



RESEARCH ARTICLE

**Commodity Chain Assessment: Case Of Candlenut In
Transboundary Timor And Indonesia¹**

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ABSTRACT

This paper tries to answer three four main questions: how to improve the small farmers' income by having better prices for their candlenuts remains unanswered question. How can the farmers gain market access and link the farmers to the external traders? How to improve the post harvest processing and handling skills of the farmers, learning from the case of the farmers in West Timor, Indonesia? The paper tries to answer these questions through candlenut chain assessment in West Timor, Indonesia. The assessment focused on the post harvesting technology of the farmers in West Timor, downstream market in Kupang and Surabaya, especially on the willingness to buy products from Timor Leste, including conditions set by the buyers.

Keywords: candlenuts ; technology ; small farmers ; Timor Leste ; market access

1. Introduction to the research

The Development of Candlenut Enterprise (hereinafter DOCE) Project in Timor Leste since 2006 sets the goal for East Timor to have a well-established and efficient candlenut industry that serves as

¹ This research paper was drafted for Catholic Relief Services in Timor Leste. It is presented here as an academic paper and all the mistakes that may be found in this draft are those of the authors.

a stable and growing source of income for selected rural communities.² In order to meet this goal, this research was somehow designed as a partially engaged research, involving the informal chain of candlenut business from the upper stream to the downstream.

As of 1997, candlenut (*Aleurites moluccana*) was one of big three tree crops in Timor Leste, after coffee bean and coconut (see table of Agricultural Production of Timor Leste in 1997 and 2001 in IMF 2005:174). It is produced by small farmers who sell it to traders at low price. There are held views that the low price is due to lack of quality and lack of market demand in the country. As of 1999, at least 900 metric tons of candlenut was produced by the farmers, mainly in Covalima, Bacau and Ainaro (Rio 2001:21). Today, the candlenut market faces several barriers that will be discussed in the point 4.

The challenges today are many: the market chain outside the country such as West Timor, Indonesia is hardly understood. How to improve the small farmers' income by having better prices for their candlenuts remains unanswered question. How can the farmers gain market access and link with the external traders? How to improve the post harvest technology especially the processing and handling skills of the farmers, learning from the case of the farmers in West Timor, Indonesia?

2. Research Objectives

- To assess the market chain and price structure of the candle nuts market in Indonesia and Timor Leste
- To assess the downstream buyers in Indonesia (Surabaya and West Timor) who have the willingness to buy candlenuts directly from Timor Leste.
- To assess the quality of product as required by the market including the post harvesting
- To assess the willingness to buy from the external traders in Indonesia

3. Methodology

Qualitative research with open-ended questions and unstructured interviews combined with in-depth interviews were carried out in series of field visit to Surabaya, Kupang, Kefa and Atambua during the period of 21 June 2007 to 3 July 2007.

4. The Context of Candlenuts Market in Timor Leste

At the household level, it is often used for cooking ingredient. Due to its nutty (meaty) flavor, candlenut is used as taste/flavor enhancer. The Javanese cook candlenut and sometimes it is pulverized and mixed with other spices. Javanese dishes have influenced the cooking habit in other parts of Indonesia, creating more demand for candlenuts. Although the cheaper monosodium glutamate have partly replaced its role as taste improver, people still prefer candlenut for the flavor and that it brings thicker consistency to food. Candlenuts' oil is often used as an ingredient for traditional medicine to prevent hair loss and enhance hair growth. However, this practice is replaced by modern shampoos and hair cosmetics. Modern cosmetics companies have tried to include candlenut's oil in their product range with little success. It can also be used as cosmetics materials

² As stated by the TOR of the research by Catholic Relief Services in Timor Leste.

and skin care industries.

Traditionally the hard-shelled nuts are also used in betting games, particularly in the eastern part of West Java (Tasikmalaya, Garut). Two nuts are placed on top of each other on a wooden pedestal and smashed with a wooden club. The broken one lost. This game used to require candlenuts from East Timor because of their very hard shells. However, the quantity is insignificant. Some people also use candlenuts' shells as biomass energy but they are mostly wasted. It can also be used for charcoal. The idea is to mix the pulverized charcoal with starch and pressed into small bricks. These charcoal bricks production is technically easy and simple but to find the market and the cost benefit is still in question.

The market of candlenuts oil (for cosmetics, food industry, etc) is very small compared to candlenuts usage for daily consumption as food ingredient. Although traditionally Indonesians use candlenuts oil to prevent hair loss and to stimulate hair growth, nowadays people prefer to use shampoo that is more practical.

McArthur (2006:79) noted some of the facts concerning the market problem of the candlenuts in Timor Leste: as (a) "candlenuts have provided a source of supplemental income for rural families." (b) the farmers have no control over the price that buyers in Indonesia are willing to pay based on fluctuating supply and demand (3) Since East Timor's independence in 2000, the Indonesian Government set 11% tariff on nuts coming from East Timor making the farmers are not able to compete and (4) When the price traders are willing to pay East Timor farmers drops below about 35 cents per kilogram for shelled nuts, people simply choose not to sell their nuts."

The government of Timor Leste, through the Ministry of Agriculture has set 12 strategic policy directions in the next five years (2005-2010) in order to overcome problems and constraints including no (k) to "promote, develop, and improve from tree crops such as candlenut for both domestic and export markets." (IMF 2005:179)

Despite of recent efforts from the officials in Timor Leste to export the candlenut oil to new market such as Hawaii, United States,³ this paper tries to investigate the old market pathways in Indonesia. Some reports from the researcher from the University of Hawaii concerning the recent initiatives for post harvesting technology are available from <http://tpss.hawaii.edu/tl/reports/index.html>.

5. Findings on Post Harvest Technology: Processing, and Handling

People in East Timor harvest candlenuts with a very simple method. They pick candlenuts from the trees or collect the fallen fruits under the trees. The farmers take out the hard-shells by firstly drying the collected candlenuts using solar energy in the open air. The time needed for optimum sun-dried candlenuts is about 2 to 3 days. There are other techniques if there was not enough sun i.e. baking the candlenuts on an iron-plate or bury the candlenuts under the soil burn some biomass materials on the surface of the soil. The farmer also boil the nut that consequently lower the quality as the meat of the nut turn yellowish and oily – this method required another air-dried in order to prevent from moisture before packing.

5.1. De-shelling Process.

3 See "Candlenut Oil Export from strength to strength" in Agribusiness Timor Leste Volume 2, Issue 1, and February 2007. http://tpss.hawaii.edu/tl/reports/MAFF/Agribusiness_TL_72DPI_FinalFeb_07.pdf [last access 1 Nov 2009]

The candlenut trees bear fruit yearlong but the peak harvest season last about 5 months. That is between September/October to January/February. When mature, the fruit drop from the tree. Harvesting is collecting the fallen fruit. During the high season when candlenuts' price drop, farmers are not interested in collecting the nuts but simply letting them lay on the ground to wait for better price. By practice, people know that candlenuts in their hard shells can retain their quality for up to 2 years. When farmers are in urgent need of cash, they would decide to sell the whole nuts while they are still in the shells at a very low price. The common practice is to de-shell the nuts before selling. De-shelling the nuts is done by cracking the hard shells manually or mechanically with a cracking machine.

We observed that in North Sumatra, Indonesia, the process is that the farmers manually de-shelling by clamping the nut in a palm leave handle and smashing it onto a flat-surfaced stone - the tool is made of rubber taken from the inside part of an old tire, attached to a rattan stick. Some practice of this kind can be found in West Timor. In addition, still many farmers in West Timor do manually de-shelling by clamping the nut in a palm leave handle and smashing it onto a flat-surfaced stone. The average yield of unbroken whole pieces (high quality) is about 60% to 65%. About 3.5 to 4 kg nuts with shell yield 1 kg nuts of mixed grades.

In Kupang (West Timor), de-shelling process is done mostly by elderly women. They usually earn IDR 1000 (equivalent to USD 0.11 /kg net). While the cost for machine de-shelling is only IDR 350 (equivalent to USD 0.04/kg net). Big traders have tried to use de-shelling machine with various results. "Toko Murah," one of the big traders in Kupang has tried a small capacity machine but the yield result of unbroken whole pieces was only 40%. Much bigger machines claimed to yield up to 80% net. To get the highest quality nuts (unbroken) the hard-shelled nuts must be heated before cracking. The heating process will release the nuts from the shell walls. Air-drying under the sun usually takes 2 to 4 days, depending on the weather. Based on our interviews (second author) the traders in Surabaya, East Java argued that the air-drying process gives better result (unbroken and clean nuts), while the method used by farmers in Timor Leste that is to boil hard shell candlenuts will produce yellowish, oily and low quality nuts. This statement needs to be further verified.

Another air-drying process before the packaging is needed to minimize the level of moisture. Nevertheless, this time, it needs to be done in a shaded area. Perhaps because direct exposure to sun will turn the candlenuts to yellowish and oily. To keep the products clean, people usually do the drying process in a warehouse with proper flooring. This drying process is important to prevent early rotting and mildew. The quality of de-shelled candlenuts can be kept to maximum 3 months. After that, the quality will deteriorate.

5.2. Tools

Several type /size of machines ranging from 40 to 80% of efficiency. The cracking of the candlenut that has been dried for about two-three days under the sun, the candlenuts will be separated into hard shells and nuts.

5.3. Steps to de-shell candlenut

- 1) Prepare candlenut, turn on the machine.
- 2) Pouring the candlenut through a funnel.
- 3) Collect candlenut from the machine and separate meat from the hard shell.
- 4) Clean the machine after using.

Specification (1) Dimension: P = 90 cm; L = 117 cm; T = 122 cm (2) Weight: 86 kg (3) Motor: 5,0 HP; RPM = 800-1200 (4) Working capacity: 300-400 kg/hour (5) Operator: 2-3 persons (6) Material: Iron plat, *pulley*.

The machine has function to take advantage of centrifugal energy which produced by activating motor axis rotation. Candlenuts entered to machine, thrown by the centrifugal energy and crashed onto the cover of machine, which made of iron plate. They will be broken and the pulp and shell will be separated from the inner nuts. Shells and pulps shall be out through the hole under the machine. The separation of pulps and shells depends on prior process (drying process).

5.4. Processing (de-shelling) cost.

Kupang rates: Manually = IDR 1000/kg net. Mechanically (machine) = IDR 350/kg net.
Conversion rate 3.5 – 4 kg raw candlenut for 1 kg de-shelled candlenut.

6. Findings on Quality, Grades and Prices and the Downstream Market

There are no exact quality standards (in percentage of broken or oil content) for candlenuts either in Surabaya or Kupang market. The traders will buy whatever quality of candlenuts produced by farmers. Low or high quality measures of candlenuts indicated by the market price. Market differentiated the quality as whole or broken, white or yellowish. The Prime quality is dry, white, whole nuts. These will receive 100% value of price. The lowest price is whole nut with shell just IDR 1,000/kg, while the best quality is IDR 8,000 – 9,000/kg in Kupang or Atambua market.

Table 1. Grades and Market Values (Kupang Market) – Reclassified by authors

No	% Broken	% Value
1	Unbroken – whole nuts	100% value
2	10% broken	90% value
3	25% broken	75% value
4	75% broken	20% value
5	Granules and coarse powder	10% value
6	Ungraded mixed	n.a.
Whole nuts with shell is valued at IDR 1000 in Kupang (as of June 2007)		

6.1. Packaging.

Field survey in Kupang, Kefa and Atambua (NTT) shows that the sorting of whole and broken candlenuts is done by big traders in cities, not by farmers or collector traders at village level. This process reduces selling price from farmers, because farmers can only sell all kinds of nuts and the value is decided based on its weight not the grading quality (whole nut or broken). The difference of price between whole nut and broken ones is about IDR 2000/kg.

Traditionally, candlenuts were packaged in gunny/jute bags of 100kg. Nowadays candlenuts are packaged in cheaper plastic bags of 50, 80 and 100 kg, for long haul shipping/transporting. However, traders think the jute bag is better than plastic bag because it has holes for air, so that candlenuts are not easily rotten and attacked by fleas. Usually de-shelled candlenuts from Timor Leste (shipped from Atambua, West Timor) are packaged in 80 kg bag, though traders in Surabaya prefer bags of 25 kg for easier distribution to Java retailers. Candlenuts are traded as raw commodity, some sellers from Medan and Makassar brand their products as a sign of quality assurance. They packaged the candlenuts in 25 kg of plastic bag.

6.2. Trade and Price.

Mostly candlenuts are sold as raw commodity in Surabaya, Kupang, and Atambua market. There is no advanced process to increase the value of the product (i.e. to become candlenuts' oil, or other products). It is because the main usage of candlenuts in Indonesia is for daily food ingredient/spice. As said before, candlenuts are used in daily home cooking as part of ingredients in almost every recipe of Indonesian foods. Usually demand for candlenuts increases during the Moslem fasting month (Ramadan), Moslem festivals (Enid Mubarak) and during the year-end festival. Mostly because in these occasions, people consume more elaborate food, compared to any other time in the year.

Prices of candlenut can fluctuate daily in Surabaya, Kupang, and Atambua market. The main factor of fluctuation is the volume of candlenuts production. In 2007, the price of candlenut (completely unbroken 100% meat) is increased to IDR 8000/kg at Kupang and Atambua market. However if the volume of production was higher, the price could fall to IDR 5000/kg. According to traders, climate is the main factor behind the increase or decrease of candlenuts volume of production.

Some factors determine the candlenuts Price such as:

- Prices are “controlled” by Surabaya whole traders and can fluctuate daily.
- Price fluctuates from IDR 5000 to IDR 8000/kg for candlenuts in Kupang and Atambua market.
- Factors that influence price: the harvest season, Moslem fasting month and religious and year end festivals

6-3 Price Structure.

Based on information from traders for each kilo gram,

- In Timor Leste local traders/collectors/agents buy candlenuts from the farmers at USD 0.25 to 0.30
- First traders will resell to second traders in Dili at USD 0.40 to 0.45
- Dili traders will sell to Atambua traders at USD 0.50 to 0.65
- Atambua traders will ship those candlenuts from the port in Atapupu to Surabaya
- Average wholesale price in Surabaya is IDR 8.500 to 9.500

6.4. Prices Fluctuation – Some Findings

- In Surabaya wholesale, average market prices in “normal “ condition is IDR 8.500 – 9.500/kg
- During shortage of supply, (off-season) and high demand prices increase to IDR. 12.000 – 13.000
- This year is exceptional. In the 4th week of June 2007, the price of good quality candlenuts

reached up to IDR 14.500.

6.5. Surabaya Traders and Willingness to Buy

The candlenuts traders in Surabaya are concentrated in Pasar Pabean (market) in Jalan Songoyudan and Margamulyo area. Based on our own identification, there are about 25 traders and three of them are very dominant (can be perceived as leaders). They compete against each other but form an informal association. During the market link and assessment in Surabaya, 19 traders were interviewed but only one is interested to buy directly from Timor Leste. The interested trader, named Mr. Widyo is one of the few traders having a valid import license and has the knowledge and experience to deal with import “efficiently”. He also imports other commodities such as garlic, onions and other dried agriculture products. Mr Widyo has a tapioca (cassava) flour plant in Pleihari (South Kalimantan) and his real motive to trade in Timor Leste is to invest in a similar tapioca enterprise.

The reason that mostly candlenuts traders are not interested to buy from Timor Leste are: Import / export procedures; Traders in NTT are more adapt and play as “border crosser.” In addition, some said that they had had experience with Timor Leste traders in the past. In addition, the volume from Timor Leste does not influence the total market supply in Surabaya. We had no opportunity in ranking the problems.

Indonesia Import Procedure comprises of: Must have a valid import license; Fill Import declaration form; Pay import duty, value added tax and other levies; Documents attached: Invoice, Bill of loading, Quarantine form, Inspection of documents, Inspection of goods;

6.6. Surabaya Traders and Willingness to Buy

6.6.1. Traders in Kupang.

Three traders were interviewed i.e. Toko Murah owner, Toko Timor owner and Toko NAM owner. Two of these traders stated they are interested.

Assessment of Toko Murah in Kupang.⁴ Toko Murah owns has several large warehouses as for direct storage but also rented by some international NGOs. The owner is interested in candlenuts but trading peanuts is his main business. The owner tried de-shelling machine with disappointing results. (40% efficiency). He has branch/relative in Surabaya. In this case, he is willing to come to Dili for direct assessment.

B. Toko Timor in Kupang.⁵ The owner had some experience in trading with people in Timor Leste, before independence. He has an idea to bypass Surabaya traders by sending products to Central Java. He is also interested in establishing a branch office in Dili if there is good prospect for business.

C. Toko NAM is not interested to buy agriculture commodities anymore. They need to focus more on distribution of groceries, beverages and foodstuffs.

4 Interview with Mr. Herman Yappy in June 2007, in Kupang.

5 Interview with Mr. Teddy Tanoni in June 2007 in Kupang

6.6.2. Traders in Atambua

A. Toko Gajah Mada.⁶ The owner, Mr Aku is the biggest player for agriculture commodities trade in Atambua. He has branches in Dili and his working areas reach almost all districts in Timor Leste. He is the biggest businessperson in Atambua with strong contacts in Surabaya. He owns among others, the best hotel in Atambua and trade in all kinds of goods. Regularly he buys goods from traders in Timor Leste and ships them via the port in Atapupu to Surabaya.

B. Toko Paris Indah.⁷ Toko Paris Indah is the strongest competitor to Gajah Mada as it is the second biggest agriculture trader in Atambua and has experience in trading any dried agriculture products and diversified general trade. It has contacts in Timor Leste. Supposed that there are good prospects, the owner can outbid the buying price. Usually they inform the price list of commodities at the board in front of their warehouse.

A small player called Alomea comes every fortnight to Timor Leste Dili with own trucks carrying groceries. Alomea buys candlenuts from Dili trader. Also interested to buy directly to farmer groups. **In Kefa**, we also interviewed Usaha Dagang (UD) Cakra.⁸ The owner said that regularly UD Cakra sends its trucks to come to Timor Leste (Dili) every week carrying groceries. The trucks have no cargo on the return trip. He is very keen to buy candlenuts directly from farmer groups. He wants to be facilitated by NGOs or Timor Leste institution to deal with farmer groups for the first contact. He is also aware that Gajah Mada and Paris Indah in Atambua are the two biggest players in agriculture commodities trading in Timor Leste.

6.7. Conditionality of Trades – Notes from the Traders

In most cases, the traders are more interested in dealing with farmers' group/cooperatives, not with individual farmers. Price at prevalent market price and according to quality. They are more interested with cash and carry payment term and prefer delivery from Dili.

Candlenuts that are not consumed locally are sold to the markets in Java. Surabaya is the trade centre of Indonesia's candlenuts (and to Timor Leste). From Surabaya, the product will disperse to all markets in Indonesia. The biggest market demand comes from Java. Very small amount is exported to Malaysia or Singapore. Main supplies to markets in Java are from Aceh and North Sumatra, South Sulawesi and the Eastern Nusa Tenggara province (which also included candlenuts' bought from Timor Leste).

6 Interview with Mr. Julius Mintura (Mr. Aku) in June 2007, in Atambua

7 Interview with Mr. Robert Sulayman in June 2007 in Atambua

8 Interview with Mr. Haji Hamzah

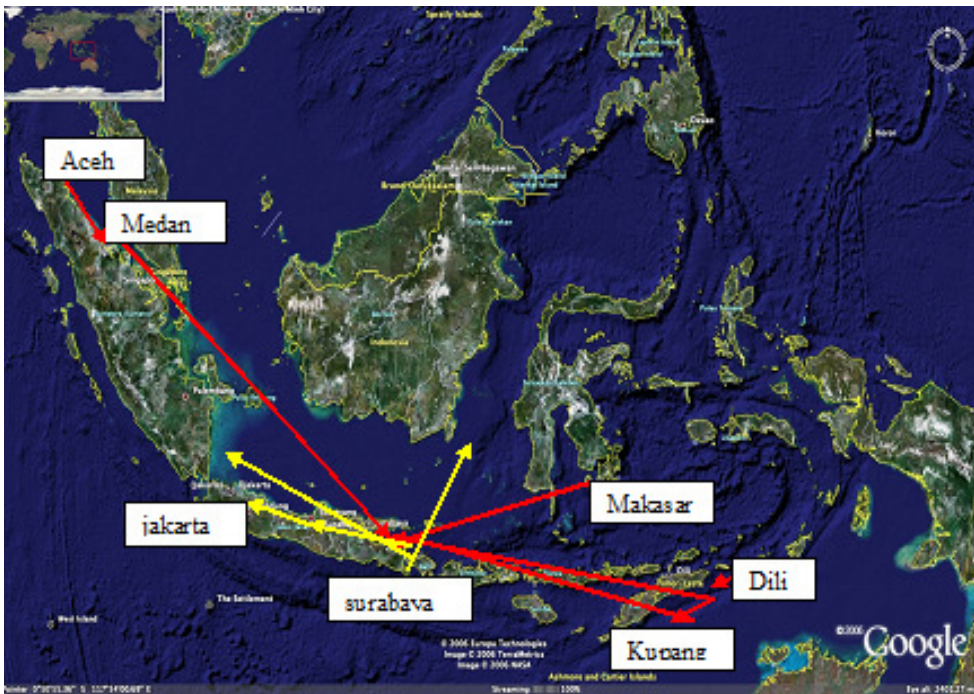
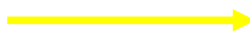



Figure 1. Candlenut Trade Route Indonesia and Timor Leste

 : flow candlenut to retailers, customers
 : Flow of candlenut from producers,

Market size. There is no official figure of candlenuts market from the government figures, while traders tend to keep the figures to themselves. The quantity of candlenuts that the traders are willing to buy can be used as estimation. Apparently, from 25 traders in *Pasar Pabean* (the market in Surabaya), one trader named Mr Yento is one of the biggest. He is mentioned of having 1000 tons turnover during the high season. He stated that he can easily pay cash for 1000 tons at one single transaction.

6. 7.1. Chain of Candlenuts – Old Pathways.

The complete chain of candle nut can be illustrated as follows: From Farmers → gatherer buyers (small traders) → traders in Dili → traders from NTT → whole sale traders in Surabaya → retail traders in Surabaya / whole sale traders in other parts of Java → retailer traders → consumers. At least there are 7-8 chain from the farmers to the consumers.

6.7.2 The quality Issues.

All traders in Indonesia (Surabaya, Kupang, Kefa, and Atambua) said that candlenuts from Timor Leste are considered as having the lowest quality measured by yellowish color, not clean and oily, un-graded with high percentage of broken small pieces with high moisture content.

The low quality of candlenuts from Timor Leste is caused by some factors:

- **Problem of processing:** Prior to de-shelling, candlenuts should be sun dried/heated, not boiled. Candlenuts are smashed to stone surface too hard. The stones are not flat and not dried before

packing.

- **Problem of Handling:** Candlenuts are not protected against moisture during storage and transporting. Candlenuts are not protected from warehouse-pest/fleas/

6.7.3. Quality Improvement

To improve the quality of candlenut from Timor Leste, there are several possibilities available. Toko Murah in Kupang welcomes farmers who want to learn/train proper de-shelling in his warehouse. There is also local NGO (partner of CRS Kupang) in Kefa that has trained farmers from Timor Leste. The NGO can facilitate training in Timor Leste or farmers from Timor Leste can come to Kefa to do apprenticeship there. This NGO has successfully established farmers associations (FA) especially the joint marketing unit (candlenuts and other agriculture products). It was recommended that farmers group in Timor Leste need to set simple Internal Control System (ICS) or Internal Guarantee System (IGS) for farmers group in Timor Leste through training and Technical Assistance.

7. The Issue of Fair Trade in the Candlenut Business – Short Notes

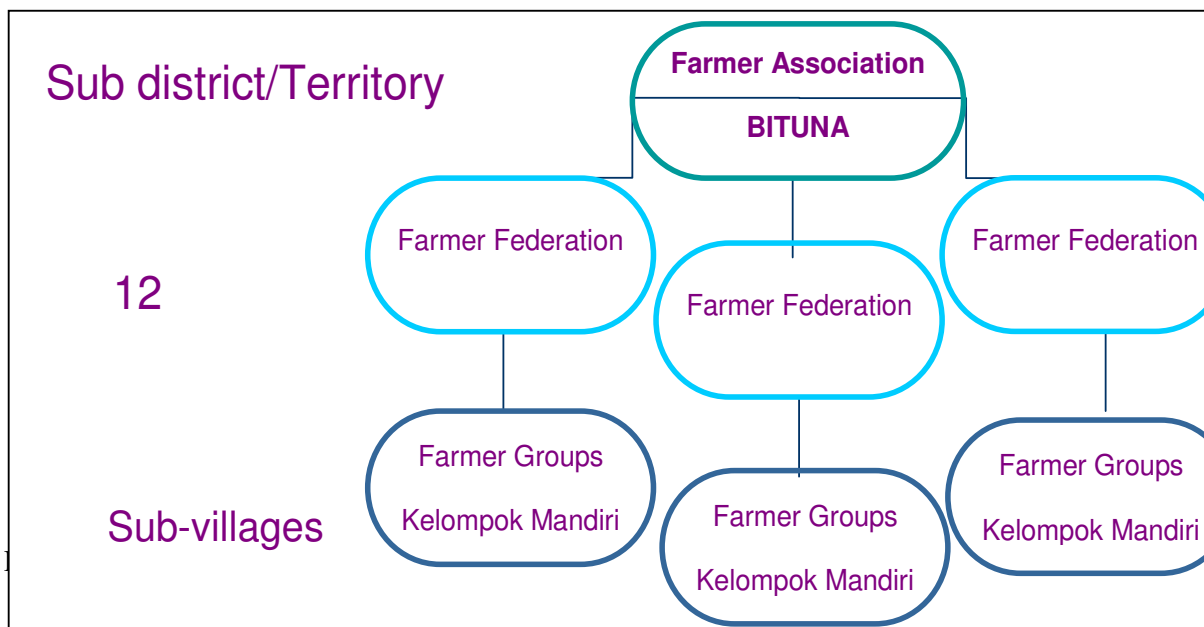
McArthur (2006) shares the concern about different ideological approach from NGOs to the sustainable livelihood of the rural farmers. For the traders, the issue of justice is not of the concern as they have to reduce the risk that may arise along the chain of the candlenut business from the farmers (such as quality) to the formal administration costs and many illegal fees in many points (including check points) on the field, including at ports. Therefore, there are institutional problems that shape the barriers to justice. However, some lessons from Kefa, Nusa Tenggara Province could be learnt.

7.1. Farmer Association in Kefa, NTT.

There is success story from Kefa on collective marketing effort done by local NGOs (Yayasan Mitra Tani Mandiri - YMTM). YMTM has established farmer association to deal with traders in Kefa areas. The objective of this association is to protect farmers from unfair trade practices done by *intermediaries* traders, such as: buy only raw candlenuts (Rp 1000/kg), unfair in scaling, buy before harvest time (*ijon* system), etc.

7.2 Description of the FA organization.

The FA is established in sub-district level. See Figure 2. There are 12 Federations at sub-district. Each federation has 1 (one) marketing officer (they called: farmer cadre on marketing). Marketing officer is responsible to collect the commodities. There are 3-4 Farmer Groups under a Federation (these groups are called *Kelompok Mandiri* or Self Help Group/SHGs. The territory is organized based on transportation route (commodities flow). Traders could only buy the commodities from Farmer Association. The commodities should be picked up by traders at Federations' collection spots. This season there was almost 100 tons of candlenuts from the FA



7.3. Policy and procedures.

Association facilitates marketing activities. Contact and negotiate with potential traders. Conduct market survey. Term of payment: in cash-carry basis. Buyer and Association agree to use scale equipment from Federation (before scale equipment from buyer). The buyer will pick up the commodities at Federation's collection spots. In urgent situation, FA would buy directly from farmers and pay in cash to meet farmer urgent needs.

7.4 Rules and regulations.

To enhance FA capital: FA would receive IDR 250 from each kg distributed to FA. 83% of the revenue will be enjoyed by the farmers, while federation receive 15% and Operational fee for the FA is 2%. For every 1 ton (1000 kg), buyer should pay IDR10.000 (or USD 1.50) to the village. This research did not able to confirm the sustainability of this approach but given that the idea is good to share with wider audience who are willing to know how NGOs approach livelihood program intervention, the idea of justice is very much of the concern.

7.5 Some Lessons Learnt: Key Success Factors.

There is village regulation to encourage collective marketing efforts for agriculture products (result from advocacy activity). Farmer Cadres conduct advocacy through BPD (village legislative body). At district level, a working group has been established since 2006. The group is consisting of Local Cooperative Body, Agriculture Body, Animal and Husbandry Body, District Legislative Body, University, and YMTM (NGO). As result of working group, every Monday and Thursday, local government releases market price information for several commodities (through Local Government Radio). The FA has succeeded to eliminate the "ijon" system (a system run by crooked traders to buy before harvest with low price). The success story of Bituna Farmer Association *has* inspired other farmers to *establish* new farmer associations.

7.6. Critical Notes.

Our conclusion to this approach is that the FA approach requires high set-up costs from donors and

consequently donors are not always willing replicate the success to bigger scales. In addition, the success is built on high set-up costs cannot be considered success due to unresolved problems of high transaction costs that arise from institutional problems such as bribes, illegal fees, and longevity of administration chain. For this, previous research on this issue within West Timor setting, please consult Suharyo et. al. 2007.

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