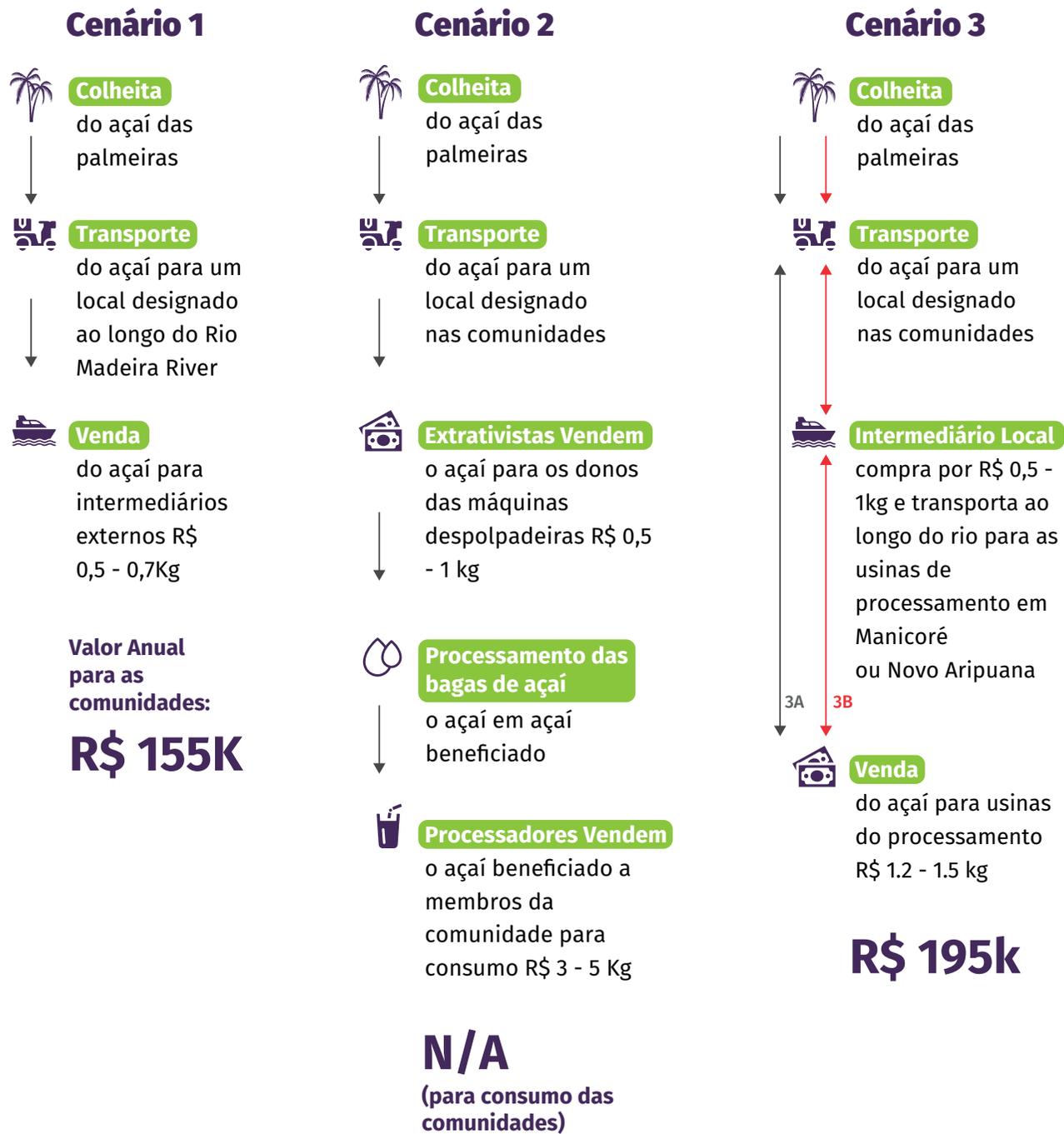
When evaluating potential recommendations to capture additional value from RDS communities' Acai production, first we must understand how much value the current Acai value chain provides to the community.

Currently, RDS Juma, RDS Rio Amapa, and RDS Rio Madeira, produce approximately 500 tons of Acai annually. In 2019, RDS Rio Amapa, produced the most with 450 tons annually, RDS Rio Madeira produced 70 tons, and RDS Juma produced 60 tons. While the total for 2019 was ~580 tons, the estimated annual amount for the reserves is closer to 500. About 250 extractivists are currently involved in this process. Our shared goal is to increase livelihoods in the communities and to increase the annual tonnage from 500 to 800 and involve 600 extractivists in the process.

This Acai that is produced is sold and provides value to the RDS communities through several different mechanisms, outlined below (see Appendix X for a more detailed description of the current value chain):

- Scenario 1: Individual extractivists sell to external middlemen along the Rio Madeira (40- 70% of harvest)
- Scenario 2: Internal RDS Consumption (10-20% of the harvest)
- Scenario 3: Extractivists sell to community middleman who sell to processors in Novo Aripuana and Manicore (20-40% of the harvest)
- Scenario 4: Lost Acai that is unable to be sold or processed (15% of the harvest)

The annual revenue generated by Scenarios 1-3 are:



Due to the fact that Scenario 2 is directly consumed by the communities and cannot be further optimized, we have determined that the economic impact of the current Acai value chain that is not tied to internal community demand, should only include Scenarios 1 and 3.

As a result, the 3 RDS communities receive R\$ 350,000 in revenue from the Acai that they sell to people outside of their communities.

See Financial Model for detailed calculations.



Photo: Monica Vendramini

CURRENT CHALLENGES IN THE ACAI VALUE CHAIN

Several challenges make it difficult for the communities to capture additional value for Acai production. Some of these challenges include:

Value Chain Challenges

Middlemen provide a necessary service for the communities as they provide the transportation necessary to access large processors. Additionally, the middlemen are experts at managing risks, negotiating favorable terms, and making sure that they get paid in cash or assets. The river communities do not currently have the necessary trading and organizational capacity to withstand the potential impact of a processor's inability to pay.

The price from external middlemen is the lowest price which extractivists receive for Acai berries while also accounting for the largest percentage of the Acai harvests, meaning that the communities are foregoing options to earn more and are allowing the external middlemen to capture a larger portion of the value along the supply chain.

There is comfort with living within the status quo and carrying out activities to which they have become accustomed. The community members are striving for better conditions for themselves and their families, however, they have become reliant on middlemen because of the simplicity, risk mitigation, and time savings that the middlemen provide.

Product Challenges

As Acai is harvested, up to 15-30% of the harvest is lost to waste, resulting in no additional value for the community. This is in part due to an inability to identify a seller for all the berries due to inconsistent demand from external middle men and limited production capabilities (more below). However, there are also difficulties with Acai itself, which lends itself to easily spoiling. Primarily, without proper refrigeration, berries will spoil or dry out within 24-36hr of harvest. As a result, this dramatically increases the impact of not being able to find consistent buyers quickly and leads to large amounts of spoilage.



Photo: Dirce Quintino

Production Capacity Challenges

There is a lack of processing capability in and near the RDS communities, which creates a bottleneck in the supply chain. Many communities have no processing capability at all. The communities that do have small depulping units that can only process 10kg/ hour. Although the cities of Novo Aripuana and Manicore have production plants that are larger than the depulpers found in the RDS communities, they are still not sufficient to handle the amount of supply that can be produced.

Current Market Challenges

Current market challenges come in several forms. The first problem that we have observed is that external middlemen and the limited numbers of pulp producers, which the reserves currently sell to, do not care about the sustainable practices used by the RDS Acai farmers, leaving uncaptured value on the table.

Many medium to large sized pulp producers buyers require reliable production levels and consistent quality, which might be difficult for the communities to meet. Additionally, some pulp producers have specific health, safety, or harvesting certifications.

As we worked to identify alternate buyers of Acai, we worked to identify buyers to mitigate the previously described problems.

Organizational Challenges

Currently, Acai harvesting is an individualized process. As a result, the RDS communities are unable to utilize collective bargaining power in order to negotiate with large buyers or collectively organize for a better price. It is imperative that extractivists work collectively in order to capture greater value for their Acai. However, bringing the communities together and developing the trust that is required in order to effectively work together is a significant challenge for the communities currently, as well as in any of the proposed recommendations.

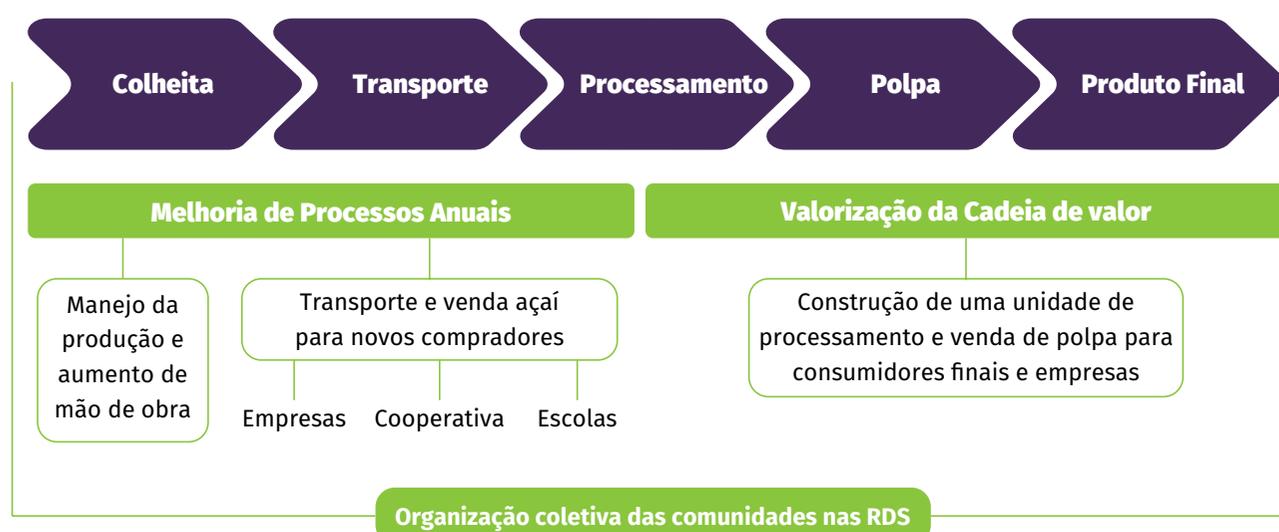


Photo: Dirce Quintino

OVERVIEW OF POTENTIAL RECOMMENDATIONS

Our recommendations span across the entire value chain from harvest to end product for consumption. There are several processes that can benefit from upgrading current practices and future opportunities to move up the value chain. Core to all ideas are within the collective organizing and management of the Acai harvest within the river communities.

Through navigating and building upon key relationships, successful transportation implementation, and proper scaling of production, we believe that FAS has the opportunity to increase the value of the Acai production businesses for the river communities by R\$ 210,000 or 60% in the short term and up to R\$ 1.2 Million or 350% in the long term.



Currently, most Acai extractivists work independently to harvest, transport, and sell their berries. Organizing individual extractivists into working as a collective group especially in the harvesting of Acai is required for the success of any potential recommendation. In order to achieve scale of harvest, organized transport, or wholesale of berries and/or pulp, collective organizing will be the core approach for the success of any operation.

We consider collective organizing to be central as it is the only way communities will achieve the scale necessary to either improve the current processes, or to move up the value chain. In terms of harvest, for example, extractivists would need to work together in order to establish when to pick Acai and also where to take it for transportation (if they do it separately, as it is the case right now, they risk not meeting the requirements for filling a large boat and would end selling for a lower price to middlemen). The same concerns carry over into moving up the value chain as collective organizing will be a prerequisite for a potential RDS operated processing facility.

Our ideas can be bucketing into two main categories: Upgrading Current Processes and Moving Up the Value Chain. Upgrading entails changes and improvements in the processes that are already performed. Our recommendations within upgrading will enable river communities to deliver upon a higher quality product while enhancing current practices through increased education, improved practices, and better machines.

Our recommendations consist of increasing the volume of Acai sold outside of the community and improving margins through better infrastructure. In order to move up the value chain, we explored the potential to build a processing facility and sell to end consumers and other businesses as inputs for final products. We can capture value for the community by fully capturing the entire value chain of Acai, from harvest to processing.



Photo: Dirce Quintino

INCREASING HARVEST QUANTITIES THROUGH IMPROVED METHODOLOGY

Harvest Management

Harvest Management entails a change in the mode of production to increase efficiency. A common strategy the communities can explore is the move to harvest management and improvement in quality control. Acai is harvested in small quantities from the broad geographical areas of all three reserves. In order to increase production from the current 500 tonnes to the FAS Goal Production of 800 tonnes, the transition towards domestication of species appears to be the surest way to regular, high-quality supply to build reliable streams of product.

Domestication of Acai can still occur in wild harvests with little transformation to the natural environment. Acai is a perennial crop that risks growth and distribution issues if abandoned by humans. Utilization of harvest management practices will be the first step to grow the Acai production businesses in the three reserves to support FAS in achieving the goal of producing 800 tonnes annually while ensuring environmental sustainability.

In a research study, 30 river communities along the four major rivers (Madeira, Solimões, Negro, Tapajos) across Brazilian Amazonia were researched over a two-year period in regards to their management practices relating to 38 useful plant species. The study finds that there are eight distinct categories of management practices that contribute to form forest patches of useful plants.¹ Research has found that six of these practices are useful for either *E. Oleracea* or *E. Precatoria* Acai within the Madeira region².

These practices can be combined near and around the river communities to promote the successful production of Acai. This study only looked into the management practices that the communities were engaging in to increase yield with no help from external sources. While we believe that the three reserves we are working in can achieve this with limited external influence,

¹ Carolina, L et al. 2018. 'How People Domesticated Amazonian Forests', *Frontiers in Ecology and Evolution*, vol 5, pp.171.

² The two practices without any findings for useful practices for Acai are: Attraction of non-human dispersers of useful plants and Fire Management.

FAS should also consider finding an agricultural expert to help facilitate the training of the six Acai management practices listed below.

Management Practice	Useful Practices for E. Oleracea	Useful Practices for E. Precatoria
Removal of Non-Useful Plants	<ul style="list-style-type: none"> • Clearing the Understory • Liana Cutting • Cutting Older Individuals • Girdling Neighboring Large Trees • Cutting Stems in a Clump • Cutting Unproductive Individuals • Weeding • Cutting Other Trees 	<ul style="list-style-type: none"> • Weeding • Cutting Other Trees
Protection of Useful Plants	<ul style="list-style-type: none"> • Not Cutting • Pruning • Selective Harvesting of Certain Individuals based on Age, Size, or Sex 	<ul style="list-style-type: none"> • Rotating Harvest • Keeping when Clearing the Land • Selective Harvesting of Certain Individuals based on Age, Size, or Sex
Transportation of Useful Plants	<ul style="list-style-type: none"> • Dispersing Seeds and/or Collecting Seedlings for Transplanting Elsewhere 	<ul style="list-style-type: none"> • Dispersing Seeds and/or Collecting Seedlings for Transplanting Elsewhere

Management Practice	Useful Practices for E. Oleracea	Useful Practices for E. Precatoria
Selection of Phenotypes	<ul style="list-style-type: none"> • Human Selection and Intervention in Plant Populations 	<ul style="list-style-type: none"> • Human Selection and Intervention in Plant Populations
Planting of Useful Plants	<ul style="list-style-type: none"> • Intentional Sowing and Planting of Seedlings 	<ul style="list-style-type: none"> • Intentional Sowing and Planting of Seedlings
Soil Improvement	<ul style="list-style-type: none"> • Adding Organic Material and Mulch • Spreading Mulch Fertilizers 	

Due to the restrictions from working within protected reserves, FAS must determine which practices listed above will be viable and comply with all local and government requirements and regulations. We encourage the river communities and FAS to begin communication on implementing any of the viable Acai management practices that can be employed in the next harvest season. Next, we will discuss how Harvest Management and Increasing Labor will impact the value of the Acai production businesses in the three reserves.



Photo: Monica Vendramini

Increase Labor

FAS has the goal of increasing the rate of production from 500 to 800 tons of Acai and enabling 600 families to be involved in the Acai production businesses. Scaling production comes with a risk of over-extracting the natural resources and reducing the total availability of viable Acai to extract in future years. With the enhanced practices in Harvest management, the river communities can scale production and increase the number of involved families (from the current 250 up to the goal of 600 extractivists), while ensuring safe and controlled extraction of Acai that will enable them to reach the goal rate of production to **increase the collective income by R\$ 215,000.**

	Current production (500 t/year)	Production target (800 t/year)
Set 1	R\$ 155 k	R\$ 255 k
Set 2	Self-consumption	Self-consumption
Set 3	R\$ 195 k	R\$ 310 k
Total value for communities	~R\$ 350k	~R\$ 565k

These figures assume that there is no change to the current value chain other than managing the harvest and increase the number of participating families in the Acai production businesses.

However, there is a large risk as the goal is to increase extraction by 60% and also increase the number of participating families by 140%. Doing an increase in this fashion will yield more money going into the communities as a whole, but will also lead to a decrease in individual income by 35%. In order to avoid lessening of the individual income, at the Goal Production Rate of 800 tonnes, only 400 members of the community can be involved (Increase of 150).

Further analysis may be found in the Financial Model.

SELL ACAI BERRIES TO CORPORATE BUYER

The river communities can also capture more value through collective organization which would enable them to receive a higher price as well as reduce product waste given a more stable demand by integrating into an existing value chain. We looked into integrating into an existing value chain of a large, corporate buyer of Acai. This will be done by negotiating a contract and transporting berries directly to their processing factories using large refrigerated boats that the RDS communities would purchase.

One of the additional benefits of working with a larger, more established buyer would be additional community capacity building through the support offered by these buyers. We contacted several potential buyers, and according to their requirements and the production capabilities of the three RDS communities, we have identified two target buyers, Frooty and Petruz:

Frooty

Frooty, based in Sao Paulo is one of the largest domestic buyers of Acai in Brazil. They sell a large variety of Acai and pitaya based products to consumers all across Brazil, selling their products through supermarkets, convenience stores, and Frooty branded retail outlets. On the production side, they have 5 Acai processing facilities, with 3 located in Para and 2 located in the Amazonas state --3 of these facilities are operated by business partners of Frooty. The nearest facility to the RDSs is in the city of Humaita.

Frooty values sustainability and has a mission to make all aspects of its supply chain sustainable. According to Frooty Board member Carlos Brito, Frooty is concerned with “giving back to the Earth”, and the organization shares similar social goals to FAS. Frooty also works closely with its sourcing communities to ensure they follow all of Frooty’s sustainability guidelines, which include a ban on child labor, use of filtered water, and proper waste management, among many others. To keep track of the social progress in the many harvesting communities they work with, Frooty provides a detailed questionnaire to all communities that identifies areas of improvement for each specific community. Once areas of improvement are identified, Frooty works side by side with community partners to improve social standards to

an optimal level. Ultimately, it is the community's choice whether or not to adopt such changes, but Frooty has made a commitment to help communities to operate sustainably.



Photo: Monica Vendramini

It is important to highlight that working with Frooty would allow the communities to establish a connection with a powerful player in the Brazilian Acai industry. Frooty could help the RDSs modernize their processes, improve their capabilities, and stay on top of future changes in the industry. This in turn could positively help the RDSs long-term success in the Acai industry.

To integrate into the supply chain of Frooty, raw berries from all three RDSs would have to be transported to Manicore, which is where berries are currently picked up for transport to the Humaita processing facility. Since some of the communities are up to 24 hours away from Manicore, refrigerated boats would likely be needed to avoid spoilage of the berries on the trip to Manicore. Frooty then manages the transportation of all berries for the eight-hour boat trip from Manicore to Humaita.

According to Frooty CEO, Alexandre Miranda, the communities would have to work together and form multiple small cooperatives that could pool together berries and get the berries to Manicore, where Frooty would then take over the supply chain. These cooperatives are required since Frooty does not have the resources to source from individual families, especially due to the distance from Humaita to the RDSs. Thus, having a more centralized supply source would logistically make this proposal feasible for Frooty, but Frooty is willing to support the cooperatives once they are formed. Additionally, Frooty does not pay in physical cash and requires suppliers to hold a bank account. The cooperatives could collect payment and distribute it to all the members/ harvesters. Frooty offers payment within 1 day of purchase of berries, fostering trust with the cooperatives who will not have to wait for payment.

Frooty processes 1.2 million kg of raw berries per year at its Humaita facility, producing 600,000 kg of 14% concentrated pulp. These berries are purchased during the February to May harvest season for an average price of R\$1.7 per kg, but like most purchase prices this number can fluctuate greatly. To handle transportation from Manicore to Humaita, Frooty rents boats for R\$107,00 per month, and pays less than R\$0.1 per kg of berries in diesel³.

³ <https://pitchbook.com/profiles/company/178322-50#overview>

Economic Impact of Selling to Frooty

	Frooty @ Current production (500 t)
Total transport costs	R\$ 8,000
Amount of açaí needed (kg) to reach the break-even point	4,500 kg of fruit
Transport cost / kg of fruit	R\$ 0.37 / kg of fruit*
Sale price	R\$ 1.70
Profit / kg of fruit	R\$ 1.33
Total Net Income*	~R\$ 560k

*Please see Financial Model for more detailed calculations.

By selling to Frooty, the Reserves would be able to receive an additional R\$ 0.83 per kg of berries. This will result in an Annual Net Income of R\$ 560,000 Which is a 60% increase, respectively, to what the reserves currently earn from their Acai. Furthermore, the communities would only have to sell approximately 265 tons of Acai to match the economic impact that they are currently experiencing.

Additionally, selling to Frooty would eliminate some of the production capability bottleneck, which would allow the RDS communities to sell at least some of the waste that is currently being lost to waste because extractivists are unable to identify a buyer. If that amount tends to be approximately 15% of the total harvest (approx. 75 tons), selling to Frooty would allow extractivists to sell that additional 75 tons of Acai and capture an additional R\$ 100,000 for the communities. This would bring the total annual Net Income to R\$ 665,000, an 88% increase from current levels.

Furthermore, Frooty has significant production capacity, which will allow for the Reserves to increase production to their goal level of 800 tons annually and would also open up this opportunity for additional extractivists in the RDS communities. Selling to Frooty would enable tor reserves to receive R\$ 900,000 in annual net income for their harvest once they reach goal production, a 156% increase to current levels.

Key Considerations:

Qualidade do açaí

Frooty sells their product all across Brazil and requires high quality inputs in order to produce their high quality product. The communities must be sure to keep their berries in top condition before they can sell it to Frooty. Fortunately, Frooty is committed to helping its suppliers reach this quality standard, and they provide training and tools to help with the process.

Child Labor

Frooty has a strict policy of not buying from suppliers who use child labor in their harvesting process. We do not know how the RDS communities currently view child labor, but it is important to note this consideration. Not adhering to this policy could severely damage the relationship between Frooty and the RDSs.

Facility Ownership

Frooty does not technically own the Humaita factory which we would be supplying, as the facility is owned by a business partner of Frooty. However, Frooty does fully control the sourcing of the berries they send to this facility, and it seems Frooty has large control over the policies of the facility.

Purchase of Refrigerated Boats

Refrigerated Boats will need to be purchased and communally managed in order to minimize spoilage. Each refrigerated boat will cost approximately R\$ 250,000⁴. At current production levels, selling to Petruz will result in ~R\$ 310,000 of additional net income above that which the communities are currently grossing.

As a result, if the communities initially use this additional net income to only pay back the cost of the boats, the payback period of purchasing one refrigerated boat is less than 1 year.

Please note, this payback period is assuming that only one refrigerated boat is necessary. It is believed that only one boat will be required if round trips to Manicore is only 3 day total. It will take 40 trips to transport the goal production of 800 tons of Acai can be transported via boats that carry 20 tons of acai berries. As a result, these boats would be used for 120 days per year and would be able to earn the full ~R\$ 310,000 of additional net income in the first year to pay off this boat in one year.

Furthermore, these boats would require a fixed pickup schedule and communal management. Please see the Financial Model for all of the costs associated with transporting the Acai to Manicore to sell to Frooty.

Development of a Cooperative

Frooty has a history of supporting communities as they form cooperatives. Although they will not actually form the cooperative for the communities, they do have some expertise in advising in this area and have seen both successes and failures, which could be a very beneficial source of knowledge for the communities.

⁴ Calculation based BOTFL X team's Pirarucu transportation analysis

Please see attached Cooperative Document for further information on best practices and potential difficulties. Based on these considerations, we have determined Frooty to be a low risk option when compared to the alternatives.



Photo: Dirce Quintino

Petruz

Petruz is one of the largest Acai manufacturing businesses in the world. Petruz exports to over 35 countries and processes 189 tons of fruit every day across all of their factories. Its main facility is in Castanhal but has 4 factories in Amazonas, with the largest being in Manacapuru.

Currently, Petruz has 14 active social and environmental projects focused on the Amazon. Petruz would like to expand its programming to include working with more river and indigenous communities in the Amazon. There is opportunity for FAS and Petruz to work together to support the RDS river communities.

In order to be a supplier for Petruz factories, the extractivists/communities will need to acquire an organic and non-GMO certification. Petruz is also able to assist in moving forward with this process. Once becoming a supplier, Petruz will work with the communities to grant them a Fair for Life Certification, which is the most formal certification.

To work with Petruz, the communities would be responsible for transporting the Acai to one of the four factories in Amazonas. Although Petruz can not give a firm number for what they are willing to pay until terms of a contract are reached, they have given the estimate of R\$ 40 per tin, which translates to R\$ 2.85 per kilogram.



Photo: Ricardo Oliveira

Economic Impact of Selling to Petruz

	Petruz @Current Production (500 t)
Total transport costs	R\$ 10,000
Amount of açaí needed (kg) to reach break-even point	3,500 kg of fruit
Shipping cost / kg of fruit	R\$ 0.51 / kg of fruit*
Sale price	R\$ 2.85
Profit / kg of fruit	R\$ 2.34
Estimated waste	30%
Total Net Income*	~R\$ 700,000 (with waste)

***please note, the transportation costs are calculated to Manaus, not a specific factory.**

Please see Financial Model for more detailed calculations.

By self-transporting their berries to and selling to a Petruz factory, the Reserves would be able to achieve Annual Net Income of R\$ 1,000,000. Which is a 180% increase to what the reserves currently earn from their Acai. However, this is not adjusting for spoilage (see further discussion below). If a 30% spoilage rate is considered, the net income would decrease to R\$ 700,000, which is still a 98% increase to current levels. Although spoilage rates significantly affect profitability, the communities would only have to sell approximately 150 tons of Acai to match the economic impact that they are currently experiencing.

Similar to Frooty, selling to Petruz would eliminate some of the production capability bottleneck, which would allow the RDS communities to sell at least some of the waste that they are currently experiencing. Assuming that waste is approximately 75 tons annually, selling to Petruz would allow extractivists to sell that additional 75 tons of Acai and capture an additional R\$ 175,000 for the communities. This would bring the Total Annual Net Income to R\$ 1,170,000, a 233% increase from current levels (before accounting for spoilage). Accounting for spoilage, the Total Annual Net Income would be R\$ 820,000, a 133% increase.

As with Frooty, selling to Petruz would allow for the Reserves to increase production to potentially 800 tons annually and would also open up this opportunity for additional extractivists in the RDS communities. At this goal production capability, the RDS communities could potentially earn approximately ~R\$ 1,595,000 in annual net income, not adjusting for spoilage. When we account for spoilage, this total net income would be ~R\$ 1,115,000.



Photo: Monica Vendramini

Key Considerations:

(Spoilage

Due to the distance between the reserves and the Petruz processing facility, spoilage of the Acai is a likely occurrence. As a result, this number is likely to be much less, due to spoilage, however, it is impossible to tell exactly what the spoilage amount will be at this time. Even though the exact spoilage rate is impossible to predict, for illustration purposes, if we were to estimate a 30% spoilage rate, net income would decrease as previously stated.

(Requirements of Certification

Before the RDS can be considered as a supplier for Petruz, the extracativists must have an organic certification. This process is time consuming so delay in receiving certification will prevent Petruz from being a viable option for the river communities.

(Financing of Operations

Petruz works on a more traditional financial model where there is a delay between purchase of berries and receiving the compensation. The river communities are unable to work in this sort of environment without an intermediary financial source.

(Purchase of Refrigerated Boats

Refrigerated boats will need to be purchased and communally managed in order to minimize spoilage. Each refrigerated boat will cost approximately R\$ 250,000⁵. At current production levels, selling to Petruz will result in ~R\$ 470,000 of additional net income, above that which the communities are currently grossing. As a result, if the communities initially use this additional net income to only pay back the cost of the boats, the payback period of purchasing one refrigerated boat is less than 1 year.

Please note, this payback period is assuming that only one refrigerated boat is necessary. It is believed that more than one boat will be required because round trips to Manacapuru are estimated to be 9 days. It will take 40 trips to transport the goal production of 800 tons of Acai can be transported via

⁵ Calculation based BOTFL X team's Pirarucu transportation analysis

boats that carry 20 tons of acai berries. As a result, these boats would be used for 360 days per year. However, Acai season only lasts for approximately 6 months. As a result, the reserves will need to purchase 3 boats in order to enable berry pickup every 3 days. As a result, total investment in boats will equal R\$ 750,000 and the payback period for this investment would be just under 2 years.

Furthermore, these boats would require a fixed pickup schedule and communal management. Please see the Financial Model for all of the costs associated with transporting the Acai to sell to Petruz.

Comparison of Both Corporate Buyer Options

	Petrus @ Current production (500 t)	Frooty @ Current production (500 t)
Total transport costs	R\$ 10,000	R\$ 7,700
Amount of açaí needed (kg) to reach break-even point	3,500 kg of fruit	4,500 kg of fruit
Shipping cost / kg of fruit	R\$ 0.51 / kg of fruit*	R\$ 0.37 / kg of fruit*
Sale price	R\$ 2.85	R\$ 1.70
Profit / kg of fruit	R\$ 2.34	R\$ 1.33
Additional income from the sale of previously spoiled fruit	R\$ 175k	R\$ 100k
Estimated waste	30%	0%
Total Net Income*	~R\$ 820,000	~R\$ 665,000

**Please see Financial Model for more detailed calculations.*

In addition to financial considerations, there are other considerations that must be compared between Petruz and Frooty, especially because they affect the riskiness of each option.

	Petrusz	Frooty
Factory Location	Manacapuru	Humaita
Place of sale	Manacapuru	Manicore
Purchase price	~ R\$ 40 / tins	~ R\$ 1.7 / kilogram
Requirements	Organic Certification	Meet Frooty's quality standards
Benefits	Fair for Life Certification	Provides free training and materials and assists in the formation of cooperatives
Riskiness	Wasteful, long lead time for financing, high quality standards	High quality standards
Risk Assessment	HIGH	LOW

When compared, Petruz does present a greater value capture opportunity, however, due to transportation considerations, a purchasing agreement with Frooty can be executed with ease and reduce the amount of risk. However, it is important to consider diversification with customers, therefore, we would encourage the RDSs to further engage with both Frooty and Petruz. In any case, developing small co-ops that are able to work together will be crucial for the success in negotiating contracts with corporate buyers.

SELL ACAI BERRIES TO COOPERATIVE

Another option that could help increase demand for Acai in the RDSs is to sell to the Coopema Cooperative based in Manicore. Similar to selling to a corporate buyer such as Frooty or Petruz, selling to this co-op would require communities to organize among themselves and purchase refrigerated boats to keep the berries fresh on the trip to Manicore. Once the berries get to Manicore, Coopema purchases for around R\$2 per kg. Coopema then processes the berries and transports the pulp, usually by land, to their buyers. Unfortunately, based on our conversation with co-op partner Mariza Lisley, Coopema has had some difficulty finding reliable buyers in the past.

In order to join the co-op, there is a R\$2,000 one time fee that must be paid. This makes it harder for individual harvesters to join the co-op, and instead favors groups of individuals coming together and joining. However, Coopema can potentially provide training to the communities to help them form associations. Coopema also shares a portion of the excess profits with all its members, which suggests that harvesters could get compensated very well if the harvest is especially profitable.



Photo: Dirce Quintino

Financial Impact of Selling to Coopema

	Coopema @ Production target (500 tons)	Coopema @ Production target (800 tons)
Total Transport Costs	R\$ 8,000	Do not change
Amount of açai needed (kg) to reach break-even point	4,000 kg of berries	Do not change
Shipping cost / kg of fruit	R\$ 0.37 / kg of berries	Do not change
Sale price	R\$ 2.00	Do not change
Profit / kg of fruit	R\$ 1.63	Do not change
Total Annual Net Income*	~R\$ 690,000	R\$ 1,100, 000

**assuming a full 20 ton capacity on every boat trip*

By partnering and selling to Coopema, the Reserves would be able to achieve Annual Net Income of R\$ 690,000. Which is a 96% increase to what the reserves currently earn from their Acai. Furthermore, the communities would only have to sell approximately 216 tons of Acai to match the economic impact that they are currently experiencing.

Similar to the Frooty and Petruz options, selling to Coopema has the potential to allow the RDS communities to sell at least some of the waste that they are currently experiencing. Assuming that waste is approximately 75 tons annually. Selling to Coopema would allow extractivists to sell that additional 75 tons of Acai and capture an additional R\$ 120,000 for the communities. This would bring the **Total Annual Net Income to R\$ 810,000**, a 131% increase from current levels.

As with any of the previously proposed options, selling to Coopema would allow for the Reserves to increase production to potentially 800 tons annually and would also open up this opportunity for additional extractivists in the RDS communities. At this goal production capability, the RDS communities could potentially earn approximately ~R\$ 1,100,000 in annual net income.

Key Considerations

In addition to the financial implications of Coopema, there are several other considerations that need to be considered when evaluating this option. Some of these considerations are:

(Fees to Join Coopema

It is important to note that all of the previous calculations do not include the fees that are required to join Coopema. Currently, it costs R\$ 2,000 to join Coopema. If we were to make the high assumption that every community which is currently producing Acai (39 communities) would be required to pay this R\$ 2,000 fee, the fee to join would be R\$ 78,000. While this is quite a bit, it would only adjust the net income in the first year and the net income would still equal R\$ 735,000, which is an increase of 109% to current levels.

(Qualification based on Geography

Currently Coopema only purchases from reserves in Manicore, we would need to confirm that they would be willing to purchase from the reserves.

Potential Limit on Quantity Coopema is able to Purchase

Coopema has only just recently entered the Acai market and as a result, can have difficulty in finding a location to sell their berries. Because of this, there might be an initial limit on the amount of berries that they are able to purchase from the RDS communities. Due to the fact that Coopema might not be able to purchase all 425 tons of berries (as modeled) the financial impact of this option could be lower than previously stated depending on the quantity Coopema is able to purchase

Capacity Building Considerations

Coopema might be less able to help to build capacity within the communities. Although financially Coopema is an attractive financial option, the capacity building efforts of the corporate buyers might be attractive to FAS. The corporate buyers previously described, such as Frooty, have employees who assist with organization and training of the communities. However, due to Coopema's smaller scale, it is very possible that FAS staff will have to fill the role of assisting in organization and training efforts.

Purchase of Refrigerated Boats

Refrigerated boats will need to be purchased and communally managed in order to minimize spoilage. Each refrigerated boat will cost approximately R\$ 250,000⁶. At current production levels, selling to Coopema will result in ~R\$ 340,000 of additional net income above that which the communities are currently grossing. As a result, if the communities initially use this additional net income to only pay back the cost of the boats, the payback period of purchasing one refrigerated boat is less than 1 year.

Please note, this payback period is assuming that only one refrigerated boat is necessary. It is believed that only one boat will be required if round trips to Manicore is only 3 day total. It will take 40 trips to transport the goal production of 800 tons of Acai can be transported via boats that carry 20 tons of acai berries. As a result, these boats would be used for 120 days per year and would be able to earn the full ~R\$ 340,000 of additional net income in the first year to pay off this boat in one year.

Furthermore, these boats would require a fixed pickup schedule and

⁶ Calculation based BOTFL X team's Pirarucu transportation analysis

communal management. Please see the Financial Model for all of the costs associated with transporting the Acai to sell to Coopema.

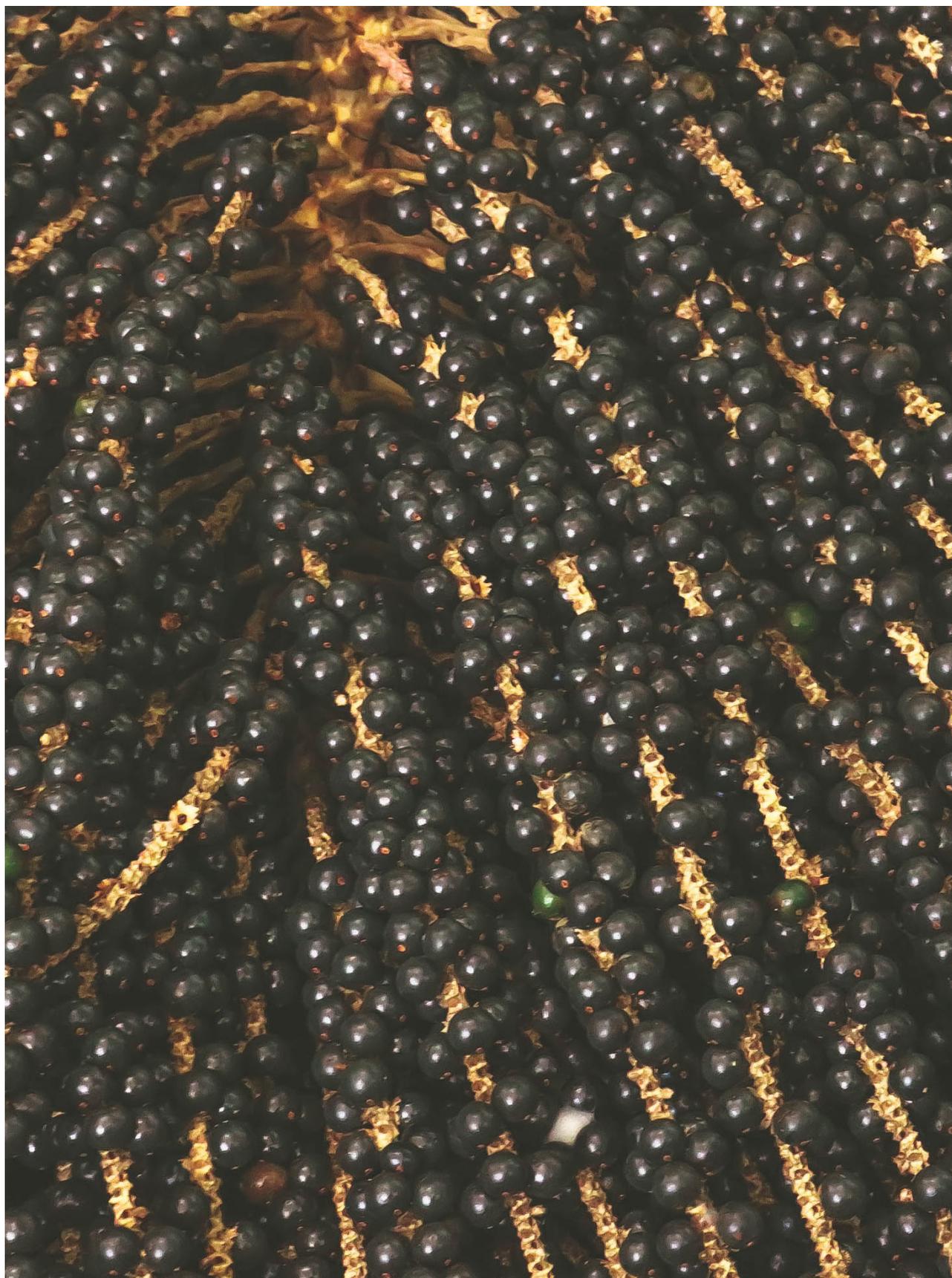


Photo: Dirce Quintino

	Coopema
Location	Manicore
Admission Fee	R\$ 2,000
Requirements	RDS communities would have to form a collective association
Benefits	<ul style="list-style-type: none"> • Low Spoilage • Partnering with other communities would benefit the maximum number of river communities • Potential for additional profit sharing through “buying into” the cooperative • Coopema works with other fruits and products as well and could potentially be a partner in those economic activities, compounding the effects of this partnership
Risk	<ul style="list-style-type: none"> • Coopema has had difficulty finding buyers • Coopema is relatively new in the Acai market and does not have a track record of success
Risk Assessment	Medium

As a result selling to Coopema would result in a medium level risk assessment.

SELL ACAI BERRIES TO LOCAL SCHOOLS

As per the team's conversations with FAS, local schools were identified as potential buyers of Acai pulp. According to FAS' estimates, schools consume approximately 80 tons of pulp per year (this is between 138,000 kg to 363,000 kg of berries, depending on the concentration of the pulp).

Compared to Frooty and Petruz, schools have the advantage of being within the communities, which means the transportation costs are limited to those required of transporting the berries from the harvest site to the community (1 to 3 hours).

Within this option, communities would increase their income in two ways. First, by selling berries to the owners of the depulping machines within the communities, and second by selling pulp directly to schools.

In terms of the increased amount of berries sold, we calculated the production of 80 tons of pulp will require -on average-, ~229,000 of berries. This translates into an increased **Annual Income of R\$ 170,000**.

	Sale of Berries
Quantity (kg)	229,000
Average price per Kg	R\$ 0.75
Total Annual Income (Berries)	~R\$ 170,000

As to the processing of the pulp this would be done by community members. Yet, the existing depulpers within the community are not enough for processing the amount of pulp required. If one were to evenly spread the 80 tons of pulp throughout the year, 219 kg of pulp would need to be processed daily. If each depulper can process 60kg of pulp a day⁷, communities would need to buy an extra 3 or 4 depulpers for supplying the schools.

Another thing that ought to be considered when selling to schools is that they already have pulp providers, meaning locals would need to provide enough

⁷ Each depulper can process up to 10 Kg per hour (conversations with FAS)

incentives to schools for them to switch over to community produced pulp.

Assuming a sales price of R\$6 for medium pulp -and a berry to pulp conversion rate of 0.35 - communities will earn R\$1.3 per kg of berries. This would bring the **Annual Net Income to R\$ 300,000**. Therefore, selling pulp to local schools is assessed as a viable yet limited option. As such, it can be used as a complementary measure, but not as the main strategy for improving the income of the communities.

	Local Schools (80 tons of pulp)
Total Costs (machinery⁸ + berries⁹)	R\$ 180,000
Berry to pulp conversion rate	0.35
Kg of berries need to produce 1kg of pulp	2.86
Kg of Berries needed to produce 80 tons of pulp	229,000
Sale Price (kg of pulp)	R\$ 6.00
Net Income/ kg of berries	R\$ 1.30
Total Annual Income (Pulp)	~R\$ 300,000

By adding up the annual income for the sale of the berries (R\$ 170,000) and the Annual Net Income for the sale of pulp (R\$ 300,000), we foresee that communities could increase their **Total Annual Net Income to R\$ 470,000**.

⁸ Estimated price is based on buying 4 depulpers at a price of R\$2,500

⁹ Price used for berries was R\$0.75/kg, and was calculated averaging the range price provided by FAS for current scenario 2 (see pg 4 of the report).



Photo: Monica Ventramini

Key Considerations:

(Production Cap

Although the R\$ 1.3 price per kg of berry is almost double than what the communities are currently receiving from middlemen (R \$0.5 to R \$0.7), the amount of pulp processed is limited by both the schools' demand (currently at 80 tons of pulp) and the low processing capacity of the depulper machines. Thus, even when selling to schools could translate into an annual net income of R\$300,000, this is still less than what the communities could make by selling to one of the large buyers.

(Distribution of Increased Income

To meet the goal production of 80 tons of pulp, the communities would need to buy between 3 to 4 additional depulpers. Yet, as we understand it, these depulpers are privately owned by members of the community, who in turn give back to the communities 10% of their pulp sale generated income, This means that, to a large extent, additional value captured would benefit the machine owners.

(Covid-19

Within the framework of the current pandemic, schools might close down for undetermined periods of time and this consequently affects the school's demand of pulp.

(Displacement of Current Suppliers

Although we do not currently know who the current suppliers are for the schools, we would assume that the processors would need to convince the schools to switch to their product. This is a significant risk and we are unsure if it is possible to do this.

(Frequently Changing Regulation

It is our understanding that the regulations regarding selling to school change frequently. As a result, it is important to consider what effects a future change in regulation could have.

	Local Schools
Location	Within the communities
Requirements	Verify who regulates pulp sale (Ministry of Agriculture? Health? Education?)
Benefits	<ul style="list-style-type: none"> • No additional transportation costs • Low capital investment • Communities can build up their reputation as pulp producers. • All value stays within the community
Risk	<ul style="list-style-type: none"> • Schools closing down due to Covid-19 Coopema has had difficulty finding buyers • Value captured is distributed unevenly among members of the community participating in the Acai value chain. • Change in regulations that allow for schools to buy pulp from local producers.
Risk Assessment	Medium - Low

SUMMARY OF ALL NEW POTENTIAL BUYERS

	Petrusz	Frooty	Coopema	Schools
Financial Considerations				
% increase in price / kg of berries when compared to External Middle Men	350%	165%	225%	50%
Additional Considerations				
Factory Location	Manacapuru	Humaita	Manicore	Within communities
Sale Location	Manacapuru	Manicore	Manicore	Within communities
Requirements	Organic Certification	Work with Frooty to follow Frooty Standards	Living in Manicore	Health Considerations
Estimated Fees	N/A	N/A	R\$ 2,000 Entry Fee	N/A
Benefits	Provides a Fair for Life Certification	Provides no cost training and materials, also assists with co-op formation	Provides an additional sell	Gaining a reputation as pulp producers Establishing partnerships with local institutions
Risks	High risk of spoilage, Long Financing Hold Time, High Quality Standards	High Quality Standards	Difficulty Finding Buyers, Low Track Record of Success	Frequent Changes in regulations, School being closed due to Covid -19
Risk Assessment	High	Low	Medium	Medium-Low

POTENTIAL FUTURE OPTION WITHIN MOVING UP VALUE CHAIN

In order to move up the value chain, we explored the potential to build a processing facility and sell to end consumers and other businesses as inputs for final products. The additional costs incurred during functional upgrading often make the endeavor financially unattractive as the levels of productivity continue to be lower than competing larger-scale commercial endeavors.

Currently, we have calculated total costs of a processing facility, to be between R\$ 1.1-1.2 million for a 6 month operating window; a breakdown of individual costs can be found in the appendix. For further description, as well as the sources and our assumptions, please refer to the financial model.

Current Production	Sale in Novo Aripuana or Manicore @ R\$ 5 / kg	Sale in Novo Aripuana or Manicore @ R\$ 8 / kg
Revenue	R\$ 900,000	R\$ 1,440,000
Costs	~R\$ 1,100,000	R\$ 1,100,000
Net Profit	R\$ - 165,000	R\$ 375,000

At current berry harvest levels, the processing plant would not be profitable at an average price of R\$ 5 / kg of pulp. However, it would be profitable, if the average sale price was R\$ 8 / kg.

However, at that average sale price, the processing facility would earn approximately R\$ 375,000 in net profit annually. This is approximately R\$ 25,000 more than the extractivists in the reserves are currently earning, assuming current economic impact is R\$ 350,000 annually (see “Economic impact of current Acai value chain”). As a result, there is nowhere in the provided sale price range would this be a significantly more impactful option to what the reserves are currently doing.

An important consideration though is the average break even price of R\$ 5.91 /kg of pulp which the processing facility would have to achieve in order to earn any profit. However, if the RDS’ hoped to equal the current economic impact of Acai,

they would need to sell their pulp at an average price of R\$ 7.86 / kg, which given the price range in Novo Aripuana or Manicore, seems unlikely.

Goal Production	Sale in Novo Aripuana or Manicore @ R\$ 5 / kg	Sale in Novo Aripuana or Manicore @ R\$ 8 / kg
Revenue	R\$ 1,500,000	R\$ 2,400,000
Costs	~R\$ 1,100,000	R\$ 1,100,000
Net Profit	R\$ 435,000	R\$ 1,335,000

At a goal production level, which would allow the processing facility to process 750 kg of berries annually, the processing plant would be profitable at average sale prices of R\$ 5 / kg of pulp and R\$ 8 / kg. However, at that average sale price of R\$ 5 / kg of pulp, the processing facility would earn approximately R\$ 435,000 in net profit annually. Although this would result in an increase of approximately R\$ 85,000 to what the extractivists in the reserves are currently earning, it would be (R\$ 130,000) less than what they would earn if they were to continue to sell their berry production goal amount in the current value chain (R\$ 565,000 per year, see Harvest Management section).

If the average sale price was R\$ 8 / kg of pulp, the processing facility would earn approximately R\$ 1,335,000 annually, which is an economic impact increase of approximately R\$ 770,000.

Furthermore, the break even price to match the potential economic impact that the current Acai value chain would have at their goal harvest rate would be R\$ 5.65 / kg of pulp. Because there is an economic viability in future production states, we recommend that FAS re-evaluate the potential after successfully scaling the harvest. Other key considerations into the development of the processing facility, including customer analysis, production capability, operating expenses, etc. can be found in the appendix.

To summarize, a production facility at current production levels is not an attractive option. Once FAS reaches their goal production levels and if the communities were able to process 750 tons of berries a year, FAS should reconsider. However the following requirements would need to be met:

- 1** FAS would need to be confident that they could receive an average sale price of at least R\$ 6 / kg of pulp
- 2** FAS would need to be confident that it could find customers and ensure an ongoing demand of the pulp, this involves recognizing who the competitors are and why FAS could win over customers from other pulp producers
- 3** Training of employees would need to be efficient and not costly (training costs were not considered in the model)
- 4** Berry production is consistent and of a high quality
- 5** Health standards can be met by the facility
- 6** The processing facility could be used during other seasons to produce other product

If these requirements can be met then it would make sense for FAS to reconsider this option in the future.



Photo: Dirce Quintino

ASSESSING RECOMMENDATIONS AND SUGGESTED IMPLEMENTATION

Current Production Levels

	Sale to Petruz	Sale to Frooty	Sale to Coopema	Sale to School	Processing Plant
Total Annual Net Income*	~R\$ 820k	~R\$ 665k	~R\$ 815k	~R\$ 480k	~R\$ 106k (average sale price)
Change from Current Net Income/ Hurdle Value (R\$ 350k)	R\$ 470k ↑133%	R\$ 315k ↑88%	R\$ 460k ↑131%	R\$ 130k ↑356%	(R\$ 245k) ↓(70%)
Risk Assessment	HIGH	LOW	MEDIUM	MEDIUM	HIGH

At the current production levels, we have found that any of the four suggested buyers will provide an increase to the total value the river communities can capture. We also find that a processing plant is not warranted for further consideration at this time. This leads to our first set of recommendations. All of these actions will be necessary prerequisites to the reserves for any future value capture opportunities. Before the next harvest, it's recommended that FAS take the three following courses of action, which present minimal risk for the communities:

1. Further Train and Develop the Community Extractivists in Proper Acai

Management The Acai production businesses of the river communities can greatly benefit from enhanced knowledge of harvest management that has been proven successful from both commercial producers and other community extractivists. We cannot recommend specific practices for the communities, but we have outlined the researched practices that have been studied for both E. Precatoria and E. Oleracea Acai.

Implementation of these practices will enable the river communities to have a richer extraction during the harvest season and stimulates future growth in following years. Focusing on this action will allow for increasing labor in future seasons and ultimately reaching production goals.

2. Continued Conversations and Relationship Building with Large Buyers, Schools and Existing Co-Operative

Working with a large buyer in the future will enable the river communities to capture the largest amount of value for the lowest risk involved. Frooty and Petruz are both highly interested in working with FAS and the river communities. Both of the corporations bring distinct advantages and disadvantages to their proposed value chain. The continued conversation will allow us to negotiate the best deal for the river communities and enable scalable growth as there is no risk of competing producers.

These corporations are looking to purchase larger shares of Acai and can provide stable income that bypasses the middleman. Additionally, FAS should begin conversations with the schools and existing co-operative to determine what additional Acai can be diverted from current scenario 1 into these chains. This will enable diversification within the Acai business and ensure that income can still be made if any of the others default.

Key Contacts:

- Frooty- Carlos Brito: carlos.brito@frooty.com.br
- Frooty Board Member and sourcing expert
- Petruz - Izabella Mello: izabella@petruz.eu
- Petruz Europe B.V.



Photo: Monica Ventramini

3. Establish Buy-In from River Communities to Form Co-Operatives

For any of these recommendations to be successful, the river communities in each of the reserves need to form a co-operative. The conversation must begin with the community leaders through establishing a buy-in. This will build trust within the communities and enable engagement within the reserves. The successful organization will allow for pooled resources and larger reserves of Acai available for sale to a single consumer rather than multiple middlemen.

Action Items	Key Considerations
1. Establish Buy In of RDS River Communities to Form a Co-Operative or Collective Association	<ul style="list-style-type: none"> • Develop a Pulse Survey to determine current willingness of RDS Communities to work as a collective • Based on results of Pulse Survey, begin conversations with RDS Community Leaders to rectify issues • Work with the three reserves and determine potential for inter-RDS collaboration
2. Further Train and Develop Community Extractavists in Proper Acai Management	<ul style="list-style-type: none"> • Determine which of the useful management practices are viable for the protected communities • Find an instructor equipped to teach community extractavists on best practices • Begin seminars and courses inside the RDS aimed towards extractavists • Run a land survey to determine if increasing labor and extraction of Acai is possible with no risk of harming the protected forest area
3. Continue Conversations and Relationship Building with Large Buyers. Local Schools and Existing Co-Operative	<ul style="list-style-type: none"> • Schedule meetings with all available contacts for introductions between FAS and potential partners • Determine any additional requirements that any potential buyer has to see if is manageable by RDS/FAS • Look into how the potential buyer may be able to assist FAS in the implementation of potential partnerships (equipment, training, etc.)

Increasing Production Levels and Securing Buyer(s)

	Maintain Current State	Increase Labor
Total Annual Net Income*	~ R\$ 350k	~ R\$ 560k
Change from Current Net Income/Hurdle Value	-	R\$ 210k ↑60%
Risk Assessment	LOW	LOW

Upon the successful establishment of the first three action items, there will be the formation of an RDS Co-Operative, established relationships with potential buyers, and trained extractivists with plans to execute future harvests. FAS should transition focus to the next four courses of action:

1. Confirm Contract between RDS Co-Operative and Buyer(s)

As outlined above, the four potential buyers all provide increased value to the communities at the current state. Based on the relationships formed during prior conversations, FAS should be able to determine which buyer will provide the greatest benefit to the communities with the lowest risk involved. By FAS confirming this contract, there will be a stable, reliable, and higher source of income for the communities at the next harvest.

Purchase of Necessary Equipment (Boats with Cold-Storage, Additional De-Pulpers, etc.)

Based on the needs of the communities and requirements of the buyers, FAS will need to help with the purchase of any necessary equipment. We have laid out the potentials for cold storage boats for transportation as well as additional community de-pulpers for local buyer options. Additional considerations may be found in the Financial Model.

3. Establishment of a Collective Transportation Schedule Alongside the Co-Op

To ensure the safe execution of sale, specifically around prevention of Acai spoilage, a transportation schedule will need to be developed. The transportation schedule will need to be planned based on the plans of the extractavists with considerations for the harvest management practices.

4. Scale Extraction of Acai

The plan to scale the extraction is strategically placed in this step. First, it will require some time before the harvest management practices will enable increased extraction. Additionally, now that a buyer is being secured, the extractavists can harvest more berries without fear of not having a buyer and the fruit being left on the forest floor.



Photo: Dirce Quintino

Action Items	Key Considerations
<p>1. Confirm Contract between RDS Co-Operative and Large Buyer, School or Co-Operative</p>	<ul style="list-style-type: none"> • Formalize contract and discuss specific contract provisions • Ensure all parties are on the same page for the upcoming harvest • Discuss any outstanding logistical issues
<p>2. Purchase of Necessary Equipment (Boats with Cold Storage, Additional De-Pulpers, etc.)</p>	<ul style="list-style-type: none"> • Purchase 1-2 Cold Storage Boats that are able to carry between 20,000 - 30,000 kg of Acai berries for transportation upgrade changes • Cold storage boats are approximate R\$ 250,000¹⁰ per boat, see pay-back analysis in previous sections. • Increase the number of local processing units if the local schools become a viable buyer
<p>3. Establishment of a Collective Transportation Schedule Alongside the Co-Op</p>	<ul style="list-style-type: none"> • Identify optimal route for boats to take during the journey to minimize time and maximize transportation potential • Recommended to schedule pickups at least 2x per week with specific times and locations for each pickup
<p>4. Scale Extraction of Acai</p>	<ul style="list-style-type: none"> • Continue utilizing Acai Harvest Management techniques • Have RDS Co-Operative train additional families in proper Acai harvest practices • Determine a schedule for scaling to determine how many additional families can participate in each yearly harvest • Begin increasing the number of participating families up towards the goal of 600

At Goal Production Levels

¹⁰ Calculation based BOTFL X team's Pirarucu transportation analysis

	Harvest Management	Sale to Petruz	Sale to Frooty	Sale to Coopema	Processing Plant
Total Annual Net Income*	~ R\$ 560k	~R\$ 1,115k	~R\$ 900k	~R\$ 1,105k	~R\$ 810k
Change from Current Net Income/ Hurdle Value (R\$ 565k)	-	R\$ 550k ↑98%	R\$ 340k ↑60%	R\$ 540k ↑96%	R\$ 325k ↑57%
Risk Assesment	LOW	HIGH	LOW	LOW	HIGH



Photo: Dirce Quintino

Upon the success of the next four action items, we find that under our current assumptions, the processing plant now becomes a profitable option. We believe that FAS should re-evaluate the potential of an RDS run facility. In a future state, the assumptions, costs, and profits we have made in this analysis may no longer reflect the true state of the Acai production business. For this reason, we suggest the two following action items:

Action Items	Key Considerations
1. Re-Evaluate the Potential to Build an RDS Operated Factory	<ul style="list-style-type: none"> • Re-evaluate existing conditions (prices, existing processing units, levels of association) • Determine if current transportation model allows for alternative options in factory location • Revisit numbers and financial model to reflect actual rates of production and new conversion amounts for popular, medium, and special Acai • Run a risk and reward analysis to compare current sale of Acai to factory change (considerations can be found in the appendix)
2. Determine if there is still capacity to further increase production beyond goal amount	<ul style="list-style-type: none"> • Run a land survey to determine if increasing labor and extraction of Acai is possible with no risk of harming the protected forest area • Run a labor analysis to determine if increasing the number of families involved in the Acai production businesses will affect the individual income levels

Appendix 1: RDS OPERATED FACTORY

Build a Facility to Produce Pulp

Considerations of what goes into the factory

Several things need to be taken into consideration to profitably run a processing facility. Perhaps most importantly is to ensure consistent high quality Acai pulp, which can be affected by the quality of the berries, the purity of the water used in the process, and the proper sanitation of the berries before turning them into pulp¹¹. The quality of the Acai berries can be affected by the transportation process, the exposure to sunlight, the time of the year when the berries are harvested, and the process through which the berries are sanitized. With this in mind, three things must be taken into consideration when processing Acai pulp:

- 1. Location:** the processing unit (factory) must be as close as possible to the harvest place in order for the berries to preserve their quality. It is also important for the factory to have constant electricity supply, as the sanitation and refrigeration of Acai depend on it. For a small plant based in Manaus electricity costs are between R\$2500 and R\$3000 per month.¹²
- 2. Sanitation:** consumption of Acai berries and Acai products has been related with Chagas disease (also called Trypanosomiasis)¹³, which makes the sanitation of the berries crucial. Sanitation can be done via different methods, that include bleaching, ozone cleaning, and pasteurizing.

In regard to pasteurization, there are concerns on the effects pasteurization has on the taste and color, and antioxidant qualities of the Acai pulp¹⁴, yet some research has shown that “the antioxidant activity

¹¹ Wilton Lira (Acai do Norte), interview March 24, 2021; André Gomes (Consulado do Acai), interview March 25, 2021; Igor Fonseca (Cilindro Acai), interview April 9, 2021

¹² Wilton Lira (Acai do Norte), interview March 24, 2021

¹³ Ferreira, R.T.B., Cabral, M.L., Martins, R.S. et al. Detection and genotyping of *Trypanosoma cruzi* from Acai products commercialized in Rio de Janeiro and Pará, Brazil. *Parasites Vectors* 11, 233 (2018). <https://doi.org/10.1186/s13071-018-2699-6>; Nóbrega AA, Garcia MH, Tatto E, Obara MT, Costa E, Sobel J, et al. Oral Transmission of Chagas Disease by Consumption of Açai Palm Fruit, Brazil. *Emerg Infect Dis*.

¹⁴ Igor Fonseca (Cilindro Acai), interview April 9, 2021; Almazonia, Mastering the Process of Acai, available at: <https://almazonia.com/blogs/rainforest-economy/Acai-factory>

tends to increase, preferentially, when lower temperatures and higher residence times are applied¹⁵.” Although bleaching and ozone cleaning are sanitation methods accepted in Brazil, other countries might require for the pulp to be pasteurized before exporting it.

3. Water quality: the quality and purity of the water used during the processing phase is crucial for the quality of the pulp produced. In this sense, it is very important that the water used for producing the pulp is drinkable and filtered. To disinfect Acai fruits, 150 ppm chlorinated water should be used. Generally, for the treatment with chlorinated water, around 40 L of water is needed for a quantity of 26 kg of Acai fruits¹⁶.

Aside from ensuring the quality of the pulp, another important consideration for the operation of the processing unit, is the seasonality on which it will operate. Factories dedicated to the production of Acai, only process pulp during the harvest period. They process as many berries as possible and stock pulp for the rest of the year. Once the harvest ends, factories dedicate only to the sale of the pulp they stocked during the harvesting season. Conversely, there are factories that, aside from Acai, process 2 or 3 other products that will be in harvest in Acai’s off-season¹⁷.

In terms of the machinery required, and according to Embrapa Acai processing plants should at least have: a stainless steel counter and a picking table for the berries, three tanks (for cleaning, coloring, and cooling), a bleaching machine, an Acai processing machine (batedora), water filters, and buckets, basins, fillers, mugs, dosers¹⁸. It is also recommended that all the equipment used is

¹⁵ Attietto, Rafaella & Gomes, F.S. & Matta, V.M.. (2014). Effect of Acai pasteurization conditions on its antioxidant activity. *Acta Horticulturae*. 1040. 179-186. 10.17660/ActaHortic.2014.1040.23.

¹⁶ Embrapa, Boas práticas de Fabricação de Acai batido, available at: <http://app.cpfap.embrapa.br/Acaiseguro/index.php/processamento/>

¹⁷ Igor Fonseca (Cilindro Acai), interview April 9, 2021

¹⁸ Embrapa, Boas práticas de Fabricação de Acai batido, available at: <http://app.cpfap.embrapa.br/Acaiseguro/index.php/processamento/>

made of stainless steel, which allows for easy cleaning¹⁹. In order to ensure the durability of the machinery, it is important to take into consideration the availability of spare parts and personnel to fix and perform equipment maintenance when required.

As we quantify these costs, it is important to understand that annual expenses will be broken down into variable costs (which change with production levels) and fixed costs (which remain constant regardless of production levels). Currently, we have calculated total costs of a processing facility, to be between R\$ 1.1-1.2 million*, a breakdown of individual costs is below. For further description, as well as the sources and our assumptions, please refer to the financial model.

¹⁹ Embrapa, Boas práticas de Fabricação de Acai batido, disponível em: <http://app.cpaafap.embrapa.br/Acaiseguro/index.php/processamento/>



Photo: Monica Ventramini

	Annual Variable Expenses*
Transportation Expense*	R\$ ~400K
Water Costs	R\$ 10k - 25k
Ice Cost	R\$ 160k - 200k
Salary Costs	R\$ 330k - 400k
Packaging Costs	R\$ 10k - 30k

	Annual Fixed Expenses*
Electricity Costs	R\$ 120,000
Annual Maintenance	R\$ 2,000
Marketing Costs	R\$ 20k - 50k
Administrative Costs	R\$ 75,000
Regulatory Costs	R\$ 100k - 120k
Chemical / Cleaning Costs	R\$ 6,500

**Please note that we have also calculated these costs to primarily be only the costs that would be incurred during the approximately six month production period.*

In addition to annual expenses, there will be certain capital expenditures that will be required at the beginning of the project to purchase the facility and machinery.

	Capital Expenditures*
Purchase of Building	R\$ 400,000
Equipment	R\$ 400,000

Currently, Capital Expenditures are estimated only for initial purchasing of a simple facility and are estimated to be R\$ 800,000. However, depending on the health and safety standards that the communities would like to achieve, these costs could be much higher and could be recurring. As an example, the CEO of Frooty described a plant that spent USD \$200,000 last year just to maintain the health and quality standards that Frooty requires.



Photo: Dirce Quintino

Production Capability

If all of the extractivists were able to divert the 500 tons of the berries used in Scenarios 1&3 from their current selling points and all of these berries were used in the RDS production facility, that would mean that the production facility would process approximately 450 tons of berries annually (with a goal of 750 tons of berries annually once the reserves reach the goal production of 800 tons).

As a result, with the current berry production rate (described above), and depending on the type of pulp produced, communities could process between 110 to 290 tons of pulp per year. If the 800 ton goal production rate were to be achieved, communities could produce between 176 to 464 tons of pulp.

Type of Pulp	Berries to Pulp conversion rate²⁰	Produced Pulp (Tons) w/ 450 tons of berries	Produced Pulp (Tons) w/ 750 tons of berries
Popular Acai (8%-11%)	0.58	290	464
Medium Acai (11%-14%)	0.35	175	280
Special Acai (+14%)	0.22	110	176

²¹ Conversion rates were calculated on the basis of the information provided by FAS and the data collected through the interviews with Acai processing units.

However, to simplify matters, and based on the most frequently used conversion rate that we found through our research and interviews (see Spreadsheet X), it is estimated that the conversion rate used by the RDS processing plant would be a conversion rate of 0.40 berries to pulp.

	Berries to Pulp conversion rate²¹	Produced Pulp (Tons) w/ 450 tons of berries	Produced Pulp (Tons) w/ 750 tons of berries
Estimated Conversion Rate for RDS Processing Facility	0,40	180 tons	300 tons

As a result, it is estimated that the production facility would produce 180 tons of pulp at the current berry harvest rate, and could potentially produce up to 300 tons of pulp, if the goal berry production could be reached.

²² Conversion rates were calculated on the basis of the information provided by FAS and the data collected through the interviews with Acai processing units.

Sale of Pulp to Consumer or Business

The research conducted by the team showed that in Manaus, Acai pulp is sold at a price that ranges between R\$7 and R\$18. Variations in price are due to the type of pulp, the season, and the place where the pulp is sold. In general terms, prices are higher in large cities than in medium towns.

Source of Information	Sales price	Quantity	Type of Acai	Location	Customer
FAS	R\$ 5	Per Kg	Popular Acai	Manicore/ Novo Aripuana	Final consumer
FAS	R\$ 8	Per Kg	Special Acai	Manicore/ Novo Aripuana	Final consumer
Acai do Norte	R\$ 15-R\$ 18	Per Kg	Special Acai	Manaus, AM	Final consumer
Consulado de Acai	R\$ 7	Per Kg	Popular Acai	Manaus, AM	Final consumer
Consulado de Acai	R\$ 9	Per Kg	Medium Acai	Manaus, AM	Final consumer
Consulado de Acai	R\$ 12	Per Kg	Special Acai	Manaus, AM	Final consumer
Cilindro Acai	R\$ 7.90 - R\$ 11.50	Per Kg	Medium Acai	Belém, PA	Acai retailers
Cilindro Acai	R\$ 9 - R\$ 15.50	Per Kg	Special Acai	Belém, PA	Acai retailers

In regards to packaging, the type of client and Acai sold should be taken into consideration. In Manaus, for example, it's common to sell 1Kg/1Lt of Acai pulp to final customers²². While in places like Brasilia, where Acai is consumed in the form of juice or frozen ice cream, it is more common to sell Acai in smaller individual quantities (100g-170g)²³. When selling to other businesses (who then mix mix he Acai with sweeteners and other ingredients such as banana or guarana), pulp is usually sold in 40Kg boxes that include smaller 1Kg -2 Kg packages (i.e a box can have 20 packages of 2Kg or 40 packages of 1 Kg)²⁴.



Photo: Monica Ventramini

²² Wilton Lira (Açaí do Norte), interview March 24, 2021; André Gomes (Consulado do Acai), interview March 25, 2021

²³ Igor Fonseca (Cilindro Acai), interview April 9, 2021

²⁴ Ibid.

Profitability of Processing Facility

Sale in Novo Aripuana or Manicore @ R\$ 5 / kg	Current Production (using 450 tons of Berries)	Goal Production (using 750 tons of berries)
Revenue	R\$ 900,000	R\$ 1,500.000
Net Profit	R\$ - 163.000	R\$ 435,000

Sale in Novo Aripuana or Manicore @ R\$ 8 / kg*	Current Production (using 450 tons of Berries)	Goal Production (using 750 tons of berries)
Revenue	R\$ 1,440.000	R\$ 2,400.000
Net Profit	R\$ 375,000	R\$ 1,335.000

*a consistent sale price of \$8 /kg of pulp is unlikely

	Current Production (using 450 tons of Berries)	Goal Production (using 750 tons of berries)
Break Even Price	R\$ 5,91	R\$ 3,54
Break Even Price in order to match economic impact of the existing value chain	R\$ 7.86 (current economic impact of Acai R\$ 350k per yr)	R\$ 5.42 (economic impact of Acai at goal production is estimated to be R\$ 565k per yr)

Profitability of a RDS run processing facility will vary depending on the price at which the pulp is sold, as well as the production capability of the plant.

(At Current Berry Harvest Amounts:

At current berry harvest levels, the processing plant would not be profitable at an average price of R\$ 5 / kg of pulp. However, it would be profitable, if the average sale price was R\$ 8/kg.

However, at that average sale price, the processing facility would earn approximately R\$ 375,000 in net profit annually. This is approximately only 25,000 more than the extractivists in the reserves are currently earning, assuming current economic impact is R\$ 350,000 annually (see “Economic Impact of Current Acai Value Chain”). Given such a small profit increase, nowhere in the provided sale price range would this be a preferable option to what the reserves are currently doing.

An important consideration though is the average break even price of R\$ 5.91 / kg of pulp which the processing facility would have to achieve in order to earn any profit. However, if the RDS’ hoped to equal the current economic impact of Acai, they would need to sell their pulp at an average price of R\$ 7.86/kg, which given the price range in Novo Aripuana or Manicore, seems unlikely.

(At Goal Berry Harvest Amounts:

At goal berry harvest levels, which would allow the processing facility to process 750 tons of berries annually, the processing plant would be profitable at average sale prices of R\$ 5/kg of pulp and R\$ 8/kg.

However, at that average sale price of R\$ 5 /kg of pulp, the processing facility would earn approximately R\$ 435,000 in net profit annually. Although this would result in an increase of approximately R\$ 85,000 to what the extractivists in the reserves are currently earning, it would be (R\$ 130,000) less than what they would earn if they were to continue to sell their berry production goal amount in the current value chain (R\$ 565,000 per year, see “Harvest Management” section).

If the average sale price was R\$ 8 / kg of pulp, the processing facility would earn approximately R\$ 1,335,000 annually, which is an increase of approximately R\$ 770,000 to what they would earn through the current value chain.

Furthermore, the break even price to match the potential economic impact that the current Acai value chain would have at their goal harvest rate would

be R\$ 5.42/kg of pulp.

(Number of Required Customers

Each of these scenarios will require customers and building a business which sells to end consumers, in this case, we have calculated the number of customers required in order to achieve the net incomes that had been previously calculated.

Customers Required (if Customers Consume 50 kg / yr)	Current Production (using 450 tons of Berries)	Goal Production (using 750 tons of berries)
Pulp Price of R\$ 5/kg	N/A (this operation is not profitable)	1,750 Customers
Pulp Price of R\$ 8/kg	950 Customers	3,350 Customers



Photo: Monica Ventramini

Fundação Amazônia Sustentável (FAS)

Fundada em 2008 e com sede em Manaus/AM, a Fundação Amazônia Sustentável (FAS) é uma organização da sociedade civil e sem fins lucrativos que dissemina e implementa conhecimentos sobre desenvolvimento sustentável, contribuindo para a conservação da Amazônia.

A instituição atua com projetos voltados para educação, empreendedorismo, turismo sustentável, inovação, saúde e outras áreas prioritárias. Por meio da valorização da floresta em pé e de sua sociobiodiversidade, a FAS desenvolve trabalhos que promovem a melhoria da qualidade de vida de comunidades ribeirinhas, indígenas e periféricas da Amazônia.

Confira os programas da FAS:

Programa de Gestão e Transparência (PGT)	Por meio de mecanismos e instâncias de gestão, o PGT atua junto à comunidade interna, com planejamento e avaliação de resultados de programas e projetos.
Programa Floresta em Pé (PFP)	O PFP está focado em quatro ações estratégicas: geração de renda, empreendedorismo, infraestrutura e empoderamento comunitário.
Programa Saúde na Floresta (PSF)	Resultado de ações da Aliança Covid Amazônia, o PSF qualifica o acesso à saúde, com políticas públicas e capacitações de profissionais da área.
Programa de Educação para a Sustentabilidade (PES)	Os trabalhos do PES são voltados à formação de crianças e adolescentes, garantindo oportunidades para uma educação mais inclusiva e de qualidade.
Programa de Soluções Inovadoras (PSI)	Com base em tecnologias sociais e soluções para a sustentabilidade desenvolve-se o PSI, cujos trabalhos focam em parcerias técnicas em PD&I.
Programa de Empreendedorismo e Negócios Sustentáveis (Pensa)	O PENSA auxilia empreendedores de comunidades ribeirinhas e indígenas com incubadora, cursos, oficinas e consultorias para gerir negócios inovadores e acessar créditos.



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