



Cashew Apple Processing Business Models

Preliminary outcomes

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A top-down view of a desk with a laptop, a cup of coffee, a camera, and a map. The word "CONTENTS" is overlaid in red text.

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Introduction & methodology

**Lessons from markets around
the world**

**Conclusions: which markets &
business models**

Objectives and research questions

Objective:

Develop 4 economically feasible business models for Cashew Apple Processing in Ghana (2 small scale & 2 large scale)

Starting hypothesis:

- *There has been talk about cashew apple processing in West Africa for more than a decade, but so far it hasn't really succeeded. This means it is very difficult. We have to tackle this properly*
- *The only country where they are processing large volumes of cashew apple and are consuming large volumes is Brazil. We need to understand how they do it,*

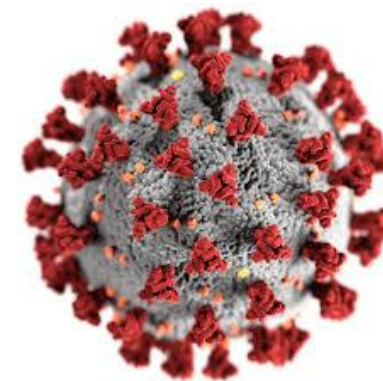
Research questions:

1. What cashew apple products are popular in Brazil, and how are they produced?
2. What are the business models in the cashew –apple processing in Brazil (and India)
3. In particular, how is the collection organized?
4. What are the experiences with Cashew apple processing in other African countries?
5. Is there an EU market for Cashew Apple Juice?
6. Is there an opportunity in the local market in Ghana for cashew apple juice or other products?
7. What business models for cashew apple processing could be economically feasible in Ghana?

Research design

- Fieldwork in Brazil and India, visit processors and farmers and points of sale
- Interviews with EU importers of juice and concentrate, bottlers and blenders
- Consumer research with 6 focus groups and tasting panels in Ghana
- Evaluation of Pinora experience in Ghana, artisanal processing in Benin
- Interviews with processing experts
- Business modelling
- Team: international experts, market research experts, juice processing expert, Brazilian and Indian local consultant

→ Corona has meant serious delays and adaptations in project execution





Lessons from markets around the world





Lessons learned from Brazil

- Juice is the only cashew product that is popular and produced in large quantities
- There are 4 basic product formats:
 - Casuina: clarified cashew apple juice in recycled beer bottles, artisanal processing in North East for local market
 - Mainstream juice for the national market, industrially processed manufactured from concentrate
 - Frozen juice portions, for home consumption and juice bars (for juice blends, smoothies etc.)
 - Carbonated canned cashew juice, industrially manufactured by adding soda water to concentrate
- The reason that artisanal juice works in Brazil but not in Africa, is that there is no deposit on beer bottles, so recycled bottles are very cheap and easy to find
- Still only 30% of cashew apples are processed in Brazil
- Cashew apple supply comes mostly from small farmers
- Cashews are harvested from trees in the morning. Apple is separated from nut early afternoon, and collected by truck from the factory who processes in the evening/ night
- There are pre-processors who press and stabilize the juice and ship this in drums to the juice plants for further processing and concentration
- Some of these are mobile platforms that process multiple fruits, and or produce frozen fruit sachets as well
- Cashew juice/ concentrate is not exported





Lessons learned from EU Market Research: juice market basics

There are 2 distinctly different business models in juice:

1. The juicing company, juicing large volumes of a few fruits close to the plant for sale in bulk
 2. The juice bottler, purchases range of concentrates and juices for blending and packaging, and distribution to stores
- Both are large scale operations requiring 2,5 to 5 million Euro investment
 - The juice industry is a blending game:
 - Blending juices from different origins to get a stable flavour throughout the year and reduced cost
 - Blending various fruits to get interesting flavours at the lowest cost
 - There are 3 types of juices for blends:
 - The base ingredients: cheap and neutral in flavour (apple, orange, pear, grape)
 - The differentiation ingredient: something special to claim on the label; expensive so used in smaller quantities (pineapple, mango, passion fruit, grapefruit, cranberry)
 - The functional benefit ingredient: something that makes you claim antioxidants, high vitamin c etc.
 - The challenge: how to get 100% fruit juice with interesting flavour and ingredients at the lowest cost
 - Juice from concentrate and traditional flavours is in decline, not from concentrate (NFC), freshly squeezed, tropical flavours, organic is still growing



- About ten years ago large companies such as Pepsi had Cashew apple juice projects
- These were mostly to explore cashew as a low cost base that can replace apple juice from China
- These were done in Vietnam, India and Brazil, and mostly unsuccessful
- Main reason: a juice base is a high volume low margin business. But it is difficult to gather the enormous volumes of cashew apple for this model
- In the US they also did tests with Cashew Apple as a flavour
- These tests were not successful, which has tainted the name of the product. They remember it failed, but not why...
- We believe the market is much more experimental than 10 years ago, so it could be ripe for Cashew as a functional or differentiation ingredient
- However, where to find an importer/ compound house who invests in product development?





Experience with Cashew Juice in Africa: artisanal casuina

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- The only model that has been tried in multiple countries is artisanal casuina.
- Available in Ghana, but particularly driven in Benin with support from technoserve
- They all face the same challenge:
 - They use recycled glass bottles which are in short supply and expensive
 - Production Volumes are limited by the availability of glass bottles
 - Unit cost are high which makes the product expensive
 - Investing in cheaper packaging requires serious investments in packaging lines and a proper factory. This is beyond the scope of most entrepreneurs
 - It would also require to produce year round using a frozen or aseptic juice; in essence become a bottler
 - It requires marketing skills, because consumers do not know the product
 - Once scale increases, sourcing enough apples becomes an issue
- Conclusion: the model is difficult to scale and therefor absorb serious amounts of apple.





Experience with Cashew Juice Africa: industrial concentrate

- In Ghana, Pinora orange and pineapple juice plant manufactured cashew apple concentrate for the Brazilian market in 2 ways:
 - By sourcing the apple and transporting to the plant (that is not in the cashew region); this was too difficult and expensive
 - By having 1 pre-processor in the region: mim cashew. It worked, but ultimately the business was not sufficiently profitable for mim
- The production was profitable for pinora, but cashew apple supply was the issue (once again)
- We feel that Pinora would need more pre-processors of a smaller scale.
- The current pre-processor was near industrial, which again makes the sourcing area too large, and the barriers to entry for the business too high



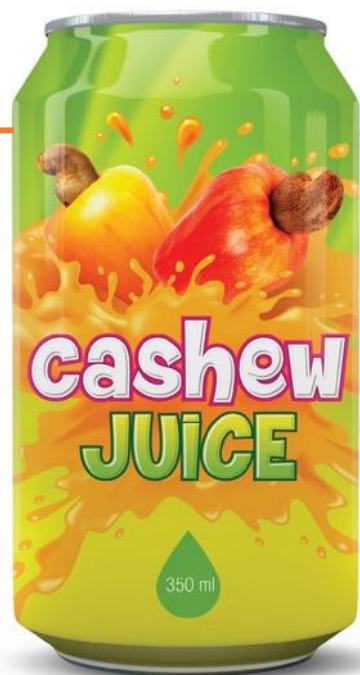
Results from Ghanaian consumer research (6 focus groups)

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Research shows Ghanaian consumers have interesting mental associations with Cashew Apple...

Cashew is Good for you

- They don't know the Apple, but borrow health cues from Cashew Nuts
- Cashew Nuts are known to be beneficial to health
- Good for recovery
- Parents have told children for generations that cashew nuts are healthy



Natural

- “Gives an opportunity to taste the natural fruit”
- Grown in Ghana, so probably natural, not from concentrate, no additives, chemicals etc.

Both Novel & Familiar

- They don't know the apple, but they know the nut
- Seems interesting for youth keen to try new things
- Health and goodness to older people



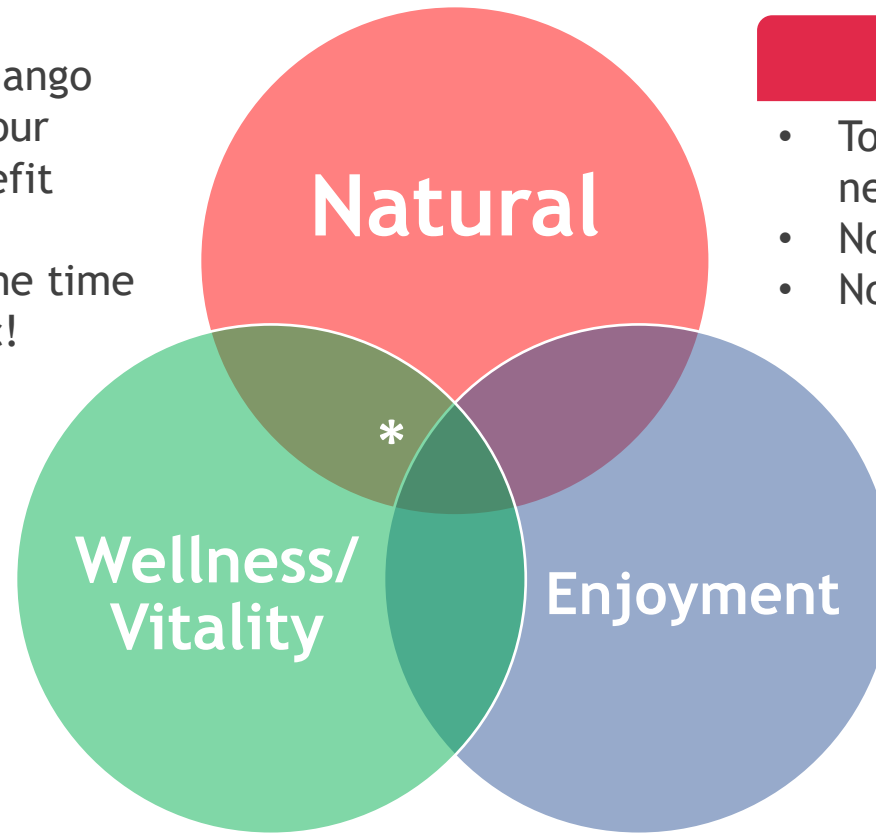


Consumer tasting shows blends with tropical base flavour are the winner¹²

- Brazilian samples scored on appearance (colour, clarity) but not on flavour & aroma
- Com cashew 100% cashew scored better on flavour & aroma than Brazil
- Tropical blends scored best:
 - Familiar natural flavour base of mango
 - Ginger helps to mask cashew flavour
 - Cashew for functional health benefit
 - Familiar enough to like it, but interesting and healthy at the same time
- Interesting: apple, pear etc. are exotic!

A punch of goodness

- Functional ingredients that make it a health product
- **Cashew** & Ginger



Nothing but the fruit

- To play in premium market it needs to be 100% juice
- No added sugar
- No added flavours and aromas

Local Familiar flavours

- Tropical fruits are a familiar, local neutral base (mango, pineapple, orange)
- Cashew flavour is too new





There's a space between the current 2 major segments

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Mango-Cashew blends could be an affordable special occasion drink with health & wellness benefits

SPECIAL OCCASION/VIP

- ✓ Natural, 100% fruit juice & premium brands in small bottles
- ✓ Enjoyment
- ✓ Restaurants, pastors and ministers, weddings
- ✓ Relaxation, quiet time
- ✓ Good taste experience (aroma, mouth feel, colour, pack etc)
- ✓ Luxury exotic flavours e.g. Apple
- ✓ Attractive resealable packs

X Expensive (which also communicates quality)

Premium Price

Vitality Drinks

Mid Tier Price

MASS MARKET DRINKS

- ✓ Mostly b-brand sodas & nectars, 2liter coke
- ✓ Refreshment (snacking moment)
- ✓ Rounding off (after meals)
- ✓ Energy
- ✓ Kids and parties
- ✓ Affordable
- ✓ Available

**X Not healthy/unhealthy
"citric acid + sugar + water"**

Value Price



Products that compete in this space

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SPECIAL OCCASION/VIP



Premium Price

Validity Drinks



Mid Tier Price

MASS MARKET DRINKS



Value Price

Conclusion: which markets should we focus on with which products?

- The EU juice market requires a strategic partner willing to invest in product development → this is a long term project
- The Brazilian market for concentrate is an option: if you can match price, you can offer an alternate season and risk diversification → short term 'proven' opportunity
- The local juice market is an option, but requires a cheaper blended product → opportunity for local professional business who can do product development, bottling at low cost and distribution and marketing. Requires concentrate.
- Casuina could be a premium niche market for artisanal producers, but requires the bottling issue to be solved
- We looked cashew apple cider, which has potential but alcoholic beverages are out of scope
- We looked at medical ethanol, but this again is a very complex high volume low margin market

Conclusion: Which business models should be developed to service these markets? ¹⁶

Industrial market

1. An industrial juice plant who produces citrus, pineapple and or mango, passion fruit as well as cashew concentrate for export to Brazil and local juice bottlers
2. A semi-industrial pre-processor who supplies this juice plant
3. Aggregators – harvesters supplying the pre-processor
4. A local bottling company who purchases concentrate and blends, bottles and markets juice

Artisinal market

1. An artisanal casuina producer who does a range of other juices and uses a contract bottling plant
2. The contract bottling plant who bottles at a fee per liter/ hour



Business Models



Model 1: The apple aggregator

Business Description:

- Cashew aggregator trains teams, that harvest the cashew for free from farmers in return for the Apple
- Transport to exporter warehouse where apple & nut get sold to the exporter- pre-processor separates nuts and apples
- One aggregator services 25ha of orchards, minimum 20 aggregators are connected to one warehouse-pre-processor

Key operational and financial data:

- Scale: 10 tons of kernel: sold at 4ghc, 50 tons of cashew apple, sold at 0,20ghc to exporter-pre-processor
- Sources froms 25ha (Average yield of 400kg of nuts & 2000kg apple per ha)
- 10,000 Ghc is revenue from apples, harvesting labour and transport is HhC 6360; gross margin is GhC 3640
- Investment cost of 11490 GhC in 1 tricycle & 100 picking crates

Advantages for stakeholders:

- free harvesting for farmer (value: 0,5GhC, 12,5% to 15% of revenue!)
- Guaranteed access to crop for aggregator
- Kernel exporter: guaranteed kernel volumes, additional income from pre-processing

Potential investors:

- Kernel exporter
- Aggregator
- Pre-processor

Model 2: The apple pre-processor

Business Description:

- Buys apples & kernel from aggregator, and processes the apple into a raw juice that needs to be finished and concentrated in a professional juice plant, while passing the kernels to the exporter
- Operates inside or close to warehouse of exporter
- Can be operated by the exporter
- Production process: separate apple from kernel, washing and sorting, pressing, filter, adding preservatives (Citric acid, sodium benzoate, sodium metabisulfite), packaging in 2 polythene liners inside 1 ton bulk bag
- Can be used for Mango, with small adaptation for pineapple and citrus. Can be made mobile at extra cost

Key operational and financial data:

- Minimum scale: 50 tons of juice every 3-4 days. Cannot be stored longer, minimum batch for concentration plant is 50 tons
- Breakeven: 1000 tons of apples, to produce 765 tons of juice (76,5% conversion)
- Sold @ 1023 GhC/ ton = GhC 782,595
- This needs 20 aggregators & 500ha of orchards
- Max capacity of equipment: 5 tons/ hour/ 20 hours per day=100 tons per day
- Investments: GhC 1,123,000 in machinery

Model 3: The Juice plant

Business Description:

- Existing juice plant for mango, citrus, pineapple and or passion fruit adds cashew apple
- Buys juice in 1-ton bulk bags from pre-processors (at least 2 suppliers for risk management)
- Production process: quality control, concentration, packaging in frozen bulk bags, aseptic bulk bags or drums (depending on client)

Key operational and financial data:

- Sold @ 1580 USD FOB/ ton of triple concentrate 30brix (conversion of 3-1 from juice in frozen bulk bags. Transport to Brazil 4500\$ reefer/ 3000\$ dry container for 22 tons drums/ 26tons bulk bags)
- Minimum scale: 50 tons of juice per batch (16,6 tons), 22-26 tons per container (66 – 78 tons of juice)
- 2 suppliers x 1000 tons = 2000 tons of apples, 1530t/ juice, 510 tons of concentrate
- 40 aggregators, 1000 Ha
- Breakeven: N.A.
- Min capacity of equipment: 5 tons/ hour
- Investments: Complete factory 3 million USD

Potential Investor

- Existing juice plant looking to diversify product range to utilise plant better throughout the year
- Season fits between citrus and mango (March, April, May)

Model 4: The industrial local/ regional juice bottler

Business Description:

- Existing juice bottler who purchases concentrates and blends, distributes and bottles a range of flavours in PET or Tetrapak
- Adds Cashew as stand-alone flavour or blend
- Production process: quality control, blending, adding preservatives, bottling, sales

Key operational and financial data:

- Investments: Complete factory 100,000 to 4 million USD depending on size and packaging material
- To be continued (work in progress)

Potential Investor

- N.A. Existing juice bottling plant adding cashew as flavour

Model 5: The artisanal juice & casuina producer

Business Description:

- Existing artisanal juice producer who adds casuina to product range, or other juice blends
- Gathers cashew & other fruits directly from farmers, does the pressing and freezes the juice in 5-10 liter containers
- Gather enough for 250 litres of juice, use contract/ toll bottler
- Traditional production process: washing, pressing of apples, clarifying, caramelizing, freezing

Key operational and financial data:

- To be continued (work in progress)

Potential Investor

- Small business owners and cooperatives already active in the juice market

Model 6: Toll bottling/ contract bottling for artisanal producers

Business description:

- Bottles fruit juices in PET bottles for a fee per bottle/ liter/ hour usage of the line
- Does variety of juices including cashew apple; can be mobile to move to different areas
- Line fits in a 40 ft container, can be moved with hired truck
- Has 200L mixing tank & heater, pump with control unit, semi-automatic filling machine, transport belt, pneumatic hand capper, bottle rinsing station, cooling bath, semi automatic labeler, barcoder, packaging table, shrink wrapper, generator
- Allows for cheaper packaging and better shelf life due to hygienic bottling
- Added service: product testing and formulation

Key operational and financial detail

- Investment: EUR 69,000, Production capacity: 1000 bottles of 0,25l per hour (250 litres)
- Hot fills 35micron PET bottles (80 degrees), with or without preservatives, different juices
- Variable cost per bottle: GHS 0,97/ EUR 0,14 of which 0,35GhC for bottle& cap, 0,44GhC including the label (EUR 0,05 excl. and 0,06 incl. label)
- Recycled bottle in Benin: Ghs 110/ EUR 0,16 excl. label but supply is very limited
- New glass bottle is GhC 1,6/ 0,23 eur, 78% more expensive.
- 250 litres minimum batch (1 hour)
- Margin needs to be added to EUR 0,14 and compared with existing bottling cost.

To-do list and discussion points on business models

- Packaging type and profitability for industrial juicing plant (drums & aseptic versus frozen and bulk bag)
- Can pre-processing be done on smaller scale?
- Separating apples from nuts: aggregator or pre-processor?
- Role of current exporters
- Sales price and blends for local juice, profitability of professional and artisanal juice producers for local market
- Technology to better freeze/ store juice from artisanal producers
- Service charge of toll bottler
- Input from brazil