

Developing a Fresh Mango Export Value Chain with West-African Smallholder Mango Farmers

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Abstract

Many small farmers with mixed farming systems in the West African countries of Burkina Faso, Mali and Côte d'Ivoire, have small mango (*Mangifera indica*) orchards. Starting initially with air cargo shipments, the development of reefer logistics in West Africa enabled the development of a fresh mango export industry. However, smallholder mango farmers in the more remote areas have benefited only marginally. On the initiative of a development organization, a farmers' union was established, aimed at directly exporting Fairtrade certified mangoes, bypassing existing traders and exporters. The trial was not successful as the right contractual agreements between farmers as principals and farmer union staff as agents were not present, leading to uneconomic behaviour by the agents. It became clear that traders and the way their contracts were arranged, played an essential role in quality control, organization of harvesters, transport and risk management, as well as the provision of credit. Based on this experience, an export company was established, working in close cooperation with farmers' groups, with access to its own packing house and able to contract efficient refrigerated logistics services. By involving the value chain actors in a triangular organization model including farmers, harvesting traders and exporters, it was possible to build on the strong points of each actor and to make the value chain more profitable and attractive for all actors. Moreover, the triangular organization was conducive in obtaining GlobalGAP, organic and Fairtrade certification. The experience with the triangular export organisation demonstrates some important lessons for the development of value chains in the transitional economies. It is important to study the way in which contractual relationships between value chain actors are regulated and to plan interventions with appropriate incentives stimulating behaviour that profits all actors.

INTRODUCTION

Growing urbanization and the increasing popularity of tropical fruits in Western countries, offers opportunities for the horticultural sector in West Africa. The potential for inclusion of smallholder farmers in the value chain makes export or regional trade of such commodities a promising strategy for reducing rural poverty and fostering the economic development of the region. An example is the development of a fresh mango export value chain from West Africa. Export cultivars of mangoes are widely available in the region. The dry climate of the Sudanic zone bordering the Sahel is favourable to the production of quality mangoes as it inhibits the development of pests like anthracnose (*Colletotrichum gloeosporioides*) and fruit fly infestation.

For some decades air freighted fresh mangoes from Mali have enjoyed a reputation as a specialty fruit in Europe. In the early 1990s, Côte d'Ivoire became the leading mango exporting country in West Africa when Ivorian exporters started to ship mangoes by sea, benefiting from the port facilities and an existing banana and pineapple export industry. Some mango exporters established pack houses in North Côte d'Ivoire (around the towns of Ferkessédougou and Korhogo)(Rey et al., 2004b). Excluding the production from plantations, exports are sourced primarily from smallholder farmers

having orchards with exportable mango cultivars in the region and in the neighbouring zones of Burkina Faso and Mali (Rey et al., 2004a).

In this paper, we describe and evaluate an attempt to organize smallholder mango farmers into an export cooperative, with the objective of giving poor farmers direct access to export markets, cutting out the middle men. We explain why this was unsuccessful, before describing how a new approach led to more sustainable results.

RESEARCH FRAMEWORK AND METHODOLOGY

In this case study, a comparison is made between the supply chain organization of a self-exporting cooperative farmers' union and an export service provider with intermediaries. The study is limited to the part of the supply chain from production up to and including the export level. Economic organisational theory provides an insight into the interactions between value chain partners, using principal-agent theory, governed by different types of contracts (Hendrikse, 2003). Economic exchange can take place by market exchange (exporter with intermediaries), or in hierarchies by means of command-and-control (farmer cooperative with hired labour) (Fafchamps, 2004).

The collection of data was carried out by the authors working inside the organisation in their capacities as technical assistant and field agent of the farmer's cooperative, and as general managers of the export service company since 2003. Interviews and discussions were held with individual farmers, harvesters (pisteurs) and other exporters. Before each mango season, group discussions were held with farmer unions and harvesting personnel to exchange information and to prepare for the season. Company records (accounting system) were also made available.

THE MANGO PRODUCTION SYSTEM

Only those cultivars considered suitable for export by sea are considered here. They comprise the fibreless Florida, coloured cultivars, 'Kent' and 'Keitt', and to a much lesser extent, the green fibreless Antillean cultivar 'Amélie'. The harvesting season in Burkina Faso usually starts around Week 11 with 'Amélie', which is replaced by 'Kent' from Week 16 through 23. The end of the season is usually determined by the onset of the rainy season, which causes more humid conditions favouring the development of anthracnose and fruit flies for which, under organic conditions, no effective pre- or post-harvest treatment is possible.

Mango production systems in West Africa can be differentiated into three categories: village plantings, managed orchards and industrial plantations (PPEA, 2003). Village plantings are patches of mango trees scattered around a village. They are heterogeneous, with trees of different ages and often mixed cultivars, including wild varieties (known as mangot). The plantings are not managed and are used to provide shade and fruit for village consumption. Managed orchards are kept for their economic value and are usually more homogeneous in nature. They are planted in rows to facilitate orchard operations. The most frequent planting pattern is 10 m x 10 m (100 trees per ha). Typical orchards are just a few hectares, with very few exceeding 10 ha. Commonly planted cultivars include 'Amélie' and 'Brooks', 'Lippens', 'Kent', 'Keitt', 'Valencia', 'Ruby', 'Zill' and 'Palmer'. The agronomic management is usually limited to the removal of weeds. Pruning is not practiced and trees are allowed to grow to their natural height. This limits the harvestable quantity of fruit. Pest control and fertilisation are seldom practiced (Vannière et al., 2004). The bulk of the fruit is consumed locally. They complement the rural diet when cereal stocks are low at the onset of the rainy season. Large quantities are sold to urban centres in the region. The production of export quality fruit for 'Kent' is limited to 3-5 tonnes per ha, which is about 30% of the yield (Rey et al., 2004a). Considerable effort at harvesting and packing is required to sort the exportable fraction from total production. The earlier in the process this is done, the more efficient the process becomes, as it prevents important costs being spent on non-exportable fruit, which will later be graded out having incurred all the associated costs.

The cost of production in such an extensive, low external input and limited monetized rural society is difficult to estimate. However, a tentative analysis made by Fruiteq staff indicate that the cost price per kg for exportable fruit is in the order of 25 CFA franc (XOF) per kg (EUR 0.04/kg), or 450 XOF (EUR 0.69) per 18 kg crate. This is in line with the reservation price farmers often consider for 'Kent' mangoes, which is 5-6 fruits for 100 XOF, below which they are not willing to sell. Assuming that a 'Kent' mango weighs on average 700 g, this means about 28 XOF (EUR 0.04) per kg. In all cases, these prices are for fruit on the tree, excluding the cost of harvesting, packing and transport. The price for export mangos "on the tree" ranges from 44 to 56 XOF (EUR 0.07-0.08) per kg for 'Amélie' and from 83 to 111 XOF (EUR 0.13-0.17) per kg for 'Kent' and 'Keitt'.

Fruits of the cultivars 'Brooks', 'Amélie' and 'Lippens' are also used for drying, using artisan drying cabinets. The dried mangoes are also exported. Harvesting of the crop for drying and subsequent export is generally carried out by the buyer of the fruit, not by the orchard owner. The orchards are usually owned by the heads of a family living in nearby villages, or urban people having family ties to the villages. Farmers seldom specialise in mango production: their farming system is a combination of staple crop production (mostly sorghum and maize) for home consumption and some trade, combined with tree crops like mango, citrus and cashew nut, vegetables and groundnuts, and sometimes cotton as cash crops.

The mango season starts in February with the early 'Amélie' cultivar, followed in late April by 'Kent', 'Keitt' in June and 'Brooks' in July-August (Rey et al., 2004a). The onset of the rains is usually in April, which means that in the months of March and April, farmers have to prepare the fields for planting sorghum and maize. This explains in part why rural families generally prefer not to dedicate their family labour to harvesting mangoes and transporting these to collection centres.

Industrial plantations of more than 100 ha are rare. There are two in Côte d'Ivoire, one in Senegal, one in Ghana and one in Gambia. These plantations are owned by exporters and managed in a professional way, using irrigation and crop protection. The plantation in Ghana is also organic-certified and is surrounded by a large number of small producers, who work under the technical management of the nucleus farm.

THE EXPORT LOGISTIC PROCESS

A viable mango supply chain relies on mangoes being transported by sea, rather than by air. Air transport is only an option for high quality specialty mangoes that serve niche markets. By sea, the export supply chain starts with harvest. The harvest takes place just after the onset of ripening, when the flesh starts to turn from white to yellow. This allows the mango to be stored under refrigerated conditions for about three weeks during transport and distribution and to ripen to an acceptable level of sweetness in the consumer's fruit bowl. The harvested fruit need to conform to strict quality criteria with regard to both the internal and external fruit quality, notably the absence of infestations of insects or microorganisms (such as the fruit fly species *Ceratitis capitata* and *Bactrocera invadens* and anthracnose *Colletotrichum gloeosporioides*, which cannot be visibly detected at harvest or in the packing house). Cosmetic criteria include the presence of sufficient colouration, the absence of significant spots, bruises, sunburn, latex stains and other skin marks. The harvested mangoes are collected in 18 kg crates, padded with mango leaves, and transported to the packing house. It is essential to keep the time between cutting and cooling as short as possible. In the packing house, the fruits are washed and sorted according to quality and size, before being packed in 4 kg cartons, palletised and refrigerated to 10°C.

The price paid by the exporter after sorting and grading to the harvesting traders depends on the location of the exporter, the cultivar and the quality standards applied, but typically, it ranges from 150 to 220 XOF (EUR 0.23-0.34) per kg. Typical packing house rejection rates are about 20-30%. Rejected fruit is given back to the harvesting trader.

Pallets are loaded into refrigerated trucks or sea containers. With an ambient temperature of up to 40°C, it is essential to ensure that the cold chain is uninterrupted over the 800 km land transport to the nearest port.

Major export centres, with packing stations, are located at Ferkessédougou, Korhogo and Sinematiali (Côte d'Ivoire), Sikasso and Bamako (Mali) and Bobo-Dioulasso (Burkina Faso).

ORGANISATION OF THE SUPPLY CHAIN

The Traditional Mango Collection System

The export stations in the region rely almost completely on production from smallholder mango orchards. The collection of fruit for export is carried out by traders or middle men with harvesting teams working under their supervision. They know where to locate suitable orchards with the right cultivars and quality, and to perform the quality inspection of the tree, the harvesting, and the organization of the transport to the exporter's packing station. In the region, these harvesting traders are known as "pisteurs", or literally "scouts", because they know the best orchards in each area and they maintain relationships with groups of mango orchard owners. The harvesting traders may provide embedded services to the mango orchard owners. To keep the latter loyal to them, the harvesting traders may extend cash credit in advance of the harvest season or provide farm entrants. Harvesting traders may use their own working capital, but usually take credit from the exporters. These credits also play a role in keeping successful harvesting traders loyal to an exporter.

In some cases, local agents known as "coxeurs" try to coax harvesting traders towards certain orchards, and act as an intermediary between the orchard owners and itinerant harvesting traders. Coxeurs play a role in reducing search costs. They are not well-liked by harvesting traders, because they realise a collective bargaining process in favour of numerous mango orchard owners in a certain village or area, and take a rent from them for their service: a typical fee paid in Burkina Faso to a "coxeur" is XOF 25 000 (EUR 38.00) per truck (5 tonnes).

The orchard owners prefer payment in cash, though sales on credit do occur. The harvesting traders are paid by the exporters based on the quantity that is accepted for export after sorting and grading. Fruit that is not accepted for export is given back to the harvesting trader, unless the latter is indebted to the exporter.

Depending on exporters' demand and the availability of produce close to the packing stations, which may vary from year to year due to climatic influences and alternate bearing, the harvesting traders may venture into areas further away.

The collection system with harvesting traders has certain disadvantages for the orchards owners: (i) uncertainty about the purchase of their crop, especially if they are further away from export centres and tarmac roads or have a lower density of quality fruit; (ii) price uncertainty and the lack of bargaining power vis-à-vis the limited number of harvesting traders; (iii) a lack of bargaining power due to the perishable nature of the fruit; (iv) credit risk if the crop is sold on credit to the harvesting trader; and (v) the risk of not selling at all if selling on credit is not accepted.

There is a large problem of trust and credibility throughout the supply chain. Most export sales take place on a commission basis. When oversupply of the market or quality defects lead to low prices, the exporter may not be able to cover his costs and will be unable to pay his harvesting traders who supplied on credit. Consequently, orchard owners are not be paid by the harvesting traders. Hence, both harvesting traders and orchard owners insist on cash payment at the moment of harvest or delivery. The exporter is paid a few weeks after arrival of the goods, and runs the biggest quality, price and non-payment risk.

Self-Exporting Cooperative Farmer Organization

As mangoes from Burkina Faso and Mali tend to reach maturity later than in Côte d'Ivoire, the crop is purchased only at the end of the season to extend the Ivorian export season. A strong need was felt for an independent mango export industry in Burkina Faso. This was recognized by a development organization supporting farmer groups in the South West of Burkina Faso. The cause became even more urgent when in September 2002, armed conflict broke out in Côte d'Ivoire, which led to the temporary closure of its borders with Mali and Burkina Faso. This blocked the commercial outlets for Burkinabè and Malian orchard owners with immediate effect. Encouraged by the development organization, local farmer groups joined an existing union of farmer groups, known as Union Fruitière et Maraîchère du Burkina (UFMB). Farmer groups and unions are a common way of organizing farmers in Burkina Faso, as well as in Mali and Côte d'Ivoire. In Burkina Faso, it is governed by Law No. 14 of 1999, which regulates cooperative societies and groups (Faso, 1999). Structuring export activities through a union of farmer groups was compatible with the mission of the development organization, which was to facilitate the institutional development of farmer organizations and to empower their role in global value chains. It also offered opportunities to overcome the disadvantages associated with harvesting traders and to extend technical training to the members. Moreover, the farmers' union could also benefit from Fairtrade certification, which aims to give disadvantaged farmers access to global markets, assure a guaranteed minimum price, a social development premium and facilitate an on-going trading relationship (FLO, 2009). A guaranteed minimum price, access to a stable, rewarding trading relationship and the extension of working capital by an importer were foreseen to facilitate entry into the European export market.

UFMB was governed by a Management Board of ten people, elected by the General Assembly. The day-to-day activities, which consisted of the provision of technical assistance and capacity building for farmer groups and the commercialisation of the product, were managed by a Coordinator, with a small staff of field technicians, an accountant and a secretary.

UFMB organized the harvest campaign from 2002-2005 using harvesting teams composed of harvest leaders and harvesters recruited on a temporary basis outside the farmers' organization. They were employed by UFMB and paid a fixed wage. They were trained and provided with the technical specifications for export fruit. Transport of the fruit to the packing station was organized by UFMB using hired trucks. The farmers were paid in cash by the UFMB harvesting team at the moment of harvesting, or after one week on presentation of harvesting records at the UFMB office.

The sorting and grading took place in a packing house with cold storage and mechanical sorting equipment. After pre-cooling, the fruit were loaded onto refrigerated trucks or reefer containers on flatbeds equipped with generators and trucked to the port of Tema (Ghana), for loading onto a reefer vessel bound for Antwerp. However, when a packing house with cold storage facilities became available in Bobo-Dioulasso and the border with Côte d'Ivoire was reopened, door-to-door intermodal (road-train-sea) refrigerated container transport from Bobo-Dioulasso through the port of Abidjan emerged as a more logical option. An additional advantage was the presence of a container terminal in Ferkessédougou, equipped with reefer technicians to serve the fresh mango export industry in the north of Côte d'Ivoire, neighbouring Burkina Faso and Mali (Danielou et al., 2003). Also, in Bobo-Dioulasso, a container terminal capable of loading containers onto railway carriages was available at that time.

UFMB also acquired European organic certification. In this respect, being a structured farmer organization was an advantage over exporters working with loosely organised harvesting traders. UFMB kept a register of all its adherent orchard owners, allowing the required traceability of the product and provided technical support and training in agricultural and Fairtrade principles.

In spite of the improved logistics, the experience of UFMB as a self-exporting farmer organization was not successful. The organization sustained serious financial

losses. This was primarily caused by the purchase of fruit by UFMB from the farmers at the full price, only to have the fruit rejected in the packing house because of poor quality. These losses could rise to as high as 50% of the volume purchased. The members of UFMB did not feel responsible for these losses as the harvest did not take place under their direct responsibility. However, as it was customary to pay cash at the farm gate, there were widespread reports of farmers bribing UFMB harvesting staff to come and harvest bigger volumes from their orchard, which decreased the rate of acceptance at the packing house. For the harvesting staff, such offers were tempting to increase their small fixed salary.

Another cause of the failure was the inefficient use of trucks. As these were ordered and paid by the coordinator and under continuous time pressure to convey loads to the packing house, the harvesting teams were not concerned with loading efficiency. Needless to say, after several years of losses, mitigated by some development assistance and the payment of the Fairtrade premium, the system collapsed. As the business could in principle be sound, it was decided to reorganize the harvest collection system, which led to the creation of the export service company "Fruiteq sarl".

Export Service Company

It was recognised that the viability of an export organization for independent small holder farmers would demand appropriate quality control and technical support, combined with appropriate financial incentives. A system that included the harvesting traders could achieve exactly this, as the harvesting traders were only paid for that fruit which met the quality standard of the exporter. They are in fact small entrepreneurs who make their money by combining their knowledge of the terrain, mango quality and handling techniques, with logistical and organizational skills in areas with poorly developed transport and communication infrastructure. They have to balance costs and risks. The farmers' perception that the harvesting traders made too much money and could not be trusted was probably based on a very limited understanding of the organizational efforts required and the financial risks sustained.

However, keeping the organic and Fairtrade certification was incompatible with intermediary harvesting traders who took ownership of the product. The system would need to make sure that orchard owners obtained a fixed price respecting the Fairtrade minimum price and that they would have certainty of payment. The solution was found by forming a long-term triangular partnership between orchard owners, harvesting traders and the exporters, in which all three parties sat together and discussed their respective points of view, cost structure and risk profile. This led to the harvesting traders formally becoming service providers to the orchard owners and the exporter formally entering into contracts with the farmer groups. The elements of the contract were negotiated with a combined delegation of orchard owners and harvesting traders, stipulating the intended volumes, quality criteria (stage of maturity, internal and external defects) and prices. Transparency about costs, quality and risks allowed a price to be fixed "on the tree" to be paid by the exporter to the farmers, and a price "accepted for export" to be paid to the harvesting traders, now called harvest service providers. The difference between these prices had to be sufficient to cover the normal operational costs of the harvest teams, such as harvest team wages and subsistence, transport costs, the normal cost of rejected fruit on acceptance by the exporter, and a reasonable margin for the harvest service provider.

Table 1 shows a breakdown of the costs and revenues for every stage of the value chain up to the exporter level. The information is based on the data collected from the Fruiteq accounts and participatory assessment with orchard owners and harvesting traders. It shows that orchard owners have a high margin, while harvesting service providers and the exporter have a low margin. The risks are low for the orchard owners and high for harvesting service providers and the exporter, especially because neither of them can pass on quality claims for latent defects (e.g. anthracnose or internal browning) appearing upon ripening at the customer, as cash on delivery payments at every stage made recovery impossible.

To make the acceptance check more objective and to increase trust, during the first three seasons, an experienced, independent quality surveyor was employed in the packing house. The exporter, harvest service providers and farmer groups are subject to a quality assurance system, described in a quality manual, with the exporter as the leader of the quality system. The quality system was certified under GlobalGAP Option 2, Euro organic (Regulation EU 834/2007) and FLO Fairtrade.

All the orchard owners of the farmer groups associated with the export company were referenced and listed in a database, with their productive areas, cultivars, state of maintenance, geographic references and predicted yield. At harvest, the collected volume was registered on a harvest slip and signed by the harvester and orchard owner. In the packing house, the harvest data on the slip was checked against the database records, especially against the predicted yields. This prevents orchard owners from trading in fruit that they have not grown themselves, which is important to ensure full traceability. Data integrity was assured by using a computer database, in which entered data can be automatically validated. It was also used to code each carton, and to generate lists of pallet compositions (fruit from several orchards on one pallet), and container packing lists. The use of barcodes minimised copying mistakes and prepared the exporter for adoption of the GS1 global logistic traceability standard.

The export company quickly became a success and was profitable from the first year, without relying on any subsidy. It became an effective organization to provide income to owners of orchards of exportable mango cultivars, thus contributing effectively to income generation and development in rural areas of West Africa. Table 2 shows the development of the export volume. Sales have slowed down in 2008 and 2009, in part due to the economic downturn, but recovered strongly in 2010. Sales are not dependent on Fairtrade alone. In contrast to the loss-making farmer's organization, it passed on sizeable amounts of the Fairtrade premium, which were invested in social projects, such as a village pharmacy, water wells, a maternity ward and ambulances for a district hospital.

DISCUSSION

The experience with a self-exporting farmer organization was not positive because the relationships between the principals (the orchard owners) and the agents (the coordinator, technical employees and harvesting staff) were complex, and the contracts between them were not performance based. This opened the door for opportunistic and rent-seeking behaviour by the agents, causing an irrational and unfeasible operation. The relationships were modelled on locally accepted ideas about organization, where the reference is mainly government bureaucracy (grafted on the colonial administration). As noted by (Fafchamps, 2004), economic allocation in organizations seems to be poorly developed in Africa, in contrast to market allocation, although this can best be compared to a flea market. The original system with harvesting traders did not have these shortcomings. Although it was popular opinion that they were making an excessive profit, the profits they were making was an accurate reflection of the high transaction costs they incurred in searching for fruit, quality inspection, communication, negotiation and transport, and the risks associated with handling a perishable product.

In principle, effective contracts between the farmers' organization as principal and its agents, notably the harvest teams, could have been introduced in the farmers' organization, but the organization was not prepared for such changes. Encouraging the mango orchard owners to take care of the harvest and transport the fruit to the export station was clearly not feasible, as there was little specialisation in mango growing. As a Fairtrade certified exporter, the company worked with multiple Fairtrade certified farmer's organizations. This was also a risk spreading strategy in case one of the farmer's organizations was decertified. Another reason for creating a limited company was the need to invest in pre-cooling equipment and a packing line. In order to be competitive in export, it was necessary to apply for a tax exemption, granted under the investment promotion law, which was only granted to new investments by limited companies.

Besides, farmer unions are formally not allowed to export and could face fiscal difficulties, especially when reclaiming value added tax paid on cartons and other inputs.

An important lesson for development practitioners' working in value chains is the need to start with a thorough analysis of the actors in the value chain and the way in which contracts between them are shaped. Interventions should not be based on any preconceived ideas about how value chains should work, or uncritically translated foreign concepts, such as farmer cooperatives. More research is needed to study the choices mango orchard owners/farmers make regarding their investment of labour and resources in their mixed farming systems.

The experience also shows that the costs associated with the extensive production of mangoes by small orchard owners are high. The high search and collection costs of harvest and high costs of agronomic management for many dispersed farmers limit the competitiveness of West-African mango exports. Investment in professional and more intensive production systems is required.

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Literature Cited

- Burkina Faso, Assemblée Nationale. 1999. Loi n° 14/99/AN du 15 avril 1999 portant réglementation des sociétés coopératives et groupements. Journal officiel (24):1459-1473.
- Danielou, M., Labaste, P. and Voisard, J.-M. 2003. Linking Farmers to Markets: Exporting Malian Mangoes to Europe. Africa Region Working Paper Series 60, World Bank, Washington DC.
- Fafchamps, M. 2004. Market Institutions in Sub-Saharan Africa: Theory and Evidence. The MIT Press, Cambridge/London.
- FLO. 2009. Fairtrade Standards For Fresh Fruit (except Bananas) for Small Producers' Organizations. Fairtrade Labelling Organizations International, Bonn.
- Hendrikse, G. 2003. Economics and Management of Organisations. McGraw-Hill Europe. Maidenhead.
- PPEA. 2003. Guide export mangue du Senegal. Editions Techniques IFLEX, Dakar.
- Rey, J.-Y., Diallo, T.M., Vannière, H., Didier, C., Kéita, S. and Sangaré, M. 2004a. La mangue en Afrique de l'Ouest francophone: variétés et composition variétale des vergers. *Fruits* 59(3):191-208.
- Rey, J.-Y., Diallo, T. M., Vannière, H., Didier, C., Kéita, S. and Sangaré, M. 2004b. La mangue en Afrique de l'Ouest francophone. *Fruits* 59(2):121-129.
- Vannière, H., Didier, C., Rey, J.-Y., Diallo, T.M., Kéita, S. and Sangaré, M. 2004. La mangue en Afrique de l'Ouest francophone: les systèmes de production et les itinéraires techniques. *Fruits* 59(6):383-398.

Tables

Table 1. Breakdown of costs and revenues.

Value chain actor	Cost per kg		Percentage		
	EUR	XOF	Exporter	Harvester	Farmer
Producer					
Cost of production	0.04	25	4.5		22.5
Margin	0.13	86	15.4		77.5
Sales price "on the tree"	0.17	111	19.9		100.0
Harvester					
Purchase price "on the tree"	0.17	111	19.9	50.5	
Quality risk	0.07	44	7.9	20.0	
Costs of harvest and transport	0.08	50	9.0	22.7	
Margin	0.02	15	2.7	6.8	
Price received for export quality	0.34	220	39.5	100.0	
Exporter					
Purchase price export quality fruit	0.34	220	39.5		
Packing and cooling	0.22	146	26.2		
Fixed overhead costs (staff, quality systems, building, equipment, finance)	0.08	54	9.7		
Transport to FOB port	0.14	93	16.7		
Quality claims by importer (5%)	0.05	32	5.7		
Margin	0.02	12	2.2		
Sales price FOB Abidjan	0.85	558	100.0		

Source: Fruiteq s.a.r.l.

Table 2. Development of the export volumes 2005-2010.

Source Country	Producer organization	Number of certified producers	Exported volumes (MT)					
			2005	2006	2007	2008	2009	2010
	UFMB	600	200					
Burkina Faso	UPPFL/CO	40		300	450	285	195	N/A
	UDPFK	120		250	250			N/A
Mali	USCPY	80			50	45	35	N/A
	Sibirila	50			25			
Cote d'Ivoire	CDFL	20			450	300	215	N/A
Total	Fruiteq ²	310	200	550	1225	630	445	1415 ¹
	FT premium ('000 EUR)		12	28	73	48	17	N/A

¹ As of end May 2010, with the season not yet finished.

² Excludes UFMB, as this organization left the project in 2006.

Source: Fruiteq s.a.r.l.

