Centre de coopération internationale en recherche agronomique pour le développement (CIRAD)

SOCIO-ECONOMIC STUDY OF THE UGANDAN COFFEE CHAIN

Overview of CIRAD and Ugandan consultant's work

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Background

This study was commissioned by the Food and Agriculture Organization of the United Nations (www.fao.org), the Project Executing Agency for project CFC/ICO/06, 'Enhancement of Coffee Quality through the Prevention of Mould Formation'.

The views expressed in this report are those of the authors and do not necessarily reflect the views of the Food and Agriculture Organization of the United Nations.

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More information on the project can be found at www.coffee-ota.org.

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1. Background

The FAO project on "Enhancing coffee quality through the prevention of mould formation", of which the socio-economic study in which we participated is a part, was launched in December 2000. It was initiated due to the determination of the European Union (EU) to introduce a standard fixing maximum ochratoxin A rates in green coffee.

Seven countries took part in the project: Brazil, Colombia, Ivory Coast, India, Indonesia, Kenya and Uganda.

Research under this project has focused on identifying, analysing and understanding the stages at which the risks of mould development leading to Ochratoxin A (OTA) formation are highest throughout the coffee processing and marketing chain.

The main project objectives were to:

- Identify the conditions required for OTA development.
- Identify the species of OTA-producing fungi, and possible rivals, fine-tune the water activity (aw) interval.
- Identify critical points for controlling contamination by moulds and OTA formation in green coffee.
- Improve analytical and mycological equipment in the laboratories of the countries taking part in the project.
- Develop and field test good codes of hygiene practice and the HACCP-based safety system.

1.1. Socio-economic component

Position of the socio-economic study within the overall project:

- When the project was launched, the first data indicated that application of the OTA standard to green coffee would lead to certain batches imported into Europe being rejected, given the higher OTA rates than those prevailing prior to the standard being introduced.
- The FAO project has thus given rise to technical research designed to identify points of OTA contamination in the production chain, and technological alternatives making it possible to limit the risk of contamination.
- Of those alternatives, new or renewed post-harvest techniques are being considered in Uganda: industrial wet process, solar dryers.
- The socio-economic component: provide an answer to the question of their suitability for adoption by operators in the commodity chain.

In addition, over and above technical innovation, application of the standard may have consequences for commodity chain organization. OTA content can only be measured by lengthy and expensive techniques. These measuring operations cannot be carried out during the first transactions between growers and traders as the commodity chain configuration stands at the moment. This means that applying the standard and controlling it at the different transaction levels will be problematic.

Faced with the problem of measuring one attribute, and taking the example of other commodity chains faced with the same problem of "measuring a credence attribute", operators in the commodity chain can, generally:

a) At the time of the transaction, fall back on proxies (indicators that make it possible to "approach" knowledge of the OTA content);

b) Acquire guarantee regarding coffee production and marketing procedures, which are known to help in limiting contamination risks. Such guarantees may be established through organizational configurations: insurance, contracts, vertical integration, specifications, certification, etc.

The socio-economic component of the study therefore focused on an analysis of types of organization (integration, etc.) and the proxies used to evaluate quality.

Moreover, these organizational modifications may lead to the appearance or disappearance of certain operators in the market: What about coffee producers who will not be able to adopt new technologies that reduce the risk of contamination? What alternative organization (grouping supplies for drying, access to credit)? What are the alternative opportunities with other crops? What are the alternative opportunities for exporters (Access to other markets? Relocation of roasting activities?, etc.), What is the reaction capacity of each type of exporter (national, firms with a high financial capacity, etc.)? Will the norm, which is akin to an obligatory standard for a large share of the export market (European market), lead to a change in price structure: quality premium, discount, etc.?

1.2. Context in Uganda

1. Coffee is primarily produced by smallholders and is a source of income for more than 500 000 Ugandan smallholders. It is the country's leading export crop. Coffee accounts for 43% of total exports.

2. At the moment, only the moisture content is assessed by buyers during transactions. On certain transaction levels within the chain, discounts are applied depending on the percentage of water contained in the coffee at the time of sale.

3. The moisture rates recorded on different transaction levels within the commodity chain (producer–trader, trader-trader, trader-exporter transactions, etc.) are currently high and indicate inadequate degrees of drying. Insufficient drying entails a major risk of coffee contamination.

4. The country produces between 85 and 90% of Robusta coffee by the dry method, and that type of processing is thought to entail greater risk of Robusta coffee contamination.

5. Processing alternatives are being tested by private companies who are being supported by UCDA, to modify primary processing from sun drying of red cherries into wet processing and drying procedures thereby improving quality and reducing contamination risks: 1) Wet processing of Robusta coffee red cherries to parchment coffee (similar to Arabica coffee processing) and drying the parchment mechanically, or sun drying introduced by importing 16 coffee "wet process" factories from Brazil. Some units will be operational from this year, 2) process drying using solar dryers (cabinet solar dryer, box solar dryer).

6. Middlemen between the producer and the exporter are involved in commercial buying-selling operations, but also usually in drying and/or hulling. The improvement of drying therefore concerns a set of stakeholders that is not limited to producers. Little is known of the incentives that encourage the different stakeholders, producers and traders, to sell coffee with a low moisture content.

Lastly, the OTA standard should involve the introduction of procedures designed to improve certain coffee quality attributes: fewer defects, checking of the moisture content, rapid drying to block water activity. Water activity or Aw plays a fundamental role in the formation of moulds responsible for OTA. Reducing the risk of contamination involves a strong recommendation: dry coffee to a water activity of less than 0.8 (which corresponds to a moisture content of 14%) as quickly as possible.

2. Objectives

The general objectives of the study were to:

1. Analyse the structure of the commodity chain and the potential consequences of OTA standards on the coffee commodity chain
2. Study the feasibility of technological alternatives investigated by research and the project for reducing contamination risks.

2.1. Coffee marketing chain In Uganda. Impact of EU standards

How is the market organized? What room for manoeuvre and negotiating powers do the different stakeholders in the commodity chain have? What are the regulation/consultation bodies? How are producers represented in them? What negotiating power do they have? What regulating role can public policies play?

Are there any quality premiums linked to the degree of coffee drying? On which transaction level?

What would be the consequences for the coffee industry if Europe introduced import standards (acceptable level of OTA) for coffee entering Europe. What strategies might be envisaged for the different stakeholders in the chain?

Topics:

- Typology of stakeholders and their function: identify, on a precise level, types of stakeholders, their relative functions (including farmers), their constraints and opportunities.

- Prevailing strategies and possible changes in the event of new standards (norms) for each type of stakeholder.

- Marketing chain structure.

- Public Policies: Actual and possible in the near future. (commercial policies, rules and regulations) – Government, European Union, World Bank, Private Sector –

- Current conflicts and negotiations. Possible resolution mechanisms.

- Market organization, price and margin systems.

    - Prices at each level in the market chain
    - Margins
    - Rules (formal and informal) to fix the price on each transaction level.
    - Link to quality at each level of transaction: what are the quality criteria, how are they evaluated, what price premium or discount?
    - Percentage of the export price going to farmers (incentives).

- Link the contamination rate to the transaction level, link between the trader function and the contamination rate and moisture content. (Data from the study carried out by G. Kulaba).

2.2. Feasibility of technologies under the project – traditional drying, wet processing and improved drying methods

Points 3, 4 and 5 presented in the "context" open section led on to an assessment of the economic possibilities, risks and opportunities, for the different drying methods.

For Robusta, these methods are:

- Current so-called "traditional" drying methods (equipment requiring limited investment: drying areas of the bare soil, tarpaulin, mat, cemented area types, etc.)
- Industrial type equipment imported from Brazil for wet processing
- Solar dryers already used in Uganda for fruit and vegetable drying; two types: solar cabinet and Ivorian box dryer.

The objective of the study here was to analyse the social, economic and technical implications (taking on board of new equipment, the technology required, etc.) of these different drying methods, from the individual viewpoint of each stakeholder, and the viewpoint of organizations and the market.

Topic:

- For each technology: costs, requirements and possible benefits (actual or theoretical)

- Potential options, constraints and opportunities for farmers. Consequences for production costs, consequences for farm management. Which producers are likely to make new investments?

a) Whether or not new technologies are taken on board by producers will partly be determined by their ability to gain access to credit, capital and information, by their

investment priorities in their different activities (position held by the coffee crop among other sources of income, interest shown in that crop compared to other possible crops, such as plantain banana, etc.), and by their social and economic organization (work schedules for the different activities and the available labour force, etc.). This is why an in-depth farming system analysis is required, including how those farms have evolved, focussing on:

- Planting dynamics for the different crops: coffee, plantain, food crops, etc. (For each crop: planting years, area planted, uncultivated area available, equipment, next planting projects and investments).
- Availability of non-traditional sources of income and alternative crops, constraints and opportunity for each crop.
- Income from each crop and other activities (charges and costs), cash availability, credit access.
- Labour force and alternative use of saved labour and work planning for each activity.
- Access to information.

b) Adoption of new technologies will also be linked to actual harvesting and post-harvest practices:

- Description of harvesting systems and types, and of post-harvest handling and processing
- Equipment, methods, materials (tarpaulins, bare floor, mats, etc.)
- Practices: A) Harvesting: floor covering, manual harvesting, types of cherries. B) Post–harvest: interval before drying, drying time, raking frequency, overnight storage, time spent in storage before selling, type of labour force, etc.
- Measurements on a farm level: thickness of the coffee layer on the drying area, type of cherry in harvest samples (greens, yellows, reds, blacks, overripes), Surface used for drying, quantity.

- Current and potential role change within the chain:

a) Wet processing: analysis

At Kalungu, in Masaka district, a private company recently acquired wet process and drying equipment imported from Brazil. That company is planning to launch wet processing of robusta coffee and drying operations this year, right from the first harvests in May 2004. For the moment, the company has reached an "understanding" with almost all the coffee producers in a few villages, to buy their red cherries for wet processing, drying into parchment coffee and milling the parchment into green coffee (FAQ) ready for the market.

b) Possible role of associations and farm level groups in drying centres with improved dryers for coffee not going through wet processing.

The role of producer associations can be analysed with respect to their potential ability to invest in large-scale drying equipment and/or their potential role in the marketing chain.

3. Methodology

3.1. Coffee marketing chain in Uganda

The studies conducted set out to:

- Describe the structure of the coffee commodity chain, and market functioning
- Identify the different stakeholders in the coffee commodity chain and establish a typology of stakeholders in accordance with different sub-segments.
- describe their functions, constraints/opportunities, and strategies
- In current or past tensions and conflicts, identify mechanisms for resolving those conflicts
- Identify the policies implemented in the coffee sector, notably those linked to coffee quality, and the effect of those policies from the viewpoint of stakeholders
- Identify the quality attributes and proxies currently employed in the commodity chain, how they are assessed and measured, and their consequences in organizational terms.

As the OTA standard was not being applied at the time of the study, the question of the consequences of the standard could only be prospective. Using computer simulation methods based on decision-making rules was not carried out as envisaged due to the time and costs involved. This said, the current study set out to carry out a comparative analysis of segments of the commodity chain that paid attention, or not, to certain quality attributes. Indeed, the OTA standard will involve implementing procedures designed to improve certain coffee quality attributes: fewer defects, controlling the moisture rate, rapid drying to minimize water activity. An analysis of the organization of those segments of the coffee commodity chain that already pay attention to some of these attributes, for standard coffee (not speciality coffees), would thus provide some answers: How are these commodity chains organized, what are the costs, who bears them, how are such quality attributes measured or guaranteed, through what organizational forms, by what procedures? What are the incentives to produce them, what is the market for this type of coffee?

The tools we used were a review of the literature, a compilation of secondary statistical data, and qualitative interviews and surveys among operators in the commodity chain, in 2004.

The operators involved in these interviews and surveys were:

- Coffee producers
- Producer associations
- Traders
- Processors (hullers)
- Exporters
- Federations (NUCAFE, UCTF)
- UCDA

These operators were met in Kampala for the national level, and in Masaka district for the regional level.

3.2. Feasibility of technologies under the project – traditional drying, wet processing and improved drying methods

We proceeded with the:

- Identification of new technologies investigated by the project
- Identification of current harvesting and post-harvest techniques used by coffee producer, and the associated constraints
- Growers' organization and management of farms
- Ability of producers to mobilize financial resources, gain access to capital, and invest
- Role of farmer associations or groups in adopting new technologies
- Possible role that the federations might play

We proceeded by:

- Interviewing project partners and scientific partners of UCDA.
- Interviewing operators who have adopted technical innovations (Kalungu)
- Conducting a qualitative survey among 30 selected farmers in the Masaka region.

The 30 farmers were selected in 5 sub-counties of Masaka district: Bigasa, Kibinge, Kalungu, Kabonera and Kiseka, and from 13 villages.
The farmers interviewed were chosen with the support of the District Coffee Coordinator, an employee of UCDA, and the Chairman of the Kabonera Coffee Farmers Association. The farmers were chosen according to the size of the farm and the production site, so as to diversify the sample based on those two criteria. Among them, 7 farmers were chosen because they sold some of their coffee to the IBERO project; they were located in the sub-counties of Kiseka (3) and Bigasa (4), and came from 4 different villages.

Masaka District was chosen because it is the largest Robusta production zone in the region (1 million bags, UCDA 2001/02).

The survey of 30 farmers took place in July and August 2004.

4. Coffee marketing chain in Uganda

Developments in the Ugandan coffee commodity chain over the last decade have largely been linked to the structural adjustment and economic restructuring programmes in developing countries called for by international organizations (International Monetary Fund and World Bank) and to concomitant changes in the global organization of this sector.
The process of liberalizing the coffee sector in Uganda began in 1990/91 and was quickly completed. Prior to that period, national markets in Africa were regulated by State-run organizations: Stabilization Funds or Marketing Boards. Such regulation guaranteed a fixed and stable price for farmers. In the coffee commodity chain, the international and national coffee markets were regulated by the International Coffee Agreements (ICA) from 1962 to

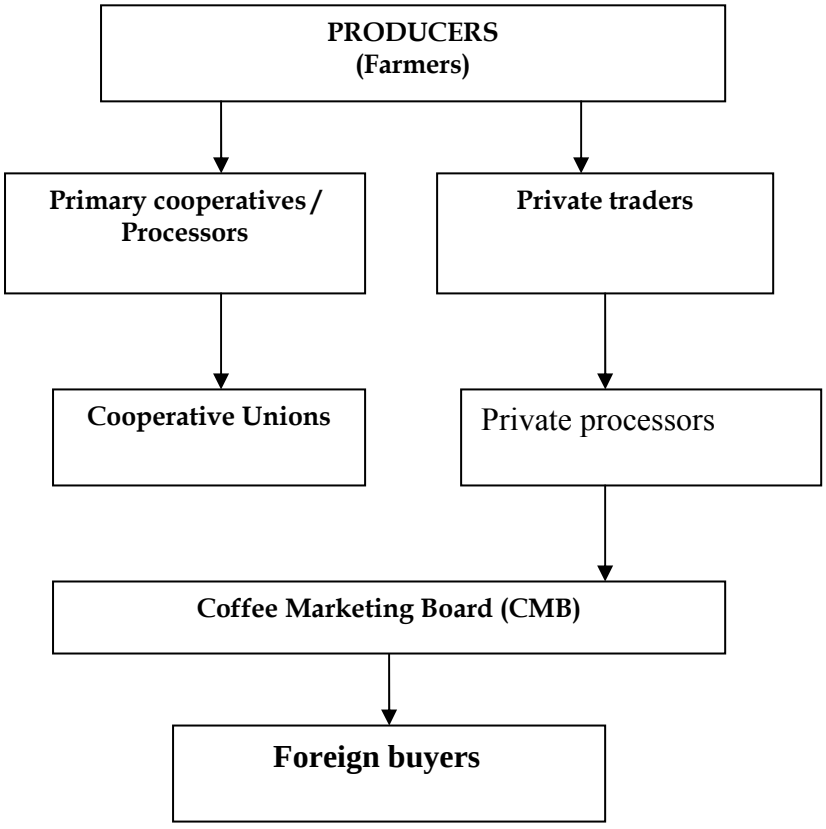
1989, notably in terms of prices and quotas. Today, it is the Ugandan coffee sector that offers the most liberalized marketing environment in East Africa (Ponté, 2001).

This part of the report deals with changes in the Ugandan coffee sector since its liberalization, and with its current organization. The data are taken from national statistics sources and from our surveys of operators in the commodity chain. The results of the study indicate that the market is "run" by international demand towards uniform standard coffee of average quality, with volumes being a priority. For operators who cannot insure themselves against risk, the high volatility of prices is leading to increasingly rapid transactions to the detriment of quality. The overall functioning of this market, in its current form, is not conducive to better green coffee quality.

4.1. Organization before liberalization (1991)

Prior to liberalization of the coffee commodity chain in 1991, domestic coffee trade was ensured by cooperative societies competing with private buyers under licence. The cooperatives and private buyers based their activities on a price paid to the farmer and fixed margins. All hulled coffee was sold to the Coffee Marketing Board (CMB), a public body that held the monopoly for coffee exported from Uganda. That public body was responsible for marketing coffee on the world market and for fixing domestic prices (Ponté, 2001)

Figure 1: Organization of the Ugandan coffee market before liberalization

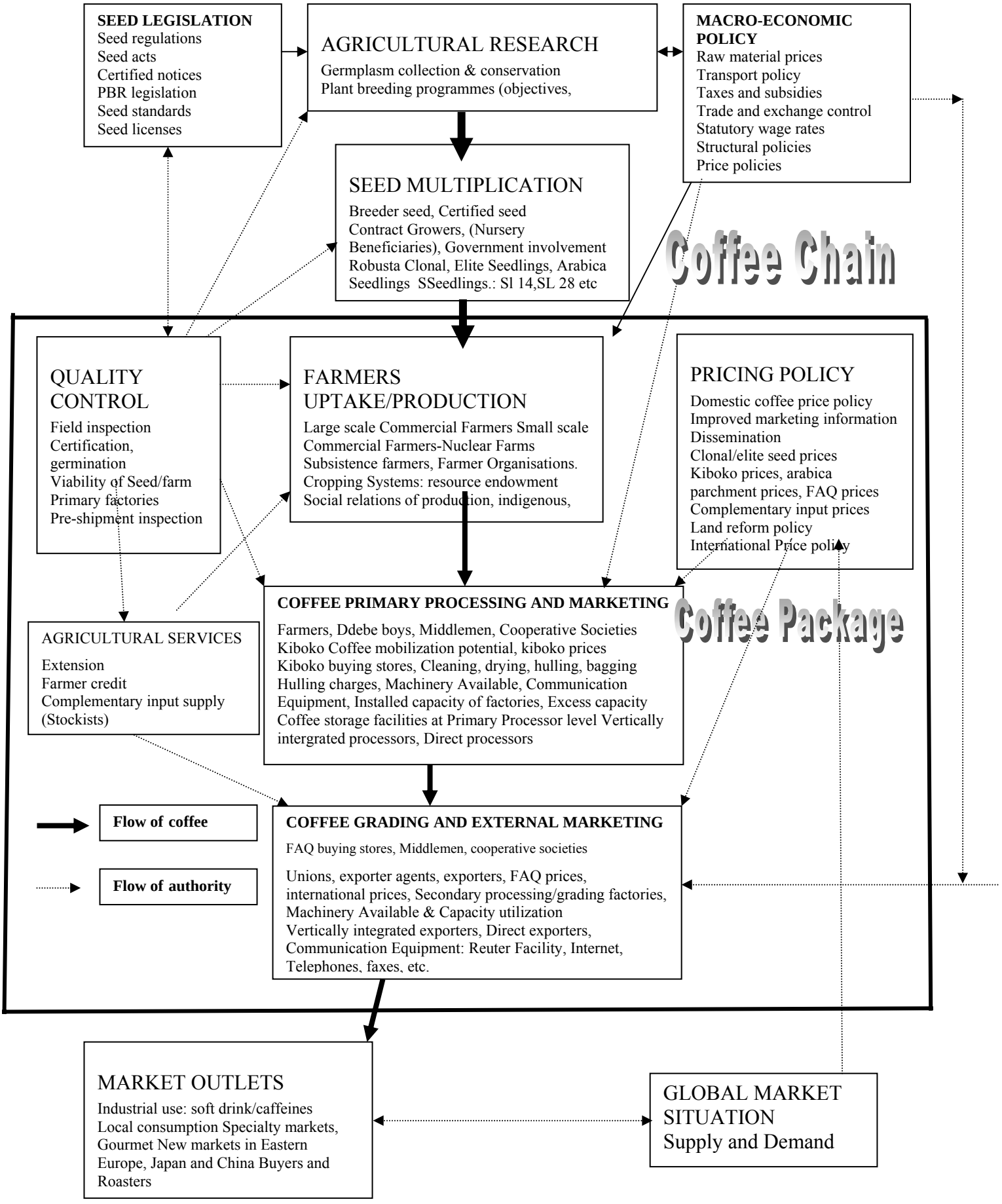


Source: Based on Stefano Ponte, 2001.

4.2. Changes in the sector since 1991

The end of the CMB monopoly was decided in 1991, leaving the possibility for cooperatives and private operators to export coffee directly. The CMB was split into two entities, the Coffee Marketing Board Limited (CMBL) responsible for export, but on a par with private exporters, and the Uganda Coffee Development Authority (UCDA). UCDA is, to this day, responsible for controlling and regulating the commodity chain (UCDA, 2003).
In the first years following liberalization, CMBL continued its exporting operation, competing with the export cooperative unions, such as Union Export Services (UNEX) and with private exporters. Financial arrangements and joint ventures with foreign companies were authorized and export taxes were abolished. In 1995, the mandatory export floor prices were also abolished (Ponté, 2001). Consequently, the cooperative sector virtually disappeared.

Figure 2. The coffee chain. A framework approach

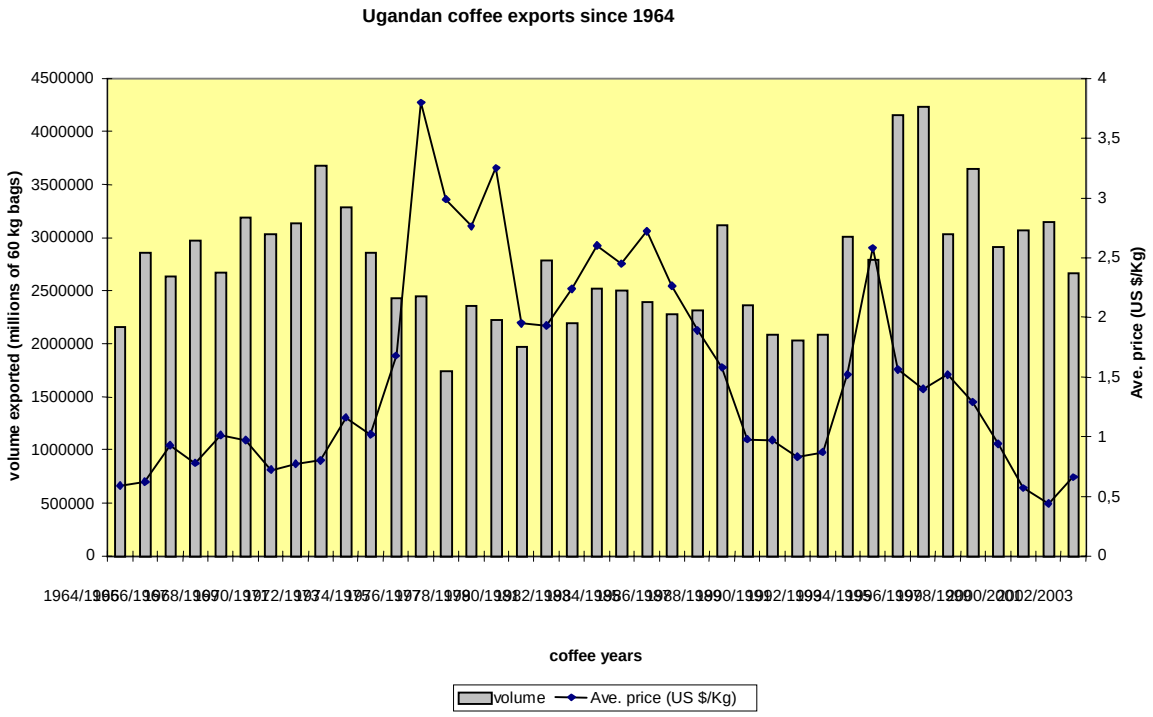


Source: modified from Kizito (1995) and Crowell, Friis-Hansen and Turner (1992).

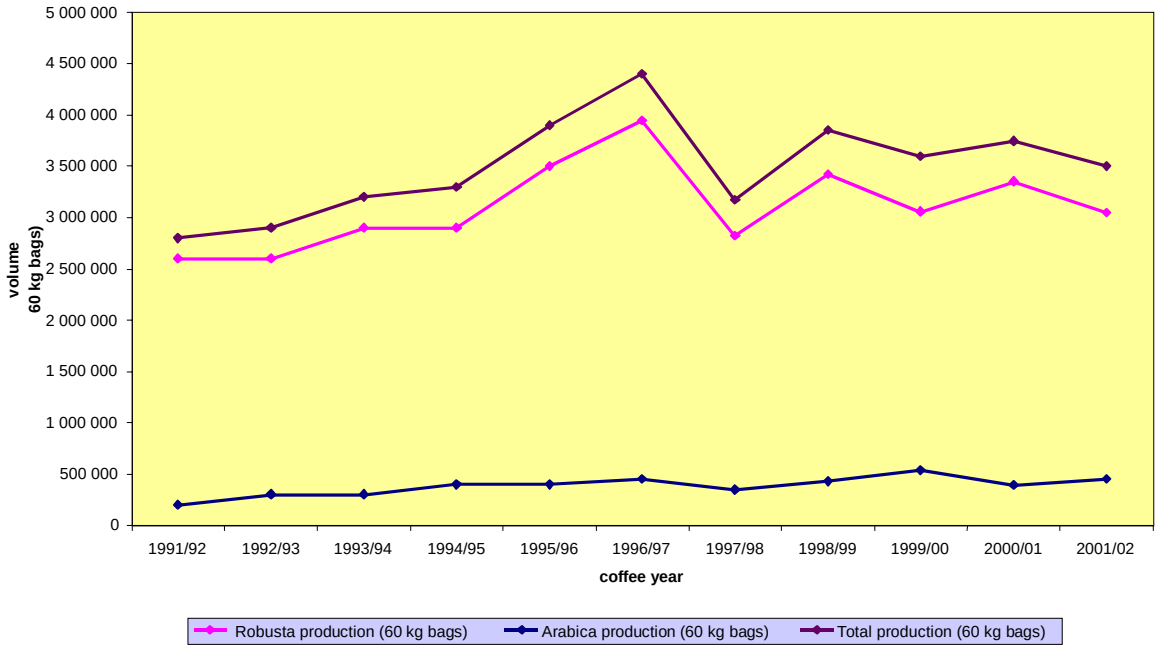
4.2.1. Exported products

The quantities of Ugandan coffee exported fell sharply from 4.2 million bags in 1996/97 to 2.6 in 2003/04. The areas in production also fell, from 256 289 ha in 2000/01 to 153 099 ha in 2002/03 for Robusta, primarily due to coffee wilt disease. Yields have remained at 700 kg/ha (clean equivalent) since 1996/97 for Robusta (traditional). (Source: UCDA).

Graph 1: Ugandan coffee exports since 1961



Graph 2: Arabica and Robusta coffee exports since 1991



Source : UCDA

Robusta amounted to between 85 and 78% of the coffees exported between 2000/01 and 2003/04. Robusta exports primarily consisted of the average grade (screen 15). "Organic" and "Washed" Robustas amounted to tiny quantities.

Table 1: Coffee quantities exported depending on coffee type and grade

	2000/01	2001/02	2002/03	2003/04
Robusta (60-kg bags) :				
SC 18	236 797	240 546	196 102	203 814
SC 15	1 560 548	1 637 448	1 242 441	1 182 974
SC 14	2 672	119 886	75 945	44 687
SC 12	591 936	428 879	432 095	308 145
BHP 1199	52 277	72 214	89 303	62 394
BHP 1013	-	3 900		250
BLACK BEANS	-	12 560	25 623	21 710
WASHED	2 095	880	746	210
ORGANIC	5 020	1 440	2 500	1 828
ROBUSTA UG		6 895		30 559
OTHER ROBUSTAS	95 922	41 292	78 416	12 493
SUB-TOTAL Robusta	2 617 777	2 722 850	2 247 063	1 967 142
Arabica (60 kg bags)	456 996	430 426	443 148	543 689
% ARABICA	15	14	17	22
TOTAL COFFEES	3 074 773	3 153 276	2 663 888	2 523 042

Source : UCDA

4.2.2. Demand for Ugandan coffee and concentration on the international market

Europe is the main destination for Ugandan coffee, accounting for 82.5% of exports in 2002/03.

Table 2: Volume of Ugandan exports by destination for the 2002/2003 season (60-kg bags)

	DESTINATION	Quantity - 60 Kilo Bags			%- Market Share	
		ROBUSTA	ARABICA	TOTAL	Individual	Cum
	GRAND TOTAL	**2,221,440**	**442,448**	**2,663,888**	**100.00**	
1	EU	1,802,246	396,570	2,198,816	82.54	82.54
2	SUDAN	186,496	2,390	188,886	7.09	89.63
3	POLAND	47,214	9,600	56,814	2.13	91.76
4	HUNGARY	39,955	2,140	42,095	1.58	93.35
5	SWITZERLAND	26,663	8,180	34,843	1.31	94.65
6	ERITREA	17,120	6,900	24,020	0.90	95.55
7	USA	15,605	945	16,550	0.62	96.18
8	MOROCCO	11,358	330	11,688	0.44	96.61
9	JAPAN	3,257	250	3,507	0.13	96.75
10	SINGAPORE	2,225	300	2,525	0.09	96.84
11	CANADA	1,647	0	1,647	0.06	96.90
12	JORDAN	668	668	1,336	0.05	96.95
13	AUSTRALIA	650	650	1,300	0.05	97.00
14	ISRAEL	668	0	668	0.03	97.03
15	OTHERS	65,668	13,525	79,193	2.97	100.00

Source : UCDA

75% of Ugandan coffee was purchased by 10 international buyers for the 2002/03 season (67% the previous season). Sucafina came top with 14.3% followed by Decotrade with 11.3% (UCDA).

Table 3: International buyers of Ugandan coffee (2002/03) – 60-kg bags.

	OVERSEAS BUYERS	Qty	Percentage Market Share	
			Individual	Cumulative
		2,663,833	**100**	
1	SUCAFINA	380,703	14.29	14.3
2	DECOTRADE	301,119	11.30	25.6
3	DRUCAFE	256,102	9.61	35.2
4	BERNARD ROTHFOS	226,909	8.52	43.7
5	OLAM INTERNATIONAL Ltd.	204,956	7.69	51.4
6	ICONACAFE	177,583	6.67	58.1
7	ELMATHABIB	159,715	6.00	64.1
8	EQUATOR TRADERS.	125,489	4.71	68.8
9	ECOM AGROINDUST	114,371	4.29	73.1
10	VOLCAFE	78,699	2.95	76.0
11	ANDIRA.	70,699	2.65	78.7
12	COMPANIA	60,506	2.27	81.0
13	ALDWAMI.	59,500	2.23	83.2
14	COFFTEA (SUDAN).	56,990	2.14	85.3

15	LOUIS DREYFUS	53,150	2.00	87.3
16	SOCADEC	48,249	1.81	89.1
17	HACOFCO	25,306	0.95	90.1
18	EURO COMM	19,336	0.73	90.8
19	TEO UK	13,249	0.50	91.3
20	OTHERS	231,202	8.68	100.0

Source : UCDA

The coffee market is "run" by operators in consumer countries, primarily roasters. The international traders and roasters sector is becoming increasingly concentrated. In 1998, the largest two coffee buyers (Neumann and Volcafé) controlled 29% of market shares and the top 6 buyers, 20 %. The market is even more concentrated for roasters. The largest two groups (Nestlé and Philip Morris) control 49% of roasted and instant coffee market shares. The top 5 groups control 69% of the market. Nestlé dominates the instant coffee market with a 56% share of the market (Dijk et *al.*, 1998, quoted by Daviron and Ponté, 2005). Daviron and Ponté (2005) highlight the increasing power of roasters, through the imposition of minimum quantities to be supplied to them, and possible substitution between coffees in blends.
At the same time, international traders are integrating export companies and sometimes even local processing, local trade, and coffee estates. Studies conducted in the coffee sector on an international scale show that the concentration of international buyers has reduced margins in producing countries to the benefit of margins achieved by operators in consumer countries (Ben Shepherd, 2004). This international market structure is also reflected in the weak negotiating power of upstream stakeholders in the coffee sector.

Daviron and Ponté (2005) highlight the paradox that leads to a prosperous coffee consumer market (increase in the margins of European coffee roasters and distributors) when green coffee prices in producing countries are in crisis. The farmgate price paid to farmers amounts to 8% of the price of roasted coffee. Some explanations frequently put forward refer to surplus coffee production resulting from the production boom in some producing countries and to power asymmetry in the market (oligopoly of buyers and roasters). Daviron and Ponté also suggest a third explanation related to the differentiation of quality attributes applied to coffees at the consumption stage and exploited on the consumer market, whereas green coffee is treated as a commodity assessed in accordance with a world standard, enabling remote trading of green coffee, on futures markets, and enabling its substitution. This thesis highlights the challenge for producing countries to measure the intrinsic attributes of the coffees they produce, differentiating between their products to take maximum advantage of quality attributes.

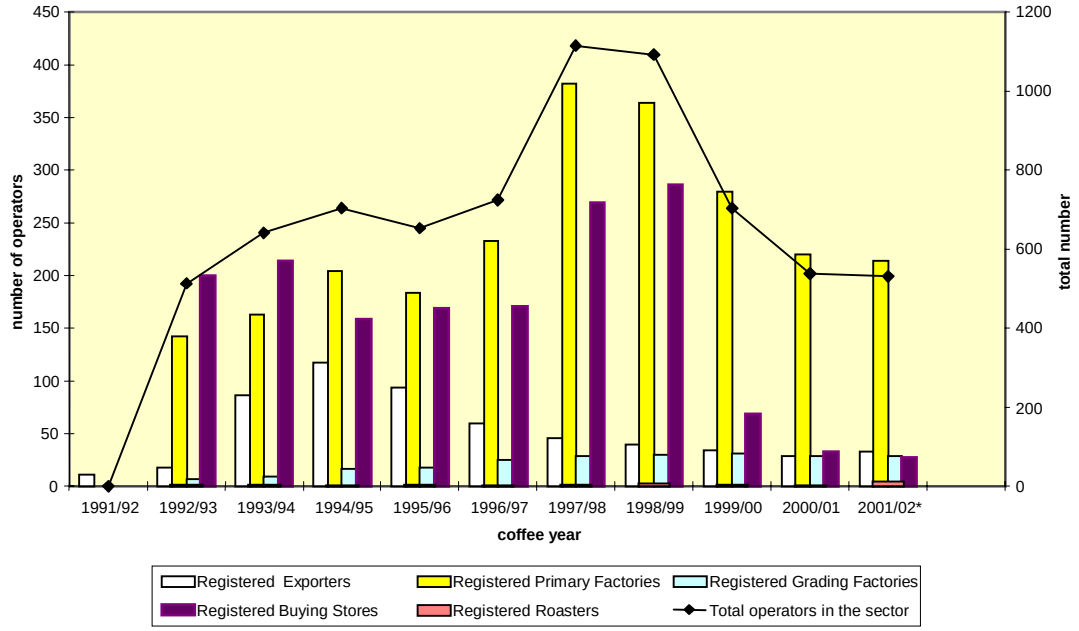
Most roasters do not buy coffees for their blends in countries that cannot supply a minimum quantity. Consequently, international buyers are encouraged, directly or indirectly, to remain involved in the domestic trade in producing countries, even if operations are not profitable, so long as they can satisfy the demand of their main roasting clients (Daviron and Ponté, 2005).
Ugandan Robusta coffee is important on the global market because it supplies large volumes, but also because of its neutral flavour.

4.2.3. Trends in marketing chain structure: concentration of exporters and vertically integrated chains

The liberalization of the coffee commodity chain led to the arrival of numerous players on the market, private export companies, kiboko (dry cherry) coffee buyers, buyers of FAQ (Fair Average Quality, unsorted hulled coffee), hulling factories, etc.
It also led to foreign buyers entering the domestic market, and their involvement at several stages of the commodity chain. Nowadays, most exporters have set up their own processing factories (drying, grading, etc.). Strong competition, the race to achieve volumes, price volatility and the installation of mechanical dryers in exporters' processing factories in Kampala for re-drying coffee to a moisture rate authorized for export (13%), are decisive for understanding the management of moisture rates in coffee trade further upstream in the commodity chain.

Change in the number of operators downstream of primary processing
Graph 3 shows variations in the number of players recorded in the commodity chain between 1991 and 2002. The number of operators increased significantly between 1992/93 and 1998/99, then decreased from 1999/00 onwards. This trend can be seen for the number of exporters, buying stores (exporter buying centres), and hulling companies.

Graph 3: Number of operators recorded in the coffee commodity chain since liberalization



Source: UCDA (2004). Note: 1991/92: no data

The number of roasters in Uganda changed little between 1992 and 2001 (5 companies on average), but it increased recently to 12 in 2001/2002. The number of grading factories increased from 7 in 1992 to 29 in 2001/2002.

Increase then reduction in the number of export companies: tendency towards concentration on the export market

Table 4 shows changes in the market share of companies acting as coffee exporters for the 1990-1996 period. After liberalization, the CMBL market share fell, to the benefit of two types of operators: Union Export Service (UNEX[1]) and the private sector, which developed from that time on. In 1990/91, the private sector market share was nil, and then went on to reach 92% five years later, and the CMBL market share fell from 92% in 1990/91 to 4% in 1995/96.

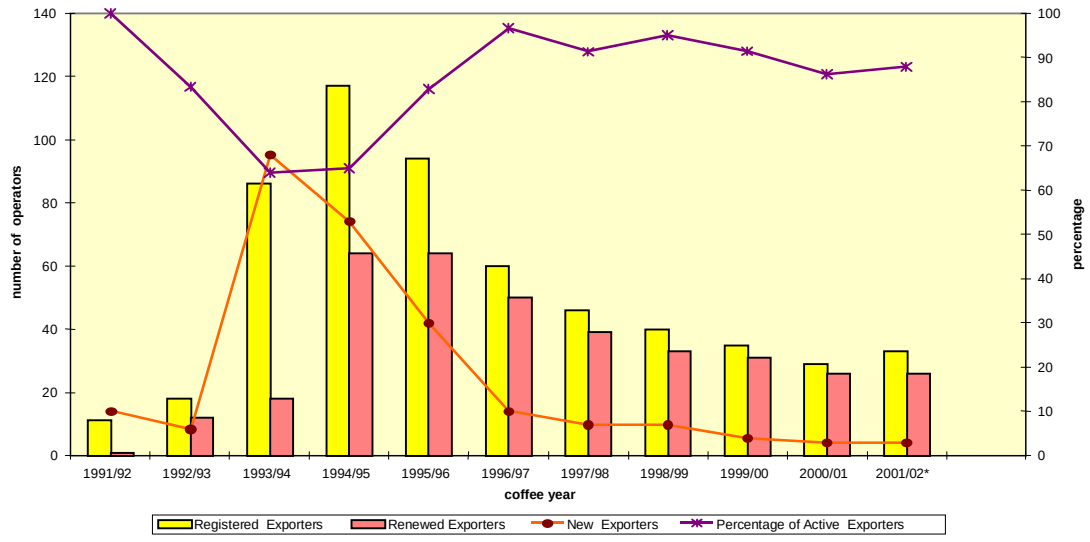
Table 4: Export market share by category of exporter over the 1990/91-1995/96 period

Exporter	1990/91	1991/92	1992/93	1993/94	1994/95	1995/96
CMBL	92	84	39	16	10	4
UNEX	8	12	16	11	11	4
PRIVATE	0	4	45	73	79	92
TOTAL	**100**	**100**	**100**	**100**	**100**	**100**

Source : ICO 1997

The graph shows changes in the number of exporters over the 1990/91 to 2001/02 period. Note that "registered exporters" are those who have obtained an export licence, whereas "renewed exporters" are those who have obtained the renewal of their operating licence. "New exporters" are arriving for the first time on the market and exporters who have taken part in coffee exports during the year are "exporters who performed". "Dormant exporters" are exporters who have a licence but have not played a role on the export market. All these categories form the "registered exporters" for a given coffee year.

Graph 4. Changes in the number of export companies since 1991



Source: UCDA (2004)

The number of exporters varied in two stages, characterized first of all by an increase then a decrease in the number of operators. Between 1991 and 1993, the number of registered exporters rose from 11 to 18, then to 86 in 1993/94 and 117 the following season. From the 1995/96 season onwards, that number decreased, reaching 33 exporters in 2001/2002. ICO

[1] UNEX is a company that was set up at the time of liberalization which exports coffee on behalf of groups of associations or cooperatives.

(1997) attributed that concentration phenomenon to difficulties in obtaining local funding and to high interest rates, and highlighted the strong dependence on outside funding to exercise this activity.

This parabolic movement in the number of exporters went hand in hand with changes in the way operations were organized. In those years where profits were high (1994-96), the exporting companies sought to integrate the commodity chain as far as purchasing from farmers, with mixed systems of buying stores in rural zones, independent middlemen and subcontractors. Some companies even invested in primary processing factories to buy cherry directly rather than hulled coffee from middlemen or local primary processors (Ponté, 2001).
In subsequent years, exporter profits shrank and, from 1996/97 onward some exporters began to buy coffee at a loss (Ponté, 2001). Most roasters do not buy coffee for their blends from countries unable to supply a minimum quantity. Ugandan Robusta coffee plays a key role in the blends produced by European roasters. International buyers have an incentive to remain directly or indirectly involved in the domestic trade of producing countries, even if operations are not profitable, so long as they can satisfy the demand of their main roasting clients. This strategy has led to an increase in the concentration of exporters, since companies that did not have the financial ability to buy at a loss were squeezed out of the the market (Ponté, 2001).

At the same time, weak barriers on entry into the sector have made it difficult to control the vast local coffee buying network in the country. Exporters linked to multinational corporations (MNC) have withdrawn from primary processing and from their contracts with middlemen, and they have also reduced the number of buying stores in rural zones. Exporters now buy most of their coffee in hulled form from all types of buyers (Ponté, 2001).

Arrival of new exporters. Vertical integration, appearance and growth of multinational corporations (MNC)
In the mid-1990s, multinational corporations started taking an interest in the Ugandan coffee market. Some of those firms integrated local exporting companies (Ponte 2001). A certain number of exporting companies belong to international buyers (Sucafina, Neumann, Volcafé, etc.), some of which are also roasters (Annex 1).

UCDA (1995-1996) specifies that some foreign buyers have set up subsidiaries in the country to speed up payments and coffee deliveries. S. Ponté (2001) shows that at the end of the 1990s, the crisis situation on the world market and the drop in prices led to a reduction in the number of exporters, but also enabled the consolidation of the presence of multinational corporations. Domestic companies who had a low financial or prefunding capacity were squeezed out of the market.

Table 5: Market shares of coffee exporters in Uganda

	91/92	94/95	95/96	96/97	997/98	98/99	99/00	00/01	01/02	2002/03
Market share of the top 5 companies	**96**	**43**	**48**	**52**	**50**	**53**		**53**	**53**	**50**
of which MNCs	*0*	*19*	*27*	*24*	*24*	*38*		*25*	*23*	*11*
of which local companies	*96*	*33*	*22*	*28*	*27*	*15*		*28*	*30*	*39*
Market share of the top 10 companies	**98**	**59**	**66**	**73**	**71**	**77**		**79**	**81**	**82**
of which MNCs	*0*	*19*	*22*	*28*	*32*	*47*		*39*	*32*	*32*
of which local companies	*98*	*49*	*39*	*45*	*39*	*30*		*40*	*48*	*50*
Market share of companies classed 11 to 20	2	19	n/a	18	22	20		17	18	16
Market share of other companies	0	21	27	10	8	3		2	2	1
Total market share of MNCs	0	21	29	33	34	47		39	32	32

Source: from S. Ponte (2001) and from UCDA annual reports (1994/95-2002/03 period).

Table 5 shows the market shares of the different Ugandan coffee exporters and the origin of their capital. A distinction is made between national companies and multinational corporations (MNCs). In 1991/92, the share of the top 5 companies amounted to 96%, with CMBL in the lead, which accounted for 84% of exports, the remaining 12% going to the cooperative unions. Since 1994/95, with the arrival of foreign capital, private companies have developed, notably MNCs. In 1996, 3 MNCs figured among the top 10 exporters. During the 1998/99 season, there were 6, of which 4 were in the group of top 5 exporters. A concentration phenomenon is increasingly visible, with more or less accentuated phases of consolidation of the market share of the multinationals. The situation for the 2002/03 period still indicated a concentration phenomenon, with 82% of exports coming from the top 10 exporters, of which 32% were MNCs and 50% local companies.

Low profit margins in the national commodity chain

The margins per kilo for the different operators, traders, processors and exporters, are relatively low.

The margins per kilo appear to be higher for farmers, but they need to be considered in relation to the average volume dealt with per category of players to assess and compare net incomes. A farmer producing 1 tonne of kiboko earns a net income of Sh 85 000 over the year. A trader who deals with 100 tonnes earns a net income of Sh 340 000, etc.

The low margins per kilo require operators to deal with large volumes to earn sufficient income or for their equipment to be cost-effective.

Table 6: Costs and margins in the commodity chain

	1999/00	2000/01	2001/02	2002/03	2003/04
Farmer's Production Cost (Shs/Kg)					
Traditional Robusta	375	230	283	445	445
Clonal Robusta	285	153	160	242	242
Arabica Parchment	850	785	540	703	703
Farmer's Margins or Net Income (Sh/Ha)					
Traditional Robusta	60 000	40 000	56 400	85 000	85 000
Clonal Robusta	420 000	468 000	532 000	1 152 000	1 152 000
Arabica Parchment	337 500	139 750	540 000	497 000	497 000

Farmer's Profitability (Sh/kg)					
Traditional Robusta	50	40	47	85	85
Clonal Robusta	140	117	120	288	288
Arabica Parchment	450	215	540	497	497
Processor's Cost (Sh/kg)	137.5	141.9	120.5	136.4	136.4
Processor's Hulling Fee (Sh/kg)	30	25	25	25	25
Processor's Margin (Sh/kg)	69.5	68	30	34	34
Exporter's Cost (Sh/kg)					
Vertically Integrated Robusta Exporter	286	262	190	199.4	199.4
Direct Robusta Exporter	286	262	190	199.4	199.4
Direct Arabica Exporter	407	252.54	286	251.99	251.99
Exporter's Margin (Sh/kg)					
Vertically Integrated Robusta Exporter	60.4	33	20	26.8	26.8
Direct Robusta Exporter	60.4	33	20	26.8	26.8
Direct Arabica Exporter	122	104	41	103	103

Source : UCDA

Partial conclusions

Liberalization led to a more competitive and dynamic market, opening it up to all the stakeholders.

The positive changes for operators have been that:

- Farmers and traders receive an immediate payment in cash on the day of the coffee sale.
- Farmers and traders can hull cherry and sell FAQ directly to exporters or their middlemen. Selling FAQ coffee is more worthwhile than kiboko.

In export terms:

- Competition has encouraged some local entrepreneurs to join in partnerships with international coffee buyers, making it possible to boost their operational capacity; they have become more competitive through the search for new markets.

Problems arising from liberalization:

- From the mid-1990s capital flows resulted in a concentration phenomenon on the export market and some operators were squeezed out of the market, notably companies with national capital.
- The funding of farmers, local traders and local exporters has not improved. Only those players with good kowledge of the markets and a financial capacity have benefited from and taken advantage of liberalization policies.
- According to the International Commodity Body (ICB), abolition of the minimum price in 1995 enabled exporters to sell coffee at any price. That weakened the ability of local exporters to negotiate lucrative prices for their coffee. As the selling price was no longer verifiable, it might not reflect the pricing situation on the international

markets. In practice, it became much more difficult to check the prices charged by the different stakeholders in the commodity chain. According to the International Commodity Body (1996), some exporters immediately took advantage of that situation by under-declaring or under-billing their coffee with a view to paying less tax. Some of them used that method to transfer stocks to their parent companies abroad, where better prices were applied.

Some different practices led to the following consequences:

- Erosion of the taxable base (coffee stabilization tax, coporation tax, etc.)
- Concentration among exporters.

We shall see in the following section that this context also led to a deterioration in coffee quality.

Some problems caused by liberalization give rise to the question of controlling and regulating the different stakeholders in the commodity chain. Some legal provisions specific to the commodity chain exist, including the creation of UCDA and the adoption of the "Coffee Regulation, 1994" by the Ugandan parliament.

4.2.4. Policies and regulation issues

4.2.4.1. The Uganda Coffee Development Authority (UCDA)

In 1991, CMB was restructured into two distinct entities: the Coffee marketing Board Limited (CMBL) responsible for exporting coffee on the same basis as private exporters, and UCDA (Uganda Coffee Development Authority), responsible for controlling and regulating the commodity chain.

UCDA is an organization governed by the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF). In 1994, the UCDA Steering Committee was replaced by a team of 12 people, comprising public and private operators, in order to integrate the expanding private sector. In 2001/02, the Board thus comprised representatives of farmers, processors, exporters, research, and the Ministry of Finance, Planning and Economic Development.

UCDA's functions can be categorized in three different fields:

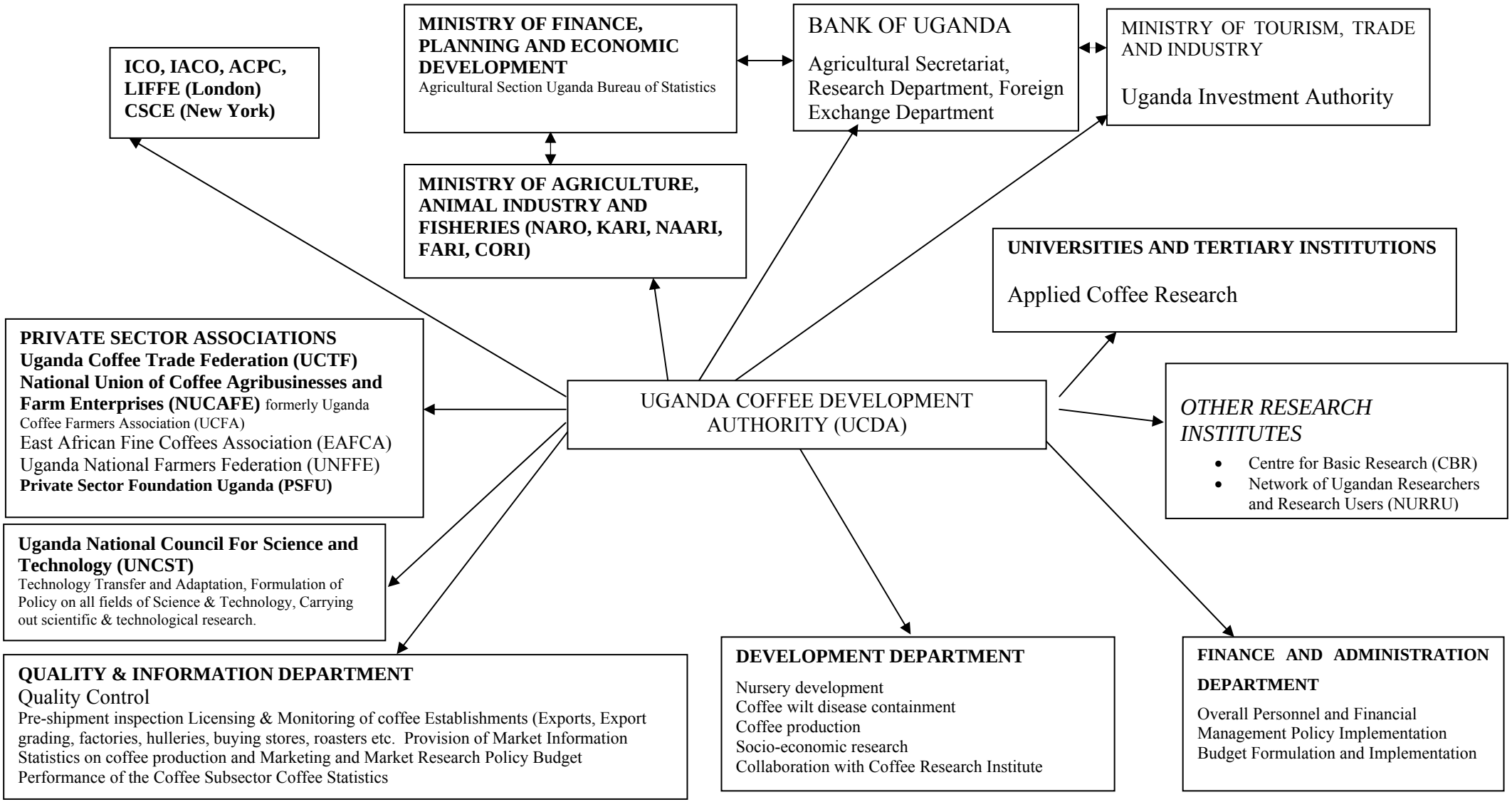
1. Regulation
2. Control
3. Research and Development.

UCDA is the central authority for coordinating activities in the coffee sector. It is the only State body in charge of controlling the quality of exported coffee. UCDA carries out coffee quality analyses by taking samples at the primary processing and export stages. The samples are used to measure moisture content and check cup quality, in order to grade the coffee and ensure its quality.

It is the responsibility of UCDA to oversee the respect and application of rules contained in "The Coffee Regulations, 1994". It has the power to inspect at any time, any building where coffee is stored or any machine that has been used for coffee processing.

UCDA is involved in research and development, and in programmes to replace traditional coffee trees with clonal planting material that is higher yielding, and particularly more resistant to certain devastating diseases such as Coffee Wilt Disease (CWD). According to the UCDA annual report for 2004, CWD incidence on a national level amounts to 44.5%, which is equivalent to 106 800 hectares (annex 2).

Figure 3 : The coffee sub-sector linkages



Source: Information Systems Department. Abstracted From UCDA Annual Report and Modernisation of Agriculture Report (1998)

4.2.4.2. The Coffee Regulations, 1994

This is the set of laws applicable to any type of coffee planted in Uganda and/or any grade of coffee brought to Uganda to be sold, processed or exported, but does not apply to coffee transiting through Uganda. For each category of stakeholders, the Regulations define rights and obligations, delimits the scope of activities and competence, along with any sanctions applicable. Failure to respect the Regulations can lead to the following sanctions:

- annulment of the operating licence, or
- payment of a fine not exceeding one million Shillings, or
- condemnation to a prison term not exceeding three months, or
- a combination of the three sanctions.

Legal regulation and control procedures do exist but they are difficult to apply.

For quality control, it is stipulated by law that all holders of an operating licence for the domestic coffee market must submit to checks during normal opening hours, facilitate free access to inspectors and/or to officers accredited by the authority, in order for them to inspect processing factories and stores and carry out any tests that prove necessary.

The Regulations make coffee grading compulsory. Such grading must comply with legal export grades. It is stipulated that a quality controller or authorized person must, at any time, proceed with coffee grading in the following case:

- before the coffee is sold by the farmer, or
- after processing, or
- before selling to the public, or
- before export.

After inspection, the controller issues a certificate that expires on a specific date. The controller sends a copy of the certificate to the Authority.

Still with regard to quality, coffee must be processed, handled and stored under suitable conditions in order to preserve its quality. The Regulations stipulate that coffee hulling, whether the coffee was produced by the dry method or the wet method, must be carried out on adequately dried coffee cherry: cherry with a 13-14% moisture content, or parchment with a 13-14% moisture content.

Nobody may export coffee without an inspection prior to loading and unless the Authority has issued a valid permit for transport by road or rail. The permit is valid for a period that must not exceed 24 hours from the receipt of the request by the Authority.

No coffee can be exported without a valid quality certificate issued by the Authority and respecting all the conditions required for an export coffee.

4.2.4.3. Masaka District Task Force

Masaka district has a Task Force which is composed of a government security apparatus, coffee stakeholders such as farmers, millers and exporters who work together to ensure that only properly dried coffee goes through Masaka district to Kampala. Masaka is strategically located as a gateway to and from Kampala for coffee that comes from Tanzania, west and

southwestern parts of Uganda, which grow almost 30% of the total coffee produced in Uganda.

Each year, at least punctually, the task force sets up road blocks to stop trucks carrying coffee. The officials measure the moisture content of the coffee sample. If the moisture content is above 13%, the truck is detained and the exporter is fined. The exporter has to pay a fine and re-dry the coffee before it is allowed to continue the trip to Kampala. The task force also organize a meeting in Masaka with stakeholders to take some decisions from the diagnosis of the situation. In 2004, those operations occurred at least in July.

4.2.4.4. Farmer associations

The National Union of Coffee Agribusiness and Farm Enterprise (NUCAFE), which is an Association of coffee farmers in Uganda representing the interests of about 80 Coffee Farmer Associations has its own code of conduct. This Association is not adequately funded as it is still very young, about 5 years old, and due to lack of funds it is not very effective on the ground. But they represent a potential to empower farmers to own their coffee and add as much value as possible within the coffee supply chain, and to negotiate prices for their coffee. The strategic actions for farmers are to integrate more added-value activities: hulling, grading, direct marketing. They defend the idea that once the farmers have added value and they know the price of that value and sell the value to the buyer it is likely that the value will not be compromised throughout the chain. The main discussions between Nucafe and UCTF relate to price incentives for farmers.

4.2.4.5. Uganda Coffee Traders Federation (UCTF)

The Uganda Coffee Traders Federation was founded in 1996. UCTF, which comprises the major coffee traders in Uganda, also has in place a code of conduct to ensure that the coffee regulations are followed. UCTF works closely with UCDA to ensure that there is compliance with the coffee regulation among exporters. The biggest challenge is that not all coffee exporters are members of UCTF (Annex 3).

The official mandate for UCTF is to "protect, promote and safeguard the business interests of persons engaged in the coffee trade and industry (whether as growers, processors, agents, brokers, traders, roasters or exporters)".

UCTF is composed of 31 members. Members are mainly exporters and commercial banks. Of 29 licensed exporters in Uganda in 2002, 13 were members of UCTF. Of those 13 members, 10 were the 10 largest exporters (volume exported in 2002) and accounted for 80% of the market share for exported coffee. The biggest exporters in Uganda are largely represented within UCTF.
The current Chairman of UCTF is a local export company (Kampala Domestic Store). The major trends observed since liberalization are:

- Reduction / adulteration of coffee quality,
- Stronger competition between stakeholders to supply coffee and guarantee volumes, with an impact on poor quality.
- Margins are low, so volumes are large to remain competitive and stay in the market.
- Need for local companies: financial support from banks (loans), to remain competitive faced with multinational export companies.

- Need for new policies and regulation laws, to regulate competition and quality control.

4.2.4.6. OTA Analysis Laboratory

The construction of an OTA analysis laboratory by UCDA in Uganda, which is the only one in East and Central Africa, has created an opportunity for Uganda to influence the way coffee will be marketed. The credibility of the laboratory will depend on how it is managed, the way the samples are determined, the quality of services provided and the policy and regulatory framework under which the laboratory operates.

UCDA is consulting widely with major potential users of the laboratory to reach agreement on the issues mentioned above and once there is a consensus, the suggestions of users and industry will be taken into account. The main challenge is how the laboratory may become a marketing tool for coffee from the region and the issues of traceability that will help to identify hot spots where OTA may occur and the necessary steps taken to minimize the occurrence of OTA.

There will be operational challenges, such as what will happen to a sample which is found to have OTA above the required level. Will the coffee be destroyed? Who will be responsible for making sure the coffee is destroyed? Will there be systematic checks? Will the authorities forbid export of contaminated coffee even to countries were there is no OTA standard? What will be the role of the laboratory? Questions as to whether the laboratory should be operated as a commercial entity, and ownership, are critical for ensuring that it enjoys the trust and confidence of the main users of lab information.

4.2.5. Critical coffee issues under debate in the Ugandan coffee industry

The major issues being currently discussed in the Ugandan coffee industry are: the decline of quality and quantity, the spread of coffee wilt disease, the coffee replanting programme, the occurrence of OTA, the EU declaration setting the amount of OTA in coffee that will be allowed to enter the EU market, wet processing, and the effects of liberalization. Through these discussions, the coffee commodity chain is going through a major transformation, such as certification of mainstream coffee, the need for a common coffee code in coffee agenda being pushed by the major traders, exporters and roasters.

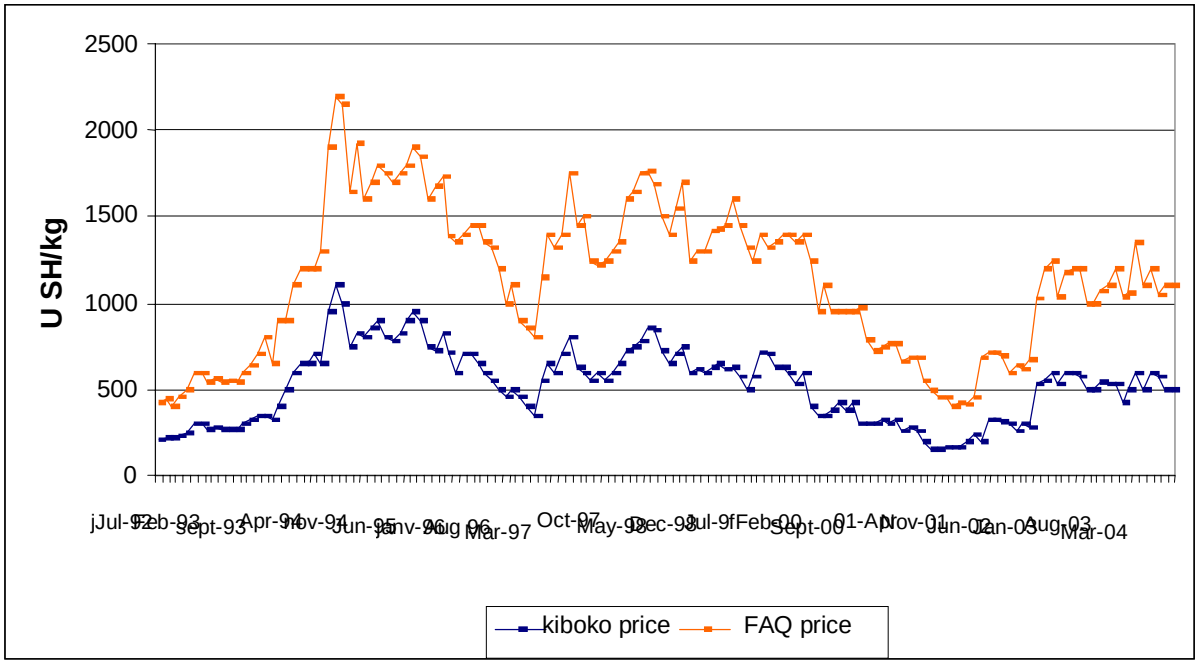
The dominant issues are the way coffee should be traded and the role of farmers in the liberalized economy.
There is also a determination of Government to zone the agriculture sectors which will allow areas which have comparative advantage for coffee production to continue producing coffee more economically and profitably. This information is in accordance with the National Agricultural Advisory Services (NAADS) strategy, for which the idea of coffee zoning came about when coffee from other producing areas, such as Okoro district in Uganda, was mixed with coffee of better quality produced in the Mount Elgon region.
There is more agreement among the major players that farmers were left out during liberalization and that they must be considered for a greater role.
The government is trying to revive the cooperative movement which played a major role in the development of the coffee industry in the past. There are still some challenges, such as the issue of funding, who should do what in the sector, and what incentives there should be. These discussions, and many other initiatives, will prevail in the industry for some time.

4.2.6. Coffee price trends

Declining prices

Robusta coffee prices in Uganda rose after liberalization, in 1993 and 1994, followed by two periods of decline: 1995-96 and 1999-2001. Prices then rose slightly and have stabilized at around Sh 500/kg for kiboko (price paid to farmer) since November 2002.

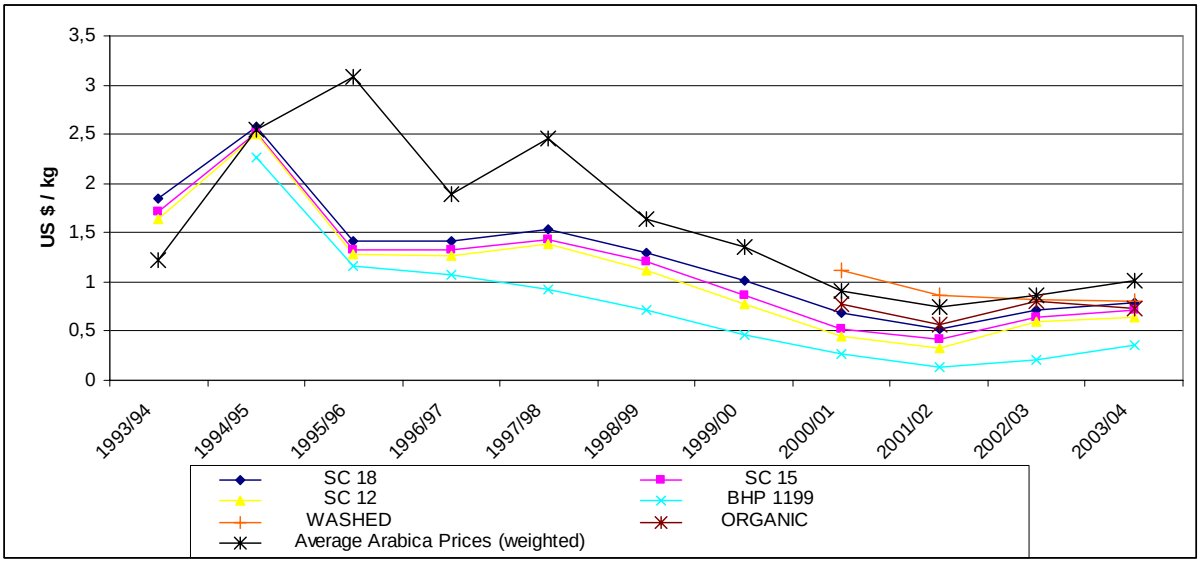
Graph 5: Average monthly prices paid to farmers (Robusta kiboko) and to processors (Robusta FAQ) in Uganda from 1992 to 2004.



Source: UCDA

The share of the export price returning to the farmer has varied between 65 and 70% since 1999. However, the prices for Ugandan coffee shrank by half between the 1994-96 and 2000-04 periods. The Robusta "screen 18" price fell from $ 1.84/kg (green coffee) in 1993/95 to $0.79 in 2003/04. "Screen 15" grade fell from $ 1.71 to $ 0.77 over the same period.

Graph 6: Prices for Ugandan Robusta coffees by grade, and for Arabica



Source: UCDA

Premium on the international market

The prices for Ugandan coffee depend on coffee price trends on the international market. Ugandan Robusta, given its particular characteristics, benefits from a quality premium on the London futures market compared to Robusta coffees of other origins. Robusta coffee is important on the world market since it is supplied in large volumes, and because of its neutral flavour. Ugandan Robusta coffee is considered to be one of the best.

Volatility and risk

The monthly variation in the nominal price was 37% over the 1990-97 period and 43% over the 1998-2000 period (Daviron and Ponté, 2005). This high price volatility is linked to abolition of the price stabilization mechanisms, but also to an increase in trade on the futures markets. The quantity of coffee traded on the futures markets increased from 4 times that traded on the spot markets in 1980 to 11 at the beginning of the 1990s (Dijk et al. 1998, quoted by Daviron and Ponté, 2005). The futures markets enable operators to fix prices before coffee delivery and to protect themselves from the risk of price volatility. However, the increase in price volatility affects operators who do not have access to instruments to protect themselves from risk (farmers and local traders in producing countries), (Gilbers 1996, quoted by Daviron and Ponté, 2005).
International traders who have remained in the market have had to protect themselves from the risk through operations on the futures markets. Most of the local exporters have had to form an alliance with international traders or disappear. But farmers and local traders do not have those options of consolidating their activity to protect them from risk. Likewise, their cooperatives have trouble competing with companies that are associated with international traders.

4.3. The mainstream coffee chain (Masaka – Kampala case)

In this section, we shall deal with the organization of the local standard coffee marketing chain. Most of the results presented came from our surveys.

4.3.1. Typology of stakeholders

4.3.1.1. Traders

A distinction was made between traders by the type of coffee they traded (kiboko or FAQ), but also by the volumes they were capable of dealing with, hence their capital. However, they could not really be distinguished in relation to their position in the commodity chain, insofar as they used numerous possibilities.

Characteristics of the traders interviewed:
The majority (14 out of the 17 traders) were also coffee producers (including for some FAQ traders).
The 17 traders began their activity between 1992 and 2002 (they had 6 years' experience on average). They therefore all began their activity after the liberalization period in 1991.
They had a diversified activity. Apart from producing and marketing coffee, they grew food crops, retailed consumer products, etc.

Typology:
Trade in one type of coffee could not be associated with a particular type of stakeholder. Farmers might hull their coffee themselves and sell it to traders or to exporters' middlemen. The traders too were often coffee producers. Exporters, such as Ibero or Kawacom, with support from international organizations, were involved in projects that brought them closer to producers.

The coffee traded could have different origins. Table 6 associates each type of coffee to a type of supplier and client. The numbers indicate a hierarchy linked to the answers given by the traders interviewed.

Table 6

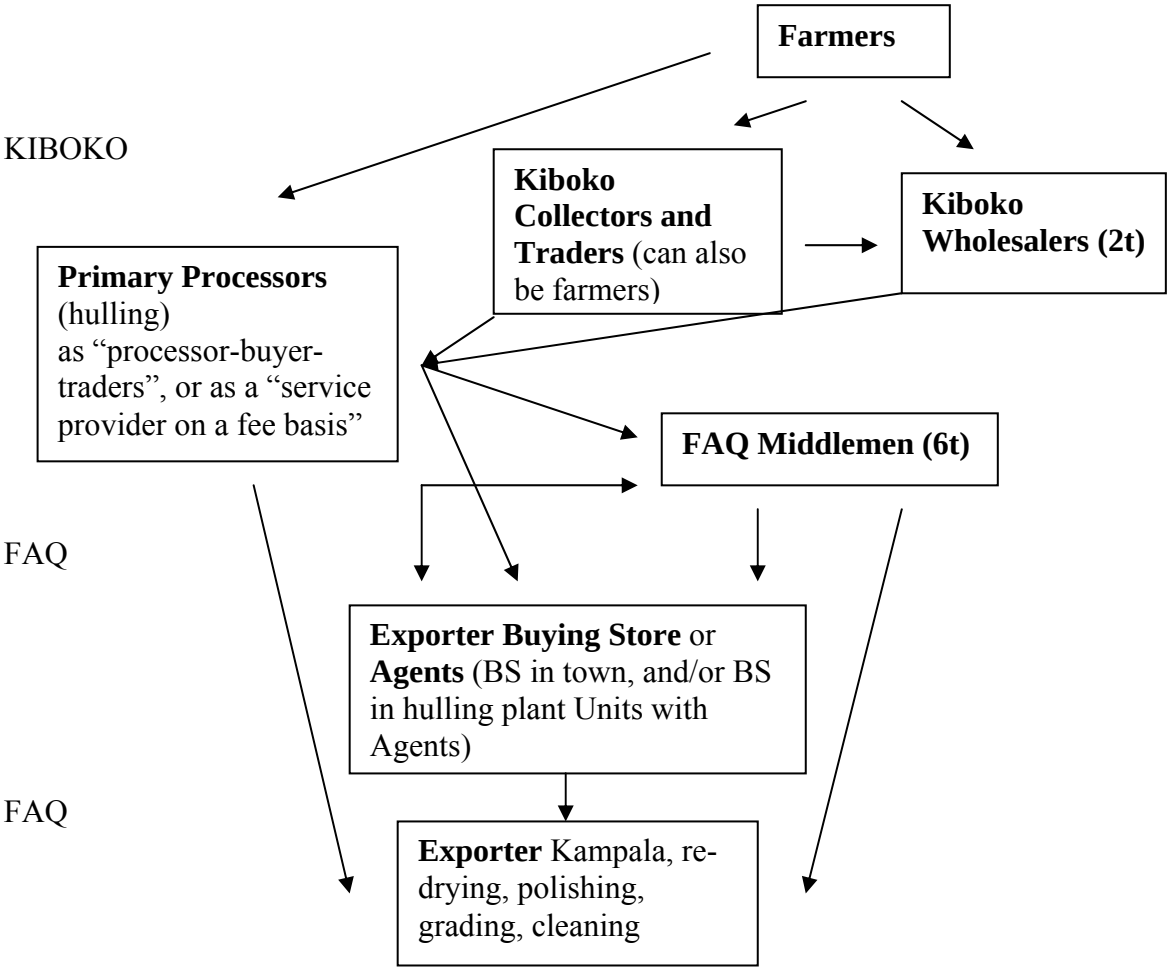
Type of coffee	Supplier	Client
Fresh cherry	1. Farmer 2. Ddebeman	
Semi dried	1. Farmer 2. Ddebeman 3. Kiboko trader	
Kiboko	1. Ddebeman 2. Kiboko trader/farmer	1. Kiboko trader 2. Hulling factory 3. Exporter's middlemen
FAQ	1. Kiboko trader 2. Ddebeman / FAQ trader 3. Farmer	1. Exporter 2. FAQ trader 3. Hulling factory

Source: Data from trader surveys (2004)

Fresh cherries were mostly sold by farmers. In general, on that level, only small traders (Ddebeman), middlemen for other traders, and farmers-traders were involved.
"Semi-dried", which is coffee in the process of being dried, was supplied by farmers, small traders and kiboko traders. This was the intermediate form between fresh cherry and kiboko.
According to farmers and traders, fresh cherry and semi-dried sales were the types of coffee that earned them least.

Traders who bought fresh cherries or semi-dried, dried the coffee then sold it on as kiboko, or as FAQ after hulling. Kiboko was bought by small traders (Ddebeman) from farmers and sold on either to kiboko traders or to hulling factories. The kiboko traders sold on kiboko or FAQ after hulling. The factories hulled coffee they had purchased and sold on FAQ. FAQ was sold to FAQ traders, to the middlemen/employees of exporters, or directly to exporters.
A small trader or a farmer might sell FAQ directly to the hulling factories, to FAQ traders, or to exporters via their middlemen or employees.
In general, exporters or their agents only bought FAQ and some traders and hulling factories were specialized in buying and selling FAQ only.

Figure 4: Commodity chain organization



(A kiboko trader is also called a Ddebeman[2]).

The 15 traders interviewed in the mainstream chain were divided up as follows:

- Purchase of cherries, semi-dried or kiboko and sale of kiboko (1)
- Purchase of cherries, semi-dried or kiboko and sale of FAQ (1)
- Purchase of cherries and sale of FAQ (1)
- Purchase of semi-dried or kiboko and sale of FAQ (1)
- Purchase of kiboko and sale of FAQ (5)
- Purchase and sale of FAQ (5)

Only 1 trader resold kiboko, the other 14 sold FAQ: either they bought FAQ, or they bought kiboko and carried out hulling via a mill acting as service provider.

[2] *Ddebeman: person who buys kiboko coffee in small quantities from farmers and can either sell it to middlemen or can process it into FAQ and sell directly to exporters or their agents. The processor identifies him/her from the quantity of coffee he/she processes at a time (normally less than 5 bags) using a bicycle, and the frequency of hulling* (UCDA, from Kizito, 1995 and Cromwell et al., 1992).

Of the 14 FAQ traders, some began their activity by buying cherries and/or kiboko in villages to resell kiboko, and were gradually able to gain access to larger volumes and enter into the hulling process to resell FAQ. In general, the traders considered FAQ trading to be more worthwhile than kiboko, and as soon as they had sufficient capital available to buy large volumes, they switched to FAQ trading .

Labour:
Of the 14 FAQ traders, 9 hired labour to load and unload the coffee or to collect coffee on their behalf. They were remunerated on a commission basis. The middlemen working for a FAQ trader had capital provided by the trader and received purchase price instructions. The middlemen thus tried to buy at a price lower than that fixed by the trader, so as to increase their remuneration. This type of remuneration contributed to downward pressures on the prices paid to farmers.

Volumes traded:
The volumes purchased by the traders depended: on their capital, the current price of coffee on the market, coffee availability, the storage space they had available.
The exporters' buying centres hased in Masaka obtained their supplies from large FAQ traders able to deliver a minimum quantity of +/- 6 tonnes per transaction. Those FAQ traders obtained their supplies from traders who delivered 1 to 2 tonnes. Some hullers who bought kiboko based their deliveries on minimum quantities (10-20 bags). A kiboko middleman in the villages who was unable to acquire such a quantity had to sell to another kiboko trader with a larger capacity who grouped together sufficient volumes.
The different middlemen therefore played a major role of grouping together coffee supplies. It was too expensive for an exporter to obtain supplies directly from farmers, which involved too many transactions given the small quantities sold each time.

Rapidity between two transactions:
The rapid fluctuation in market prices made "FAQ buying-selling" operations less risky than "kiboko buying-FAQ selling" operations as the time lapse between buying and selling could be rapid for hulled coffee, whereas buying kiboko meant taking the drying and hulling stages into account, during which the price might vary. The "market" price varied over the space of a day, usually with one price in the morning and another in the afternoon.

4.3.1.2. Hullers

9 hulling factories were visited.

The hulling factories operated in several possible ways:
- kiboko hulling as a service provider
- kiboko purchasing on their own behalf, hulling and FAQ selling
- FAQ purchasing and FAQ selling without any hulling operation (trade).

They might combine these different operations.

The clients were farmers, farmer associations or traders. The staff was paid according to volume, depending on the quantities of coffee hulled: Sh 2.5/kg. The cost of hulling was

Sh 25/kg of FAQ. The factories had drying areas. Kiboko, but also FAQ, was re-dried, on plastic sheets over cemented areas, or on bare ground.

The factories were not very particular about the quality of the coffee they hulled, due to competition. The moisture content was checked in a sensory manner, or with a moisture meter. The factories sometimes agreed to hull with up to 17-18% moisture.

The coffee could be dried after hulling, in some cases on bare ground. The operators interviewed stated that in order to reduce the time between two transactions, it was better to dry hulled coffee, since it was quicker to dry a batch of hulled coffee than a batch of kiboko. Price volatility and the lack of guarantees against price variations led to transactions being speeded up and to trade in poorly dried coffee before hulling.

4.3.2. Constraints and strategies

The main two constraints raised by the traders interviewed, all categories combined, were:

- Price fluctuations (risk)
- Lack of capital and difficult access to credit (prefunding) notably to gain access to larger volumes.

Among the strategies noted, there was:

- Credit granted by kiboko buyers to farmers to guarantee a certain volume before the season
- Price negotiation based on discount formulas
- The speed to be respected between buying and selling a batch of coffee.

4.3.3. Price negotiation, discount formulas and premiums

Buying and selling prices varied depending on the players, their negotiating power, the type of coffee and the period of the season when transactions took place.

Since price liberalization and an end to systems fixing prices a the beginning of the season, there no longer existed a minimum price fixed by the State. Traders, hulling factories and exporters used different methods to fix buying and selling prices.

Buying and selling prices were subject to daily or weekly variations.

It was the buyers who fixed their price basis and discount formula, at all stages of the commodity chain.
The buying price of a trader depended on several factors:

- The average price prevailing on the day of purchase for each type of coffee. Most farmers, traders and hullers stated that they referred to the "market price" during transactions. That market price, or price of the day, could be established according to the indicative price passed on by UCDA from Kampala. It might also be an average price declared after enquiring among the main coffee buyers, notably exporters. FAQ traders regularly acquired price information by SMS text messages from exporters or FAQ buyers. However, that price would be modulated by reductions linked to coffee moisture content and the number of defects.

- The expected sale price for a batch of coffee purchased.
- Quality discounts or premiums.

Traders, hulling factories or exporters all frequently used a method during transactions designed to deduct a quantity of coffee corresponding to a moisture content percentage and a number of defects exceeding the standard. The basic principle was simple and varied depending on the operator, the level at which the transaction took place, and the type of coffee involved: Kiboko, FAQ, etc. The aim was to protect against a loss in weight that would occur once the coffee was completely dried and when all the impurities had been removed.

Price discounts

Discount formula applied to FAQ: The deduction is based on weight, mainly by the m.c. level:

(Current m.c. as a % - 13%) x n = % of kilo to be deducted from sold weight quantity.

Where:

"n" varied with the m.c. level (risk of weight loss between buying and selling increases with a higher m.c.).

13% was the maximum m.c. for export coffee, according to the regulation law.

E.g.:

For a coffee sold at a 16% mc, the formula was: (16-13) x **2** = 6% deduction from the weight of coffee supplied in kilograms. So for 1 000 kg supplied, only 940 kg were paid for.

For a coffee sold at an 18% m.c., the formula was: (18-13) x **3** = 15% deduction from the weight of coffee supplied in kilograms.

For a coffee sold at a 14.5% m.c., the formula was: (14.5-13) x **1** = 1.5% deduction from the weight of coffee supplied in kilograms.

In fact, "n" also varied according to negotiations between buyers and sellers and depending on the competition. When different buyers offered the same FAQ price to a seller, the seller negotiated on the "discount formula" (n) to decide to whom he would sell his coffee.

The "percentage" of defects was integrated into the formula, adding a 1 or 2% kilo deduction from total weight for high levels of defects. But some buyers explained that this "percentage of defects" now tended to no longer be integrated in the discount formula because of competition between buyers.

Sometimes the formula varied taking 13.5 rather than 13 as the reference.

E.g. : (Current m.c. as a % - **13.5** %) x 2 = % of kilo to be deducted from sold weight quantity.

Buyers also sometimes quite simply based themselves on a conversion table they had created. E.g., traders when buying FAQ:

if the coffee was at 18%, a deduction of 10 to 12 kg for 100 kg of coffee.

if the coffee was at 16%, a deduction of 6 to 8 kg for 100 kg of coffee.

if the coffee was at 15%, a deduction of 4 kg for 100 kg of coffee.

if the coffee was at 14%, a deduction of 2 kg for 100 kg of coffee.

So, before export, the price was not linked to quality attributes such as screen or cup quality. All stakeholders agreed that an adulteration and reduction in coffee quality could be seen (mix BHP, stone, husk, etc., and high m.c.) and attributed that to competition.

Discount formula for kiboko:
A deduction could be made from the price directly:

> if 18% m.c. kiboko was bought for Sh 560/kg, a processor bought 16% m.c. kiboko for Sh 600/kg and 14%m.c. kiboko for Sh 620/kg.

The discount could also be made in kilos, even between farmers and collectors:

> In 1 village interviewed: dried (14 days) and semi-dried (10 days) cherries were apparently the same price, but a buyer (farmer collector) applied a deduction of 5 kg per 80-kg bag to the farmer for semi–dried cherries.
> Another buyer stated that he deducted between 7 and 10 kg from 100 kg if the kiboko had an 18% m.c., and 5 kg from 100 kg for a 16% kiboko.

The discount could also be applied by a formula:

> (Current m.c. as a % - 13%) x n = % of kilo to be deducted from sold weight quantity.

Premium prices

Payment of a premium for coffee quality was rare, be it by exporters or by traders. However, some traders, hullers and exporter agents granted a premium:

- To encourage coffee deliveries,
- To ensure supplier loyalty,
- Depending on the context: period of competition or not,
- Depending on quality: when moisture was good, when the coffee was clean and/or looked good.

The premium could be of two types:

- Monetary, i.e. additional money added to the sum paid per kilogram of coffee.
- If not monetary, it consisted in reducing the quantity of coffee that would have been deducted for moisture content or defects.

For FAQ coffee, one processor in Masaka might give a premium price for screen 18 = +Sh 20/kg FAQ. This could only be given for FAQ, not for kiboko (not visible in kiboko). So there did not really exist a high screen incentive for farmers selling kiboko (incentive for pruning coffee, etc.).

For FAQ, one processor in Masaka might buy at 13% m.c. In that case he did not apply the discount formula and gave a premium price of Sh 20/FAQ kg.

Thus, generally, transactions were dominated by discount systems applied to compensate for weight loss and an excessive number of defects.
Quality premiums were rare, and criteria other than moisture content or number of defects were rarely reflected in premiums for FAQ, never for kiboko.

Lastly, it needs to be pointed out that the discount formulas used for weight loss were disadvantageous to sellers in reality: the formula deducted slightly more weight than the true

weight loss. It tended to increase the margin of the buyer. It was imposed by buyers seeking to protect themselves from risk and/or to increase a margin that was already very low at the outset.

4.3.4 Volume or quality in this competitive market?

Coffee trading was dominated by competition based on volumes. Coffee quality was not a criterion that entered into the transaction, apart from the degree of drying, which gave rise to a discount for weight loss and the number of defects.

All coffee grades circulated, especially when coffee became scarcer and competition between traders for coffee purchases increased. Such competition largely explained purchases of coffee with a high moisture content.

The maximum coffee moisture content was defined by law (13% to 14% for hulling) and controlled by UCDA, though rarely applied.
Traders bought and sold coffee at moisture contents declared to be between 13 and 16%, including for hulled coffee, but the discount formula allowed for up to 18% moisture.
In July 2004, UCDA seized batches of hulled coffee in Masaka region heading for Kampala with moisture contents over 15%, notably between 16 and 17%. Some of those batches came from the buying centres of exporting companies.
During a meeting organized by the Masaka Task force following the seizure of the coffee batches, the exporters present explained that:

- it was the type of coffee circulating in their trade with FAQ sellers,
- the coffee could be dried in Kampala to 13% in mechanical dryers installed for the purpose,
- in terms of demand on the international market, there was no difference between a coffee dried to 13% before hulling and a coffee dried later to 13%, after hulling (no premium on the market). These practices were therefore apparently not prejudicial to Ugandan Robusta, which continued to benefit from the highest quality premium on the London market. Lastly, they pointed out that the current market structure led them to deal with purchases in volume terms (discussions with exporters).

The other stakeholders attending the meeting (local authorities, farmers, UCDA) specified that selling inadequately dry coffee was encouraged by exporting buyers (buying as quickly as possible, processing large quantities, no rejection of coffee depending on moisture content standards, although measurable). They feared that trading in inadequately dried coffee harmed the medium-term reputation of Ugandan coffee, which could lose its quality premium on the London market.

This race for volume and the deterioration of quality were explained by different factors:

a) Pressure on margins:

Small traders (Dbebeman) received money from other traders to buy coffee in villages. The buying prices were fixed in advance by traders who commissioned the small traders. When coffee prices were low, the small traders reduced the prices paid to farmers, in order to earn a profit margin. In this system, the trader's concern was more one of quantity rather than quality.

It was sometimes in the buyers' interests to buy coffee with a moisture content over 15%, enabling them to apply discounts. The discount formulas described earlier led to a percentage per kilo of coffee being deducted that was usually greater than the true calculated weight loss. The discount, intended to compensate for weight loss, also enabled buyers to add value to their margins which they had difficulty guaranteeing.

Net margins were low, for both middlemen and exporters; profitability was linked to the ability to deal in large volumes to earn sufficient income or a sufficient net profit.

b) Lack of incentives

Hulled coffee was re-dried by exporters equipped with large-capacity mechanical dryers at their factories in Kampala. In all cases, the coffee could therefore be exported at moisture content authorized by the legislation.

No operator benefited from a quality premium. The moisture rate was not a quality criterion leading to a difference in price in terms of a quality premium.

c) Price volatility

Buyers or clients exerted considerable pressure due to strong price volatility, making the achievable profit margin uncertain[3]. Price variation at least once a day led to the time between two transactions for a trader being reduced as much as possible (to the detriment of quality and of coffee drying).

d) Massive competition when the market was opened up

Liberalization of the coffee sector led to the arrival of new operators and of massive competition between buyers, notably exporters, to establish their share of the Ugandan coffee market (Ponté, 2001). This encouraged all operators in the chain to buy rapidly, without paying attention to quality control. The stakeholders in the commodity chain acknowledged that this had led to a substantial drop in quality to the increasingly frequent trade in cherries and in insufficiently dried FAQ (Ponté, 2001 and our surveys).

Competition between operators led to a concentration phenomenon which was based on the ability to deal in volume.

e) Pressure on capital:

Banks that granted credit also exerted pressure to speed up transactions.

These parameters had consequences for:

- Risk in the activity (net losses between buying and selling a batch). To protect against that, traders tended to protect themselves by reducing the buying price for coffee batches, by manipulating: the price, the discount formula, weight measurement.

- Coffee quality. Traders had to proceed with the physical transaction within a few hours at the latest following price negotiation, in order to benefit from the negotiated price. Thus, a trader who had a prior agreement on a price with a FAQ buyer (often

[3] For example, a price fixed in the morning at Sh 1050/kg might fall to Sh 1000/kg in the afternoon.

by telephone) had to buy in the following hours the FAQ or kiboko available in the hulling factories and have it hulled very quickly, even if it were not dry enough, so as to make the physical transaction on the same day as the negotiation.

- Coffee processing in large quantities, with a view to ensuring volume, also led to the mixing of different coffee origins bought from farmers in bags traded right along the commodity chain. Batch traceability was not feasible due to these mixed origins.

Such developments are not specific to Uganda: in other countries, the tendency in the post-ICA period (after 1989) was homogenization towards low coffee qualities, especially for Robusta: bulk exports, containers without bags (Daviron and Ponté, 2005).

4.3.5. Consequences for OTA

Stakeholder strategies were closely linked to a market centred on volume and the need to deal in large quantities of coffee.

Preventing OTA contamination came into contradiction with these current strategies based on volume. Exporters, as much as middlemen traders, highlighted the apparent paradox between the demand from European buyers, which mirrored that of the exporters geared towards volume even if quality suffered, and European regulations fixing an OTA standard which required an improvement in coffee quality.

Measuring OTA contamination in coffee requires equipment and it is expensive; the OTA standard was therefore likely to entail extra costs throughout the commodity chain (inspection of procedures, measurement on the product, waiting costs, cost of rejects, etc.).

Moreover, it was not possible at the moment to guarantee non-contamination through batch traceability.

In such a situation, indirect (proxy) indicators of contamination risks could be used to reduce those inspection costs throughout the commodity chain.
On-station research has made it possible to determine whether OTA contamination risks are linked to the time lapse between cherry harvesting and drying on farms, to the equipment used, or to other indicators.
It notably indicated that the contamination rate increased over time, including when the coffee was held by operators other than farmers, for any coffee not dried to 13%.

Did operators in the commodity chain have inexpensive sensory means of determining drying quality on the product, identify whether hulled coffee had been dried to 13% on the farm, or dried later after hulling, or after transiting via different traders, etc?

It turned out:

- Regarding the time spent between the harvest and the first day of cherry drying on the farm: that some traders acknowledged that they could sensorily detect whether kiboko had been dried directly after harvesting or after waiting for a few days, based on the colour (white if drying delayed after harvesting).
- Regarding the moment of drying to 13%, before hulling or after hilling: that the cup taste could determine whether the coffee had been dried in kiboko form or had been

re-dried later after hulling. But this test was only carried out downstream in the commodity chain.

In general, there existed few indicators linked to coffee quality evaluation in terms of contamination that could be quantified and serve as proxies and as a basis for pricing.

4.4. Quality Coffee Chains (for standard robusta)

In this section, we shall be considering two sub-segments of the mainstream commodity chain, but which bring into play strategies intended to supply quality coffee, notably at acceptable moisture rates.

4.4.1. USAID – Uganda initiative

The United States Agency for International Development (USAID) approved four projects namely, COMPETE, SPEED, APEP and PRIME West all aiming to empower farmers to increase productivity and improve quality. The farmer organizational development part of the COMPETE, SPEED, and APEP was implemented by IBERO Coffee Exporters, which is a subsidiary of Neumann Kaffee Gruppe. Mount Rwenzory Coffee Company has been working with Prime West to encourage the formation of farmer associations/groups through a lead farmer for production and selling through the Company.

2 000 farms are involved in Masaka district. This organization covers specific actions and costs: negotiation/information for farmers, training sessions, supplying tarpaulins to farmers, direct supply from farmers to Ibero (no middlemen, direct chain), control/advice (40 extension markers, statistical data collection of farm characteristics), collection by truck, from villages by the export company, organization of hulling by the exporter (hiring of equipment in Masaka district), etc.

We visited farmers in Masaka who were supported by USAID/Uganda through IBERO. The farmers were given training in quality enhancement, drying materials (tarpaulins) and encouraged to sell their coffee to IBERO who were paying the farmer a premium price of an average of Sh 600-650 per kg compared to the prevailing farm gate price of 500 – 550 per kg. The IBERO quality requirements were basically that the coffee should be picked red and then dried on a tarpaulin although most of the farmers did not have enough tarpaulins to dry their coffee. It was observed that farmers dried the red cherry on a tarpaulin for 1-3 days and transferred the coffee to the bare ground to provide space for new coffee cherries picked. Another requirement was that the coffee should be dried to the right moisture content of 12.5% when it was ready for sale. Although IBERO was paying a premium price of 650, the price was also determined by market prices. For example, the prices paid by IBERO ranged between 500, 550, 600 and 650 but the prices were much higher than the ongoing market price. When the average price of coffee was 500, IBERO paid Sh 550-600 and increased the price as the market price increased, or decreased the price as market prices decreased. The farmers were therefore earning a Sh 50 – 150 “premium” price for their dried “kiboko” coffee.

The volume involved in this project was very small compared to other export volumes for this company.

Farmers felt they were still price-takers and that they had never had an opportunity to negotiate the price of their coffee, as they were not involved in the process of setting the price which IBERO was paying them. Some complained that the premium price paid was not adequate to cover the additional cost of fulfilling the required conditions (additional cost of picking, drying, etc.).

The price differential may have partly corresponded to the profit margins of middlemen between farmers and exporters, in which case it was not really a question of quality premiums. That said, it was difficult to assess the additional costs generated by direct buying from farmers, and to find out who funded them (Subsidies or Company).

Another observation was that traders were competing and matching the price of IBERO, but at the same time deducting up to 5 kg per bag due to higher moisture content, despite the fact that the farmers were convinced that they had adequately dried their coffee. The traders announced a price equal to the price that IBERO would be paying. When farmers brought their coffee to the trader, the trader deducted for higher moisture in the coffee. Since the traders used their own moisture meters, farmers had little evidence to support the level of moisture content they perceived for their coffee. The traders also tampered with the weighing scales and paid the price of 1 kg of coffee for more than 1 kg. For example, the trader calibrated the weighing scale to show 1.25 kg as one kg which meant that for each kilo of coffee the trader bought, the trader got an additional 0.25 kg free. These traders sometimes also mixed the coffee with foreign bodies and black beans to the acceptable level of 5%. All in all, traders were making more profit from buying coffee "under IBERO" and paying the "IBERO prices" than the ordinary coffee which was selling for a lower price than that paid by IBERO. Another advantage for the traders was that they could buy any time throughout the week, while IBERO had a specific market day.

Therefore these types of projects, which worked in a similar mode supported by USAID, had their problems but had managed to introduce the concept of farmer groups, associations which can manage and control quality given an opportunity.

Another merit was also to provide incentives to improve coffee quality through good drying at the producer point, which is important to reduce the risk of OTA contamination.

However, according to IBERO, this coffee still did not benefit from a premium price on the international market. If this is confirmed, such an initiative would not be viable without subsidies.

4.4.2. UNEX. Union Export Services Ltd. Kampala

Fair Trade

UNEX is a private company which concentrates on the export of fair trade coffee procured from farmers registered with fair trade.

Fair trade coffee offers a fixed price averaging $ 1.26 per kg FOB Mombasa Kenya, which is much higher than the farmgate price of $ 0.30 per kg of dry kiboko or $ 0.63 per kg of green coffee. The above standard does not emphasize quality as a parameter on which price is determined, although it is normally a practice that fair trade registered farmers will produce

high quality due to the higher price they earn. Therefore, UNEX could not be used as a chain through which quality only is emphasised and used to reward farmers.

Mainstream coffee
Since the market for Fair Trade coffees is limited, UNEX also buys and sells mainstream coffees. Most of the UNEX members are a few individuals and primary cooperative societies of selected members who still believe in quality, good looking coffee that is effectively processed according to the laid-down procedures. These members still sell their coffee through UNEX

UNEX strategy is to buy coffee as directly as possible from farmers/farmer cooperatives, "near to the source". One of the objectives is to reduce the risk of quality fraud (mainly moisture content) and increase quality (better control of harvesting and post harvesting practices, inspection after picking). UNEX buys up to 15% m.c. and deducts 2% of weight per point to reach 13% (export m.c.).
UNEX, as a local company, sells to medium international buyers and small roasters and tries to diversify the number of its buyers as much as possible (so as not to be dependent upon one buyer).
One of the consequences of those quality buying strategies is low volumes: UNEX is 14th among the 29 exporting companies licensed in 2002, with a 1.7% share of the coffee export market.

Since this quality robusta has a reduced market (low incentives from international buyers), this initiative would not be possible to develop at present for the mainstream market.

4.5. Conclusion

New structuring of the coffee sector in producing countries is leading to the homogenization of coffee batches of average standard quality. Local traders need to carry out their transactions rapidly or minimize their costs on capital. They cannot spend too much time assessing the quality of batches. Farmers have no incentive to produce high quality coffee. At the moment, all coffee grades are mixed; it is the exporter who grades coffees and can derive added value from them, but farmers do not receive any premiums. Daviron and Ponté (2005) remind us that coffee quality has decreased in several producing countries and that for some coffee origins this has led to a discount on the international market and a loss of reputation for those origins.

Application of an OTA standard runs counter to the current functioning in the commodity chain, based on volume and rapid transactions. These strategies work against drying quality and maintain high moisture rates in coffee up to its arrival at the factories in Kampala.

Given the asymmetry of negotiating power between stakeholders upstream and those downstream, farmers are likely to bear the brunt of the cost linked to the standard, whether this involves certification of farmer practices (cost of investment to fall into line with standards, and cost of certification) or whether it involves a more fluid system in which the costs borne by the other operators (inspection cost, waiting costs, rejected batches) are passed on upstream by discount systems. Moreover, it is more likely that in the second option, the standard would lead to a discount system for coffees identified as being of poor quality rather than a system of premiums for good quality.

Regulation of the sector:
In the current situation, where the market does not give any price incentive for certain quality attributes, and when those attributes are considered to be relevant for upholding the market shares of the country (in competition with other producing countries), in principle the State can play a role whereby it regulates and controls those attributes, through an imposed quality standard system.
According to Daviron and Ponté (2005, p 117), "where quality is important it has become clearer that preserving quality and reputation is more difficult, if not impossible, in deregulated markets (Tanzania). The experiences of partly liberalized markets (Kenya, Ethiopia) suggest that appropriate regulation can maintain quality levels and reputation, and can also ensure that "local" actors have more control over the meaning and valuation of their coffee".
Weak regulations with quality enforcement on a farm level and throughout the chain by self-regulation would not address the problem of quality. Despite the fact that there is a licensing and inspection mechanism for export coffee, poor quality coffee goes through.

Traceability among farmers through added value integrated into the farm:
Since there is no clear cause of OTA occurrence, the viable option is management and clear ownership and reward for assuming management and ownership functions. OTA occurrence will be better managed if farmers are empowered, own their coffee from the farm, pick, process, grade and market their coffees.
What is crucial is the identification of the hot spots where contamination and OTA may occur. This will be possible if there is effective traceability of the coffee from the coffee tree to the cup.
Traceability would be possible if farmers assume as many functions as possible along the chain, respecting known international quality parameter indicators. The known quality parameter indicators are the moisture content measured using the farmer's own moisture meter, cleanness from other defects and foreign bodies, the history of the coffee as to how it was handled from the tree to the point of sale, whether adequate care was taken to ensure that the coffee was not exposed to any risk of contamination and verified by OTA or other analysis such as cup quality. Farmers are aware of value when they can access market and price information, which they can use as a basis for price negotiation.
Consequently, farmer empowerment as explained above would be a solution for managing contamination which will minimize OTA occurrence.

Distribution of value:
Downward pressure on prices is detrimental to the establishment of practices that reduce the risk of contamination. Such downward pressure is worsened by a transfer of margins from producing countries to importing countries. A devaluation of farmer margins greatly reduces the possibilities of producing quality coffee.
As farmers earn more money they would be able to invest in the farm and processing, producing and processing high quality coffee which would also fetch higher prices on the consumer market. In this respect, farmers would be earning money on the forward linkages due to improved quality, access to market and price information, and price bargaining skills.

Adding value through demand:
Current commodity chains in which strict quality control procedures exist and are respected could gain new market shares. If the standard makes it possible to develop demand for coffees whose quality is remunerated from the beginning of the process, exporters who bank on quality could increase their market shares.

5. Feasibility of technologies for coffee quality improvement – traditional drying, wet processing and improved drying methods

Different technologies have been tested by the project teams to reduce the risk of OTA contamination. This socio-economic study focuses on acceptability for farmers[4]. In some cases the project identified initiatives being promoted nationally within the framework of OTA prevention and quality improvement programmes and requested a socio-economic study to evaluate their feasibility.

5.1. Technologies investigated by the Project teams

The technologies investigated by the project are the development of post-harvest wet processing, and the use of solar dryers for dry processing.

Wet Processing:

- Project launched by the government and local companies (16 industrial units installed, including the Kalungu unit).

- Advantages/limitations presented by the project initiators:

- Wet processing reduces contamination risks.
- Wet processing improves the flavour quality of robusta coffee. According to the 2003 UCDA report, 100% of wet processed robusta passed the "cup tasting".
- Wet processed coffee fetches a higher price than other robusta grades on the world makets.

- The cost of buying a unit can be prohibitive, be it for farmers or for some farmer associations.

For large scale unit organization:
- It is not necessarily in the interest of farmers to sell fresh cherries. This raises a problem of fresh cherry supplies for wet processing.
- Wet processing requires red cherry supplies, hence selective picking has to be carried out in the field. This means additional costs for farmers in terms of work and labour costs, without any guarantee of getting a better sale price for the coffee. This means

[4] Comment: Solar dryers that were to be tested on pilot farms by the technical teams at the time of this study could not be tested. The data are therefore purely speculative.

also to take into consideration hygienic parameters in logistics of collecting fresh cherries.
- Infrastructures and means of transport can limit supplies from farmers, especially those in remote places.
- The cherries harvested have to be processed very quickly (8-10 h), which can raise logistics problems.

Solar Dryers:

- Advantages/limitations presented by the project initiators:

- Solar energy is available, unlimited and does not pollute.
- Coffee dries more rapidly than with traditional technologies, and uniformly, which can play a role in maintaining product quality at the farmgate.
- Cherries are dried in a controlled environment and there is less risk of contamination.

- When the weather is cloudy, they are not very useful. Heat can also damage the cherries. Close surveillance is therefore required to avoid that. For instance, when the temperature increases, it must be possible to evacuate excessively hot air, in order to maintain a satisfactory ambient temperature.
- Drying is more rapid (around 11 days), but there is very little difference between the drying time for solar dryers and for the traditional technique most widely used by farmers (bare soil).
- The cost of acquiring equipment can hold back farmers who do not have sufficient capital.

- Cost of the equipment

Detailed equipment costs can be found in annex 4. Solar dryers cost Sh 83 500 and Sh 273 000 depending on the model, for 6 to 8 m2 of drying area. The "greenhouse" costs Sh 1 498 250 for 30 m2 of drying area.

5.2. Farming Systems in Family Agriculture

The results shown here came from surveys on 30 farms in the Masaka region in July and August 2004 (see methodology).

1. Characteristics of the households in the sample

Half (16) of the sample had already exercised a professional activity other than agriculture. At the time, a third (11) of the farmers had a secondary activity. For 28 farmers, the agricultural activity was considered to be the main activity.

Secondary activities were building or masonry or trading activities (coffee trader, fishmonger, general trade).

The farmers who had had other professional activities in the past had been traders (14 out of 16): coffee trader, food vendor, business, etc.

Likewise, the spouse had a main agricultural activity, and in 2 cases a secondary activity (trader).

2. Diversified agricultural activities

The farms of coffee growers were diversified. All the farmers had at least one crop other than coffee. 22 farmers had at least 5 different crops.

Number of different crops grown on farms:

	Number of farms
At least 2 crops	30
At least 3 crops	28
At least 4 crops	26
At least 5 crops	22
At least 6 crops	16
At least 7 crops	10
At least 8 crops	5
At least 9 crops	2

After coffee, the most frequently grown crops on the farm were: banana, bean, maize, potato and cassava.

Number of farmers growing each crop:

Crop	Number of farms
Coffee	30
Banana	27
Bean	25
Maize	22
Potato	22
Cassava	21
Groundnut	8
Vanilla	3
Upland rice	2
Yam	2
Tobacco	1
Sorghum	1
Cowpea	1
Sugar	1
Soybean	1

Number of plots concerned by each crop (several crops possible in the same plot):

	Number of plots
Number of coffee plots	46.00
Number of banana plots	49.00

Number of bean plots	26.00
Number of maize plots	25.00
Number of vanilla plots	3.00
Number of groundnut plots	5.00
Number of **sweet potato** plots	18.00
Number of **cassava** plots	22.00
Number of sugarcane plots	1.00
Number of eucalyptus plots	2.00
Number of **clonal coffee plots**	29.00
Number of sorghum plots	1.00
Number of upland rice plots	1.00
Number of tobacco plots	1.00

Total = 207 plots (29 farms).

The farmers had between 1 and 3 plots containing coffee. Clonal coffee was quite frequently introduced: 16 farmers had "clonal coffee" on their farm, 27 farmers had old robusta.
Given the intercropping system, tree density on each farm varied and it was difficult to link the area of the coffee plot to coffee production in terms of yields/ha. On average, the farmers had 873 "old coffee" trees per farm (up to 3 500 trees maximum, but 10 farmers had fewer than 350 trees). In terms of clonal coffee, those farmers who had planted it had 848 trees on average (data obtained from 13 out of 16 farms) and up to 2 720 maximum. 8 of them had fewer than 500 trees.

For all coffees combined, the farmers had between 20 and 3 950 trees, breaking down as follows:

< 500 arbres: 7 farms
650 to 1300: 7 farms
1400 to 3950: 8 farms
No data: 7 farms

Cattle, goat and pig rearing were mostly intended for commercial use, whereas fowl rearing was usually for self-consumption (except for 3 large fowl rearing operations for commercial purposes and egg production).

Rearing activities:

Animals and Livestock	Number of farms concerned	Average livestock	Min - Max	Classes
Cattle	17	7 animals	3 to 30	0 animals = 13 farms 1 to 4 animals = 10 farms 5 to 30 animals = 7 farms
Goats	14	2.4 animals	1 to 5	
Pigs	18	2.9 animals	1 to 8	0 animals = 12 farms 1 to 3 animals = 10 farms 4 to 8 = 8 farms
Fowl	20		1 to 1 500	0 animals = 10 farms 1 to 10 animals = 16 farms 50 to 1 500 animals = 3 farms
Milk	7	2 480 litres/yr	235 to 5475 litres	

Hides	0			
Eggs	3			

Activities were therefore highly diversified.

3. Perceived advantages/disadvantages of the different crops

The two preferred crops, generally speaking, were coffee then banana.
For coffee, the main reasons mentioned were: the income provided, the provision of global or lump sum income, the "main source of income", provision of a sustainable income.
For banana, the reasons mentioned concerned food security in half the cases, and the fact that this crop combined food security and a source of income at the same time.

Perception of the different crops by the farmers
As the number of times the crop was mentioned by the farmers for each question (Which is your preferred crop? Which crop requires most labour time during production? etc.):

Questions:	Preferred crops	Requires most labour time during production	Requires most labour time for marketing	More risky	Demands highest skill levels	More profitable
Coffee	19	16	21	7	7	22
Banana	13	9	1	6	12	2
Bean	8	3		5	3	2
Maize	7	1	2	3		
Sorghum	1					
Cassava	1		1	1		
Potato		1		3		
Clonal coffee		1			1	
Vanilla			1	1	1	
Groundnut			1			
Upland rice				1	1	
Number of respondants	*27*	*27*	*27*	*27*	*25*	*26*

The crop perceived as being **"the most profitable"** was coffee. The reasons put forward were as follows: coffee makes it possible to pay schooling fees, or provides a substantial overall income, it is a non-perishable product, a cash crop that provides worthwhile income, given the inputs which can be low, and bulk sales are possible.

None of the 3 most frequently grown crops seemed to involve more **risk** than another. Coffee was presented as being risky with regard to price fluctuations and wilt desease; banana was presented as risky in relation to the perishable nature of the fruits and the fact that this crop required substantial investment in weeding and pruning to obtain sufficiently large bunches.

Banana required **a higher level of skills** than coffee, but **less labour time** (for production and marketing).
Banana was described as a crop that needed greater manuring, mulching, fertilising, detrashing and pest control skills.

Coffee was described as a crop that required more **marketing time** for the following reasons: need to dry and transport coffee (in some cases where farmers were committed to delivering), seeking the best prices, traders who are going to offer good prices, telephone calls, etc. in a context of buyer scarcity, substantial price fluctuations and low prices.

4. Crop dynamics

9 farmers stated that they had already felled or pulled up a plantation (1 to 2 crops). This involved: beans, groundnuts, cassava, local coffee, Irish potatoes. The most frequent cases of pulling up were for coffee (3) and cassava (4).
3 farms had already pulled up a plot of local coffee. In 2 cases, the coffee had been totally pulled up and the area replanted with banana (one in 1994, the other in 2000), for reasons related either to excessively low coffee prices (1994) of to a preference geared towards food security. In the third case, the coffee was partly pulled up when yields were too low and replaced by clonal coffee (en 2000).
In general, out of the 12 plots pulled up by the 9 farmers, the preferred replanting crops were: clonal coffee (4 plots) and beans (3 plots).

The crops that offered a current attraction in terms of "new planting" potential were: vanilla (8 farmers were planning to plant some), avorea (5), upland rice (5), eucalyptus (2), clonal coffee (1), and cowpeas (1).
Vanilla and avoera were chosen for their "profitability/income ("more profitable", "high prices", "increased income"), upland rice was chosen for its contribution to food security ("food security and income"), clonal coffee for its resistance to coffee wilt disease and the other crops for farm "diversification".

5. Areas cultivated

The farmers had between 1 and 6 plots; two thirds of them had at least 3 plots. The average area of those plots was between 1.3 and 3 acres.
The total area cultivated ranged from 0.5 to 34 acres; a third of the sample had at least 4.1 acres. The average area cultivated was 7 acres.

Areas of cultivated plots :

Plots	Number of farms	Average area in acres	Min-Max	Distribution by class
1st	29	3	0.25 to 20	≤ 2 acres: 16 farms > 2: 14 farms
2nd	25	1.9	0.25 to 6	
3rd	19	1.3	0.25 to 5	
4th	10	2.9	0.25 to 15	
5th	5	2	0.25 to 5	
6th	1			
Total cultivated	29	7	0.5 to 34	1 to 4 acres: 10 farms 4.1 to 6.9 acres: 10 farms ≥ 7 acres: 9 farms

6. Intercropping

Several crops were grown in the same plot. In the first plot planted, 17 farmers were growing at least 3 crops, 24 were growing at least two.

Number of different crops in the first plot:
- in plot 1 : at least 2 crops = 24 farms
at least 3 crops = 17 farms
at least 4 crops = 12 farms
at least 5 crops = 7 farms
at least 6 crops = 3 farms
1 crop only = n = 5 farms

A limited arable land area and optimization of land availability were the main reasons put forward to explain the mixed-cropping system. Other reasons were also put forward, notably farmer "security" (food security, spreading the risk in the event of a problem with a crop) and a need for agricultural efficiency (shade for coffee, optimization of labour time).

Reasons for “mixed-cropping” (2 possible answers):

Reasons	N
Limited land	12
Maximize land use	7
Food security	5
Distribute risk	1
Bananas provide shade for coffee	3
Easy management of the crops	1
Maximize labour	1

7. Uncultivated land / agricultural extensions

A third of the farmers (11) also had some land yet to be cultivated: 2.7 acres on average (2 acres or less for 8 of those farmers – 1 to 11 acres depending on the farmers).
Among those with no more "free" land (18 farmers), 10 pointed out that they could extend their farm, but by buying land.

8. Coffee plantation upkeep

The farmers declared that upkeep in their coffee plantations was better in the 1990s than since 2000. The reasons were primarily linked to coffee prices ("better price" in the 1990s; "low price" since 2000). The drop in coffee prices, hence in income, led to a reduction in coffee plantation upkeep.

Answers grouped by decade	Highest upkeep	Lowest upkeep
1970s	4	
1990s	**12**	1
Since 2000	2	**17**
Numbers answering	18	18

9. Labour

Virtually all the farms used hired labour (24 out of 29 farms). These were mainly labourers paid on a piece-work basis (task workers) as and when needed and recruited as required. Full-time hired labour was rather rare (6 farmers employed permanent workers); the costs indicated ranged from Sh 30 000 to Sh 80 000/month.
The 21 farmers employing task workers, 4 on average per farm, did so for activities related to coffee and to other crops, working in equal proportions on coffee harvesting, land preparation, planting and weeding. There was substantial disparity in the labour costs announced: Sh 10 000 to Sh 40 000/month, Sh 10 000 to Sh 30 000/week, or Sh 27 000 to Sh 53 000/acre (and Sh 1500 to 2000/day, Sh 300 to 500/basket of coffee harvested).
Family labour was also used, on 21 farms, usually on an occasional basis, for coffee or annual crops.

Hired Labour :

	Number farmers	**Number workers/farm**	**Way of payment**	**Activities**
Permanent workers	6	Average = 3.2 1 to 5		
Task workers	21	Average = 3.95 - 1 to 2 workers: 10 farms - 3 to 4 workers: 9 farms -15 to 25 workers: 2 farms	By task: 18 farms By day: 1 farm	- coffee: 7 farms - all crops: 4 farms - other: 2 farms no data: 8
Total external labour	24	(No ext. lab: 5 farms) - 1 ext lab: 8 farms - 2 to 4: 12 farms - 5 to 30: 4 farms Average for total number (29): 3.15 workers		

Family Labour :

Number of farmers	**Type of family labour**	**Reg/Occ**	**For what crop?**	**For what activity?**
21	Adults: 5 Children: 16	Regular: 6 Occasional: 15	All: 8 Annual: 7 Coffee: 2 Coff + ann: 2	All: 6 Harvest: 7 Weeding/planting: 10

When asked about changes in this labour, the farmers declared that their use of labour was different from previous years, in that the number of workers hired had decreased. That decrease had particularly been seen since the end of the 1990s.

10. Savings and credit

The most frequently mentioned saving methods were "cash at home" and the bank (7 cases for savings under Sh 100 000, except for 2 farmers). Both options might be combined by the same farmer, even in the case of a farmer with access to a bank account.

Savings:

	N farmers	Amounts
Bank	7	Sh 10 000 to Sh 3 million (for 5 farms: Sh ≤100 000)
Micro finance	3	Sh 10 000 to Sh 50 000
Roscas	4	Sh 20 000 to Sh 100 000
Cash at home	10	Sh 5 000 to Sh 200 000 (for 9 farms: Sh ≤ 50 000)

Loans taken out :

Have you ever borrowed money?	Number farmers	Details
No	12	-
Yes, formal loan	6	Bank (1), microfinance (2), association (2)
Yes, informal loan	6	Coffee trader (2), friends (4)
No anwser	5	-

12 farmers said they had already borrowed money, half by formal loan (banks, microfinance or their association), and half by informal loan. Only 1 farmer out of 30 had already had a loan from a bank. The amounts borrowed varied between Sh 40 000 and Sh 6 million, but for most of them (10 out of 12 loans) the amounts were under or equal to Sh 500 000. Loans were used for: agricultural activities (7 loans), coffee business (2 loans), payment of school fees (1), and other commercial activities (1).

11. **Land acquisition**

Many plots had to be bought and were not necessarily automatically inherited.

Number of plots	87
Type of acquisition	- Purchase: 52 plots - Inheritance: 22 plots - Both: 2 plots
Source of capital in the case of plot purchasing	- Farming income: 13 plots - Coffee business: 5 - Business: 4 - Other : 3 - Missing data: 27
Type of ownership	- Kibanja: 55 plots - Customary : 8 - Rented: 1 - Mailo: 1

12. Income and expenditure

Schooling expenses were evaluated. They provided information on the expenses that had to be incurred to ensure the schooling of children. Average expenditure was between Sh 18 600 and Sh 276 000/child/term depending on the schools.

In primary and secondary education, 3.6 and 2.1 children were schooled on average per household (for 27 and 20 households in all who schooled some or all of their children). In some households the children could not be schooled.

	Number of farms	Average number on farm concerned	Average cost of fees per term and per child
Not schooled	22	2.3	-
Primary	27	3.6	Sh 18 600
Secondary	20	2.1	Sh 114 000
Higher	6	1.8	Sh 276 000
Dependent adults	13	2.1	-

On half the farms, the farmers mentioned the purchase of agricultural land for their activities. The average price paid for land was Sh 618 000/acre. That said, the standard deviations were very high. Prices varied from Sh 100 000/acre to Sh 1 800 000/acre (values not updated).

	Capital used for acquisition of all plots	Price per acre for plot 1	Price per acre for plot 2	Price per acre for plot 3	Price per acre for plot 4	Price per acre for plot 5
N farms	14	10	8	5	3	2
Average	1 913 571	496 666	720 386	940 000	392 444	350 000
Std. Dev.	1 783 167	445 412	541 312	654 217	269 142	212 132
Minimum	200 000	100 000	125 000	200 000	200 000	200 000
Maximum	5 160 000	1 500 000	1 500 000	1 800 000	700 000	500 000

The turnover from crop and animal sales was evaluated for 2003, but was merely based on declarations. It may have been under or over-estimated.

Turnover (gross income):

	Total Crop sales in 2003	Cattle sold in 2003	Goats sold in 2003	Pigs sold 2003	Fowl sold in 2003	Milk sold in 2003	Eggs sold in 2003	Total animal sales	TOTAL Crops + animals
N farms	27	6	2	12	4	2	2	14	27
Average	753 787	487 500	30 000	82 000	238 875	112 500	6 975 000	1 364 250	1 517 012
Std. Dev.	1 269 800	341 961	14 142	63 165	440 828	70 003	318 198	2 909 158	2 858 185
Minimum	12 000	200 000	20 000	20 000	10 500	63 000	6 750 000	15 000	12 000
Maximum	5 665 000	1 000 000	40 000	200 000	900 000	162 000	7 200 000	8 747 000	11 606 000

Crop sales in 2003 amounted to Sh 753 000 on average, but with substantial variability between farms. This gross income broke down as follows:

- < Sh 200 000: 11 farms
- Sh 200 000 to Sh 1 000 000: 11 farms
- > Sh 1 000 000: 5 farms

Half the farmers also sold animals in 2003, mostly pigs (12 farms). Cattle sales were less frequent, but the gross income generated was greater. Only 2 farms were involved in egg sales, for a substantial income.

Average turnover for animal sales varied depending on the farms:

- No sales, no animal income: 15 farms
- Sh 15 000 to Sh 100 000: 7 farms

- Sh 100 000 to Sh 500 000: 4 farms
- Sh 1 150 000: 1 farm
- Sh 7 to 8 million: 2 (egg) farms

Total gross income from farming in 2003 likewise varied substantially depending on the farms:

- Sh 12 000 to Sh 200 000: 7 farms
- Sh 200 000 to Sh 400 000: 8 farms
- Sh 500 000 to Sh 1 400 000: 8 farms
- Sh 3, 4 to 11 million: 4 farms
- no data: 2

The income provided by coffee was still largely used to school children.
Use of coffee money :

	Number
Home needs	21
Fees (school)	19
Any pb	5
Farming input	6

Conclusions:

The farms in the sample displayed substantial variability in the farming systems. However, in all cases, the farming systems were based on diversifying crops and income sources. That diversity was based on the will to ensure income and food security and limit risk (inherent to a single crop). It was also associated with limited access to land, notably due to the cost of land. The majority crops were coffee and banana, but animal rearing provided additional income on half the farms. The size of the farms in terms of cultivated areas was relatively small (7 acres on average). Access to capital and credit was very limited. Income derived from cash crop sales was partly used to cover the high costs of schooling children. Coffee remained a crop preferred by the farmers, though other crops had been developing more recently, such as vanilla. The drop in coffee prices and income limited the possibilities for sufficient upkeep in the plantations and led farmers to introduce new crops for additional income and for guarantees against fluctuating prices.

5.3. Coffee harvesting and post-harvest practices

5.3.1. Harvesting

Harvesting frequency:
Harvesting frequency varied depending on the farms. Seven farms harvested coffee daily throughout the season, 8 farms organized more or less weekly harvesting rounds, and the others less than weekly harvesting rounds.

The farms that harvested daily were larger, but the number of observations made was insufficient to establish a statistical relation:

Daily harvest: 2028 coffee trees on average on the farm
Weekly harvest: 1 500 coffee trees on average on the farm
Less than weekly harvest: 495 coffee trees on average on the farm

In all, each plot was harvested at least 3 times over the season, varying from 3 to 5 rounds in the same plot. At the time of the survey, at the end of the season, 8 plots had been harvested twice only, 21 plots 3 times, 5 plots 4 times and 14 plots 5 times. Some farmers were planning for at least one other harvesting round (for 25 plots in all).

Type of harvesting: 12 farmers said they carried out selective picking of ripe cherries, 3 carried out strip picking, and 14 carried out both alternately. Those who chose selective picking stated their reasons to be:

- to maintain harvest quality (notably for those selling to the Ibero project) and/or to obtain the quality premium,
- to "save for the future" in case there was a financial problem, leaving unripe cherries for a second harvest,
- because ripe cherries weighed more (weight gain).

But in fact, among those 12 farmers, 7 stated that their harvesting method varied depending on the degree of cherry ripeness and the time of season. Only 5 farmers said that they only carried out selective picking throughout the season.

Those using both methods alternately explained that it depended on the degree of ripeness of all the cherries on each tree: in particular, they carried out selective picking at the start of the season when the degree of ripeness on trees was heterogeneous, then switched to strip picking when the cherries were more or less uniformly ripe on the same tree.

Virtually all the farmers (28) said that they collected fallen fruits. They explained that those cherries were ripe (they fell to the ground because they were ripe) and this enabled them to limit losses, and the market did not make any distinction (no premium or discount for that criterion in the price paid to farmers), this criterion being difficult to spot at the time of purchase.

Quantities harvested:

The quantities of cherries harvested in 1 day were:

- 10 to 150 kg: 8 farms
- 160 to 450 kg: 10 farms
- 720 to 2500 kg: 4 farms

Quantity harvested/day in kg on the farm:

kg	Frequency
4.50	1
64.00	1
80.00	3
84,00	1
126.00	1
150.00	1
160.00	2
175.00	1
180.00	2
210.00	1
216.00	2
375.00	1

450.00	1
720.00	1
1400.00	1
1700.00	1
2500.00	1
Total	22
Missing	7
Number	29

At the start of the season, harvesters could harvest 1 to 2 baskets (16 to 20 kg of cherries) per person. During the peak season, they could harvest 3 to 5 baskets per person (48 to 100 kg).

Labour:

Virtually all the farms used family labour for harvesting; on average 3.5 workers. Outside workers were recruited for harvesting on half the farms visited; on average, 3 workers on those farms.
These task workers were paid according to the volume harvested (never on a daily basis). The farmers gave many reasons for that choice: that type of remuneration made it possible to pay for small quantities harvested, to assess and pay for work in direct relation with the work actually done, which seemed to them to be more advantageous (pay for work actually carried out based on weighing the cherries harvested).
However, that had repercussions for harvest quality: with piece-work it was in the interests of the task workers to collect a maximum of cherries from a branch in one go, rather than selecting ripe cherries one by one each time.
Labour costs for harvesting in 2004 were Sh 300 to 500 per basket (16 to 20 kg of cherries). If they were paid on a daily basis, though that was rare, they received Sh 1 500/day.

Farmers often had problems taking on several task workers at the same time in the high season, as they were in much demand by all coffee producers.

Labour for coffee harvesting:

	Number of farms	**Average Min-Max**	**Classes**	**Way of payment**
Family workers	25	Ave= 3.5 (1 to 10 workers) 88 family workers	≤ 2 workers: 15 farms > 2 workers: 10 farms	-
Permanent workers	2			Per season or per week
Task workers	13	Ave= 3 (1 to 11 workers) 40 task workers	≤ 2 workers: 7 farms > 2 workers: 6 farms	Per basket or per tin (piece work). -Not per day- Sh 300 to 500/tin

5.3.2. Storage before drying

Coffee storage before the drying operation

Prior to drying, coffee was stored at home or in a store. It was stored in bags (9), on bare ground (7), on a cemented floor (8), in bags on a cemented floor (1), in a drum (1).

Only 3 farmers did not store their coffee between harvesting and drying.

Depending on the farms, coffee storage time varied from 1-2 days to 7 days.

- Storage for 1 to 2 days: 8 farms
- Storage for 3 days: 7 farms
- Storage for 4 to 7 jours: 9 farms
- No answer on storage time: 2

This said, the storage times indicated could vary depending on cherry ripening speed and the quantities harvested, which were not the same throughout the season, and depending on the climate. To the question "The last time you dried, how many days did you store the coffee before drying?", the time lapses indicated were mostly longer than those declared for the more general question "After how many days do you dry -delay before drying ?": in this case it could be up to 14 days (the survey was undertaken at the end of the season).

The number of days' storage appeared to be higher on small coffee farms, but the number of observations was insufficient to establish a statistical relation:

DELAY BEFORE DRYING	Average number of coffee trees (old + clonal)	Number of farms	Standard deviation
1 day	2500	1	,
2 days	2140	5	1480
3 days	1755	4	89
4 days	400	1	,
5 days	922	4	775
7 days	240	2	14
Total	1458	17	1171

The reasons put forward for storage before drying were economic or technical:

Economic reasons:

- For wholesale – sellling a large quantity (“dry once to sell once, to sell in bulk, to get bulk pay, to sell at minimum 1 sack”): 4 farms
- To reduce work time or "save time to do other things": 2 farms

Technical reasons:

- To reduce the laboriousness of the work ("drying each time is too hectic") and/or maximize tarpaulin use for bringing in and taking out coffee (operations linked to rainfall during the day, bringing in the coffee overnight to protect it) – 8 farms. These operations were grouped for a given quantity of coffee. The farmers who used tarpaulins did not have enough of them to separate different heaps of coffee according to their harvesting day.
- Limited drying space: 3
- Not clarified ("to dry at once", without the reason): 5

Most of the farmers therefore stored their coffee for a few days until a quantity considered "sufficient" was reached to start drying. The quantities harvested over one day were "insufficient": this was explained by the cost of labour and the limited number of workers available, meaning that a large quantity of coffee could not be harvested in one day, or lastly due to low coffee yields on the farm, which meant spreading the harvest over several days.

Drying coffee in small quantities each day would have meant managing different coffee heaps separately for each bringing in and taking out operation depending on the weather and the night/day sequences, which was more expensive in work terms. The famers said that to switch to a system where drying was carried out directly the day of the harvest, it would be necessary to:

- have access to more labour to harvest larger quantities in one day,
- and/or use several tarpaulins: each amount harvested per day could be laid on a different tarpaulin (bringing in and taking out the coffee was facilitated by tarpaulins compared to drying on bare ground). Yet only 9 farmers had tarpaulins, and they did not have enough tarpaulins for the purpose.

It should be noted that the space available for coffee drying was only mentioned as a constraint by 3 farmers.

Quantities stored before drying

	Qty of cherries stored before drying (kg)
Number	20
Average	467
Std. deviation	378
Min	48
Max	1 530

The quantities stored before drying varied depending on the farms:

- 48 to 180 kg: 7 farms
- 210 to 540 kg: 8 farms
- 810 to 1530 kg: 5 farms
- no data: 9 farms

5.3.3. Drying

Drying method

17 farmers, i.e. almost two thirds of the sample, dried their coffee on bare ground only, a third used (partly or only) tarpaulins (10) or a cemented area (3). Each tarpaulin was used to dry 30 to 60 kg of cherries.

"How do you dry your coffee?"

	Frequency
Bare ground	17
Tarpaulin	5
Both tarpaulin and ground	4
Cemented floor	2
Both cemented floor and tarpaulin	1
Number of farmers	29

Drying time

At least half the farmers dried their coffee for between 7 and 10 days. The others dried their coffee for more than 10 days (up to 25 days). This said, those data need to be placed in context, as drying time varied depending on:
- the climate and period of the season
- demand from buyers and the farmers' need to sell: indeed, they might sell cherries as semi-dried before drying was completed (the buyer then applied a discount on the bought weight). Drying time was relative to the moisture rate required for sale.

Sunshine was the reason most often given to explain the variations in drying time, which ranged from 7 to 14 days depending on the amount of sunshine.

Drying time:

How long do you dry the coffee for?		*The last time you dried, how many days did you dry for?*	
Number of days	Number of farms	Number of days	Number of farms
7 to 10	15	7 to 10	17
8 to 14	7	11 to 14	8
14 to 21	5	17 to 25	4
Number of farmers	*27*	-	*29*

Lastly, clonal coffee took longer to dry than old coffee (around 5 to 7 days more according to the farmers).

The farmers assessed the time when drying was complete, or the degree of coffee drying, by biting (mentioned by 21 farmers), shaking (12) and scissor cutting (7).

Operations associated with drying

Protecting the coffee during drying:
* Two thirds of the sample brought their coffee into the house or into a store at night (21). 3 farmers said they simply heaped up their coffee and covered it with tarpaulins.
* If it rained during the day, fewer farmers brought their coffee in: 15 farmers. The other covered their coffee with a tarpaulin (6) or did nothing (2 to 10)[5].

Raking:
The raking frequency was twice a day for most of the farmers (18), once a day (5), or 3 times a day (2).

[5] 2 said they did nothing, 8 did not answer the question mostly for the same reason.

Drying cost
The cost of buying tarpaulins (9 farmers) varied between Sh 25 000 and Sh 100 000, except for one farmer who hired tarpaulins (Sh 1000/day), and one farmer who obtained tarpaulins free (Ibero project). Tarpaulins were used for 1 to 3 seasons. The farmers used between 1 to 4 tarpaulins.

The cost of outside labour for drying concerned few of the farmers: only 6 used hired labour for drying (Sh 1000/day).

Drying area

The average drying area was 1 300 square metres (375 to 5 600 square metres). – (9 farms had fewer than 800; 6 farms had between 800 and 1 500; 5 between 1 500 and 5 600).

21 farmers considered that their drying area was generally sufficient. Seven said it was insufficient, but that they could enlarge their drying area (except 2 who could not extend it).

When the area was too small, the practices used were (10 farmers replied):
- drying in shifts (3): they managed two alternate batches of coffee between drying and storage
- kept excess coffee stored in the house or store (3)
- increased the amount of coffee on the drying area, raking more often (1)
- sold some of the cherries fresh (1)
- used space on a neighbour's farm (2).

Constraints associated with drying and alternatives

The main constraints mentioned were: the time taken and the laboriousness of bringing in and taking out coffee (15), the weather (rainfall, etc.) (9), lack of tarpaulins (4).

The solution proposed by the farmers to reduce these bringing in/taking out and climate constraints was provide easier access to tarpaulins (17).

Two thirds (20) of the farmers said that they knew drying technologies other than the one they used, and mentioned:
- Tarpaulins (9)
- Cemented floors (9)
- Solar dryers (2)
- Electric dryers (1)
- Wire mesh (2)
- Raised platforms (2)
- Mechanical dryer in processing plants (1)

To the question "Do you know of solar dryers?", only 7 farmers replied yes. Their view of solar dryers focused on the advantages of the equipment for bringing in and taking out coffee rapidly in the event of rainfall or at night (3), for managing small harvest quantities (1), though their use would require training (3).

To the question "Have you heard about wet processing – pulper?", 22 farmers said they had, of which 19 were rather in favour of their use ("would like to use them" – is merely a declaration of intent), of which 12 subject to conditions: use of solar energy, existence of a market attribution of a price premium, wide adoption and training for users, and, in one case, especially for clonal coffee.

Among those who knew about pulpers (22), the views expressed ("What do you think about that technique"?) were (2 possible answers):

	Positive	**Has drawbacks**	**Positive subject to conditions : "good if…"**
Number	14	5	9
Reasons	Improve quality (7) Coffee dries quickly To get better profit margin Reduce drying space	Lack of water Expensive Need fully ripe coffee	If electricity If coffee prices higher/premium price If need of quick selling If trained how to use it If a market for that exists

5.3.4. Storage after drying

Coffee was stored in gunny bags kept in the house or in a store. Only 3 farmers stored coffee on a cemented floor.

Coffee is a storable commodity, and as we highlighted (above), it was judged worthwhile by farmers notably because it was a source of capital, through its sale in large quantities after storage, enabling savings to be made for the future, and to pay school fees or invest. Through that function, coffee was preferably sold at the end of the season.

This said, at the time of the survey, i.e. at the end of the harvesting season, half of the farmers did not have any coffee in storage or had a stock dating back less than 2 weeks. Those farmers' coffee sales were ongoing and spread over the whole harvesting season.

To the question "How long do you store coffee for?', 15 farmers were unable to provide any precise information on the usual storage time and said that the duration varied. Only 7 farmers replied that their coffee was stored for at least 2 months, then sold at the end of the season.
Two thirds of the farmers said that the storage time varied, depending on two criteria:
a) on the market: existence or not of buyers, evaluation of the prices applied and/or maintenance of coffee stocks as savings for the future and sale at the end of the season at a hopefully higher price,
b) on "an urgent need of money". In the end, the coffee was sold in small quantities, as needs were felt, hence spread throughout the harvesting season, by at least half of the farmers. For those farmers, the coffee then became a crop that provided daily income rather than savings or capital.

Questions	Number of farmer responses
How long do you store coffee for before selling?	-Under two months (2) -2 months (3) -At the end of the season (5) -Depends on: demand, the market, and the prices applied (3), on a farmer's (urgent) need for money (5), -It is variable – no reason given (7)
Does the period of storage vary ?	Yes =23
Explain	Varies depending on: - the market: buyer, prices applied and/or maintenance of a stock as savings for the future, to sell at a better price: 11 - urgent need for money: 11
Do you have dried coffee stored now?	Yes = 19 No = 9
Since when ?	(No coffee in store: 9) Under 14 days: 5 30 to 45 days: 6 2 months: 7 3 months: 1

Conclusion:

Most of the farmers knew about the processes that lead to better quality, but few buyers rewarded quality. They were aware of drying technologies that improve efficiency, but their limited access to capital made it difficult to buy expensive technologies. The uncertainty of income generated by coffee, which they have experienced since the strong price fluctuations, made it risky to buy new technologies. The farmers were in favour of a technology that used to exist in Uganda, pulpers, but they insisted on certain conditions, notably that of a price differential. Acquisition of tarpaulins for drying was not reflected in a higher selling price for coffee, unless the buyer was at the end of the chain (exporters or via an Association) and could pay for the coffee without involving middlemen. For exporters, this operation could not involve only very small quantities, given the costs generated by the multiplicity of purchases from farmers who each delivered small quantities. On the other hand, an Association could group supplies, ensuring a short circuit between producers and exporters. Tarpaulins were fairly appreciated by the farmers as they facilitated handling (bringing in the coffee at night, taking it out in the day). They also made it possible to manage different heaps of coffee and could enable coffee drying as and when harvested, but managing different batches of coffee in that way, in a simple manner. Drying time was very short, compared to the need to dry coffee to a 13% m.c., but that was mostly explained by the demand for that type of coffee.

5.4. Marketing and quality perception

5.4.1 Perception of coffee quality

“Kakuku” / mould

"Kakuku" is the local name for the appearance of white traces of mould. To the question "What are the main diseases on coffee?”, coffee wilt disease came out on top (mentioned by all the farmers), followed by “kakuku”, mentioned by 11 farmers.

To the more direct question "What about kakuku?", 24 farmers replied that they knew about that "infection" of coffee by moulds. Mould development on coffee was fairly widely known.

According to them, the causes of that mould were all linked to moisture. They made reference more directly to:
- the humid climate or rainfall (3),
- the delay between harvesting and drying, keeping coffee for several days at a high moisture content ("delayed drying") (6),
- storage of "humid" coffee ("wet storage"), be it before or after drying (partial coffee drying) (16),
- too thick a layer of coffee during drying, or insufficient raking (2), - " inadequate drying" (3).

According to them, the operations during which kakuku infection could develop were: long storage before drying (9), drying (11), storage, but without clarifying (4) – ("At what level do you think kakuku infection occurs?").

The ways they mentioned for checking or controlling such infection logically concerned the same operations: reduce the coffee storage time between harvesting and drying, dry cherries properly (proper drying, consistent drying) or enable aeration of the coffee (spread on cemented areas, keep coffee out before drying).

They felt that the consequences of this infection for cherries were:
- health-related: human health, illnesses, toxins (8),
- weight loss (3),
- but especially the deterioration of coffee quality: "poor quality" (15). The concept of "poor quality" was not elucidated except in 5 cases, where it was described as a degradation of the taste and/or flavour of the cherries.

In general, the farmers therefore linked mould infection of cherries to moisture and more directly to cherry storage at excessively high moisture contents, or to poor or inadequate drying.

The practices leading to poor drying and/or inadequate drying did not therefore seem to be linked to a problem of capacity or farmer knowledge, but to a market problem (current practices driven by demand).

Perception of quality: attributes and price premium

To the question "What is a good quality coffee to you?", i.e. how did the farmers perceive quality attributes, the degree of drying was a unanimous criterion (mentioned by all the farmers). It was the dominant criterion (virtually the only criterion involved) in price calculations between farmers and local traders. The existence of a high water content led buyers to apply a discount that compensated for the extra water in the weight of cherries (this criterion applied in all transactions as far as exporters who had to ensure that coffee with a 13% m.c. was being exported).
Cherry ripeness (ripe, harvested ripe) was the second criterion mentioned by half of the farmers.

Attributes	Number of farmers
Dry / low moisture content	29
Harvested ripe / ripe	16
Bean size	8
Colour	5
No kakuku / no mould	5
Clean	4
Appearance	2

To obtain a properly dried coffee, the farmers mentioned the following ways: drying each day without storing the coffee (immediately after harvesting), supervise or carry out drying themselves, and finally dry for long enough (number of days).
Checking cherry ripeness was linked by farmers to selective picking and/or increased harvesting supervision.
Bean size was linked to ripe cherry harvesting and the use of fertilizers.
Lastly, cleanness was linked to the use of tarpaulins and sorting for impurities.

These attributes were measured by the farmers in different ways: biting into the cherries or cutting with scissors to see the bean, listen to the noise made when the cherry was bitten into, shaking the cherries and listening for the noise of the bean moving about inside the cherry.

To the question "Do you get a better price for that attribute?", 12 farmers replied yes (13 replied no). Half of the farmer considering they received a price differential for these attributes sold their coffee to the IBERO Project. They did not specify whether this was a quality "premium" or a "non-discount" under the weight deduction formula system.

Indeed, the IBERO Project sets out only to buy coffee when only red cherries are harvested, then dried to a moisture content of 12%, subject to a quality premium. The farmers who sold some of their coffee under those conditions to the IBERO project estimated that they received a premium of Sh 50 to 100/kg of dry cherries.

For the others, the price differentials negotiated with traders in relation to a quality attribute were lower: Sh 10/kg, Sh 10 to 20/kg, or Sh 50/kg of dry cherries depending on the farmers, primarily in relation to the moisture content – mostly linked to more consistent drying -, without standard measurement (no threshold) and entering into the negotiations with traders.

5.4.2. Coffee sales - market

At the time of the survey, some of the farmers had not yet sold their coffee.
However, others had already sold some quantities of coffee:
-18 farmers had already sold some as dry coffee,
-9 had already sold some wet coffee on one or more occasions,
- and 4 had sold hulled coffee (FAQ).
Only 7 had yet to sell a part of their harvest.

"For this season, what type of coffee did you sell, for what prices?"

	N	Minimum	Maximum	Mean	Std. Dev.	Sum
QUANTITY OF WET CHERRIES SOLD (kg)	9	80	26 000			27 928*
UNIT PRICE OF WET (Sh)	9	100	235	171,89	42,43	
QUANTITY OF KIBOKO SOLD (kg)	18	12	10 000			25 253
UNIT PRICE OF KIBOKO (Sh)	18	450	650	512,94	67,56	
QUANTITY OF FAQ SOLD (Kg)	4	1 200	20 000			24 965
UNIT PRICE OF FAQ (Sh)	4	980	1 100	1 053,75	53,44	

* including one farmer who sold 26 000 kg.

The share sold as wet coffee was never the totality of the harvest: farmers who sold wet coffee also sold some "dry coffee". In particular, fresh sales made it possible to fall back on a source of money depending on daily needs.

Fresh cherries were sold for several reasons:
- In the event of an urgent need for money, and when there was no kiboko ready for sale.
- To pay a trader who might demand payment of his debt in that form.
- When the farmer chose to sell fresh cherries directly to a wet processing factory.
- In mid-season, when there was substantial competition between traders.
- In mid-season, it might occur that a farmer with a large quantity of coffee sold because he lacked drying/storage space.

Fresh coffee sales were staggered over the season by the farmers and varied between Sh 2 000 and Sh 3 500/tin, i.e. between Sh 100 and 235/kg approximately. The total quantities already sold per farmer varied between 4 and 30 tins, i.e. 80 to 540 kg (apart from one large-scale farmer who had sold 26 000 kg), mostly sold to "Ddebeman", except in one case to a wet processing factory and in another case to a large-scale trader.

Sales in dry form varied from 4 tins to 150 bags. 11 farmers sold between 60 and 500 kg, 5 farmers sold between 600 and 1 200 kg, and 2 farmers sold 9 000 and 10 000 kg.
Prices varied between Sh 450 and 650/kg. 11 farmers sold for between Sh 450 and 500/kg. 7 farmers sold for between Sh 515 and 650/kg.
Sales could be spread over several goes, or take place in one go. Coffee was sold to Ddebeman or traders, to the IBERO Project, and in one case to a processor.

None of the farmers said they had sold coffee in semi-dried form. If farmers did sell semi-dried coffee (not ready to sell), buyers applied a discount ranging from 4 to 10 kg from the 100 kg quantity sold, depending on the moisture content. For a 10 kg discount from the 100 kg sold, that amounted to a reduction of the basic price of Sh 500/kg amounting to Sh 50h/kg (i.e. Sh 450/kg).

Four farmers sold FAQ. For 3 of them sales amounted to between 1 200 and 2 000 kg, The fourth sold 20 000 kg. The prices obtained were between Sh 980 and 1 100/kg, from agents, exporters or hullers. Of the 4 farmers who sold FAQ, two also sold some of their coffee in dried kiboko form.
4 farmers had already sold some FAQ during the season at the time of the survey. This said, 9 of the 30 farmers said that they sold FAQ at one time or another. Those farmers were virtually all (8) members of an association, and all had taken part in workshops or training.
They hulled coffee in: Baluti, Bukoto, Kabonera, Kinoni, Mirambi. Processing costs varied from Sh 20 to 30/kg FAQ.

5 farmers were also traders; they bought coffee from other farmers for resale.

Of the 22 farmers who had already sold part of their harvest, 15 had sold coffee from home (the buyer travelled), the others travelled to sell: at the hulling factory (5), in a buying store or at a buyer's home (1 to 5 km away).

Generally, sales mostly took place with Ddebeman and traders, but also with an Association (2 cases), a huller (1 case), an exporter (4), a wholesaler (3), agents (2).

Incentives:
In most cases, the farmers did not report any particular demands from buyers, in which cases sales were transacted with Ddebeman or traders. When specific demands on the part of buyers were mentioned, it was a matter of the moisture content (13 cases), and all types of buyers were involved for that criterion.
However, more specifically, when buyers were associations, agents and exporters, there were demands relative to less frequently mentioned criteria: cherry ripeness (2), cleanness (5), no delay in drying after harvesting (1), no black cherries (1), large cherries (1).

Customer loyalty:
16 farmers sold to regular customers, which they justified through the development of a relationship of confidence, which enabled them to obtain an acceptable price and to have confidence in the prices fixed, accurate weighing, or obtain credit from them.
However, 12 said that they preferred not to establish specific customer loyalty but rather to sell to the highest bidder, or simply to the first buyer to come along when the farmer needed to sell.
The farmers who declared that they had stopped selling to a type of buyer at least once were quite numerous (22). The buyers involved were mostly Ddebeman and the reasons mentioned by the farmers referred to fraud or attempted fraud when weighing the coffee sold during the transaction (12), prices negotiated too low (6), the buyer did not help the farmer when asked (3) notably with respect to credit, or lastly because the farmer joined an Association (2).

5.4.3. Access to information

The sources of information mentioned by the farmers were: traders or hullers, farmer associations, the radio, other farmers, and in one case workshops. It was primarily to prices that attention was paid in this exchange ("From whom do you get information/what information do you get?) and that information was primarily obtained in discussions with buyers (more than from the radio).

	Prices	Quality	Plantation management	total
Traders, hullers	14	1		15
Farmers	7			7
Associations	4	2	3	9
Radio	5	2	4	11
Workshops	0		1	1
total	30	5	8	

10 farmers were members of an Association, mentioning: Kabonera Association, Kissaka Association, Bigassa Coffee Farmer Association, Farmer Saving Association and Nucafe. These associations managed coffee marketing, training and/or seed supplies or credit. The benefits perceived by the farmers were: obtaining a better price for their coffee (8), acquiring skills (5), gaining access to seeds and especially to clonal coffee (4), obtaining credit (1).

Training or workshops:
Half of the farmers (14) had already taken part in at least one training course or workshop. The fact of being a member of an Association was a key for access to such training. The 10 farmers who were members of an association had all received training (i.e. 10 of the 14 who had received training). In addition, those farmers who had access to training had been on several courses: the number of training courses attended ranged from 1 to 10, with an average of 4.5.
This training covered production aspects: planting, pruning, fertilizing, weeding, mulching, and/or land preparation, coffee diseases (including mould), and especially coffee harvesting, drying and storage techniques. The training organizations mentioned were: UCDA, Nucafé, IBERO, the District Coffee Coordinator (or extension workers), Worldvision, and the names of farmer leaders. According to the farmers, adoption and application of this training had led to: the introduction of selective picking, the use of tarpaulins, higher yields, and in one case a switch to selling FAQ.

Conclusion:
Those farmers who were members of an association had more access to training and workshops and to information in general. The Associations were places where social capital and information circulated, all of which was beneficial to rural development. However, no profile of farmers with access to Associations had been established.
The farmers clearly had no technical knowledge of OTA, but on the whole mastered rather well the conditions required for quality coffee, notably in terms of adequate and rapid drying. Post-harvest practices for achieving well dried-coffee were known. This said, buyer demands did not pull in that direction, except in very precise cases in specific segments, where buyers were Associations and exporters who wished to achieve added value through quality on small quantities (it is important to highlight the fact that this involved very small volumes and absolutely did not concern the mainstream commodity chain). Apart from strong demand from buyers, for purchases processed rapidly in large volumes irrespective of moisture contents, the increased daily needs of farmers for cash led to split sales practices, rather than to storage and sale of the complete batch which would have amounted to establishing capital. Coffee was therefore being stored less and less on farms and farmers sold quantities of wet coffee whenever necessary. This said, it was their wish in most cases to gain access to FAQ sales, i.e. to be able to hull their coffee themselves and sell coffee with higher added value.

5.5. Evaluation of new technologies

5.5.1 Solar dryers

Theoretically, solar dyers designed on research stations under the project would make it possible to dry around 1 tonne of coffee per season. The 8 m2 solar dryer is designed for a load of 30 kg/m2, i.e. 240 kg of cherries per drying session. The 30 kg load would seem to be maximum for maintaining a layer of coffee not exceeding 5 cm thick.

Average density of red cherries: 620 – 650 kg/m^3, or

Thickness in cm	Load in kg/m²
1	6.2 – 6.5
2	12.4 – 13
3	18.6 – 19.5
4	24.8 – 26
5	**31 – 32.5: recommended load**
9.2 – 9.7	60
12.3 – 12.9	80

With a drying time of 11 days and a 2-month season, the dryer would be used four times, making it possible to dry 960 tonnes over the season:

Area (m2)	8
Kg/m2	30
Total cherries per drying session (kg)	240
Drying time: number of days	11
Number of drying sessions per month	2
Number of months' drying	2
Number of drying sessions per season	4
Quantity (kg) dried per season	**960**

Acquisition of solar dryers for an area of 1ha, with two dryer models, and depending on two net margin hypotheses:

Dryer capacity:	**Ivory**	**Ivory**	**Cabinet**	**Cabinet**
Farmer's production :				
Kg kiboko/ha	1 200	1 200	1 200	1 200
Kg cherries/ha	3 000	3 000	3 000	3 000
Number of dryers needed	3.1	3.1	3.1	3.1
Cost of equipment:				
cost for 1 dryer	**83 500**	**83 500**	**273 000**	**273 000**
cost for 3 dryers	250 500	250 500	819 000	819 000
Net margin excluding dryer purchasing:				
Margin: Sh/kg kiboko (source : UCDA)	**47**	**85**	**47**	**85**
Number of kg kiboko / ha	1200	1200	1200	1200
Margin /ha	56 400	102 000	56 400	102 000
Cost/margin	**4.44**	**2.45**	**14.52**	**8.02**

With theoretical average production of 1 200 kg kiboko/ha, i.e. 3 000 kg of cherries/ha, for one hectare of production a farmer would need 3 dryers, i.e. a cost of Sh 250 500 for the Ivory Solar Dryer and Sh 819 000 for the Cabinet Solar Dryer.
Over one season, a farmer's profit margin (excluding solar dryer purchase) has evolved in recent years, according to UCDA, between Sh 47 and 85/kg. Taking a lower profit marging hypothesis (Sh 47/kg), the total margin generated by selling a ha of coffee is Sh 56 400. The cost of new drying equipment thus amounts to 4.4 times the annual net margin for the cheaper of the two and 14 times for the more expensive. In the absence of a coffee quality premium for using new technologies, the costs appear to be enormous compared to the margins achieved. Only a price differential for the price paid to farmers (quality premium) and access to credit might enable these technologies to be used. Remember that the turnover generated by agricultural sales (i.e. without taking charges into account) was under Sh 200 000/year for 7 farms and under Sh 500 000/year for 15 farms.

In addition, using solar dryers would not necessarily reduce the practice of coffee storage before drying (for a dryer with a capacity of 240 kg per drying session). Sixteen of the 30 farmers inverviewed harvested less than 216 kg in a day. Seven of them harvested under 126 kg in a day.

For those farmers who dried large quantities or had more than 3 ha, the number of solar dryers required became considerable and might raise handling and storage problems: for example, at least 9 solar dryers would be needed for an area of 3 ha.

If the 25% fly crop was taken into account, the data changed.
A farmer possessing 3 ha of old robusta coffee trees with a yield of 3 000 kg of cherries would mean a total of 9 000 kg per season and, including the fly crop which could be as high as 25%, would mean an estimated harvest of 11 250 kg of cherry per year. A 3 ha farm

produces 11 250 kg of cherries per year (9 000 kg in the main season + 2 250 kg in the fly crop):

- main crop : 100* 9000/11250 = 80% of the total, spread over 3-4 months
- fly crop : 100* 2250/11250 = 20 % of the total, spread over 2-3 months

Harvest peak in the main season: 1 month in the main season during which 60% to 70% of the harvest is picked, meaning 9 000 * 60% to 70% = 5 400 to 6 300 kg of cherries to be dried.
Each day (26 picking days in the month), the farmer collects 207 to 242 kg of cherries
Assuming that drying time (in days) is **D** and the load (in kg/m²) is **L,** the required drying area (whatever the type of dryer) would be (207 to 242)***D**/**L**

In bold, required drying areas in m². These values should be divided by the size of the solar dryers to ascertain the number of dryers and finally the investment needed for solar dryers

	Load					
	30		60		80	
Drying time	207 kg/day	242 kg/day	207 kg/day	242 kg/day	207 kg/day	242 kg/day
10	**69**	**81**	**35**	**40**	**26**	**30**
11	**76**	**89**	**38**	**44**	**28**	**33**
12	**83**	**97**	**41**	**48**	**31**	**36**
13	**90**	**105**	**45**	**52**	**34**	**39**

Harvest peak in the fly crop: 3 weeks in the fly crop during which 50% to 60% of the harvest is picked, meaning 2 250 * 50% to 60% = 1 125 to 1 350 kg of cherries to be dried.
Each day (18 picking days in the month), the farmer collects 63 to 75 kg of cherries
Assuming that drying time (in days) is **D** and the load (in kg/m²) is **L,** the required drying area (whatever the type of dryer) would be (63 to 75)***D**/**L.**
Doing the same calculation, the farmer would use only 30% of his drying capacity for the fly crop.

A farmer with an average holding of 3 ha of clonal Robusta with an estimated yield of 15 000 kg per ha, according to the UCDA 2001/02 report, including 30% of fly crop will have 19 500 kg of red cherry per 3 ha.
A 3 ha clonal robusta farm produces 19 500 kg of cherries per year (15 000 kg in the main season + 4 500 kg in the fly crop):

- main crop: 100* 15 000/19 500 = 77% of the total, spread over 3-4 months
- fly crop: 100* 4 500/19 500 = 23% of the total, spread over 2-3 months

Peak of harvest in the main season: 1 month in the main season during which 60% to 70% of the harvest is picked. So that 15000 * 60 % to 70 % = 8000 to 10 500 kg of cherries to be dried.
Each day (26 days of picking during this month), the farmer collects 308 to 404 kg of cherries
Assuming that length of drying (in days) is **D** and the load (in kg/m²) is **L,** the required drying surface (whatever the type of dryer) is therefore (308 to 404)***D**/**L**

In bold, required drying surfaces in m². These values should be divided by the size of solar dryers to assess the number of dryers and finally the investment needed for solar dryers

Length of drying	Load					
	30		60		80	
	207 kg/day	242 kg/day	207 kg/day	242 kg/day	207 kg/day	242 kg/day
10	**103**	**135**	**51**	**67**	**39**	**51**
11	**113**	**148**	**56**	**74**	**42**	**56**
12	**123**	**162**	**62**	**81**	**46**	**61**
13	**133**	**175**	**67**	**88**	**50**	**66**

Peak of harvest in the fly crop: 3 weeks in the fly crop during which 50% to 60% of the harvest is picked. So that 4 500 * 50% to 60% = 2 250 to 2 700 kg of cherries to be dried.
Each day (18 days of picking during this month), the farmer collects 63 to 75 kg of cherries
Assuming that length of drying (in days) is **D** and the load (in kg/m²) is **L,** the required drying surface (whatever the type of dryer) is therefore (125 to 150)***D**/**L**

Doing the same calculation, the farmer will use only 37% to 41% of his drying capacity for the fly crop.

For farmers, the current prices are low: the cost of kiboko production was Sh 233 in 2001/02 and the price was 280 with a net margin of Sh 47 per kg, which was too low to sustain profitable farming. Those prices are too low to resist any additional cost without a strong justification such as a price premium that will absorb the additional costs and profits to compensate for the additional burden of having the dryers. In addition, these technologies have yet to be tested in the field.

5.5.2. « Brazilian » wet processing unit

According to ICO and UCDA there is an emerging premium market paying premium prices for high quality coffees for wet washed Robusta coffee. Robusta coffee is picked, pulped and mucilage removed mechanically from the coffee before it is dried into parchment coffee. UCDA has embarked on a programme to wet process Robusta coffee and has guaranteed bank loans for the purchase of 20 wet processing plants imported from Brazil, which were distributed to farmers who had agreed to use their farms as lead farms for coffee villages. The coffee villages will be the source of cherry for these plants. Out of the 20 plants imported 8 are in the final stages of installation and will be operational in the next coffee season. The wet milling plant comes with a mechanical dryer, which minimizes human contact during drying. The mechanical dryer takes about 24 hours of good drying to moisture content of 13%. The wet process parchment coffee could also be sun dried on raised wire mesh tables when there is adequate sunshine. One of the plants is located at Kalungu in Masaka district.

1. Kalungu Unit

The wet processing factory needs: a) to buy fresh cherries (less than one day after harvest), b) to process only red and not overripe cherries (which for farmers involves “selective picking”, involving more labour costs).

Management:
When we visited the factory, the wet process machine was stopped because of technical, organisational and marketing difficulties.

- Technical constraints: inadequate tank, inadequate pulper; the imported pulper was for low screen (ideal for Arabica), so screen 18 and clonal coffee (screen 18+) was not well processed. However resolution of these constraints was ongoing with UCDA and Brazafric (the machine supplier)
- Organisational constraint: farmers delivered fresh cherries of low quality (no selective picking was practiced at the farm) so the cherry had to be sorted (which increased costs). This was in large part explained by the non-incentive price given to farmers (no quality premium to smallholder suppliers) The management explained that the non–incentive price was because it was the first processing operation being tried, management was not informed of the market price for the coffee and on using the basis of the market price to pay premiums.
- Marketing difficulties: The insufficient quantity of wet processed Robusta coffee (currently 10 m/tons) made it impossible to completely fill the container (18 m/ton of graded coffee). As explained above, the management was also not sure of the premium price of the final product. As the manager had stopped processing he was trying to bulk his coffee with another wet processing plant so that he could market the coffee. The manager confirmed that he bought a total of 120 tons of red cherry out of which 18 tons were from smallholders and 102 tons were from individual large scale farmers. Due to operational problems outlined above only 38.5 tons of cherry were processed through the wet processing plant. The rest of cherry was dried as dry kiboko. The factory collected the coffee from the farmers and they were buying whatever they could get, hence there was no quality assurance to ensure that they were buying only red cherry.

Because of the organizational costs and constraints involved in collecting fresh cherries directly from villages, in the future they planned to buy coffee from smallholders at the plant location (no collection from farms). The plant unit could guarantee its supplies primarily from large-scale farmers. This wet process unit could therefore be more dedicated to processing fresh cherries from major suppliers (large-scale farmers) who guaranteed volumes and quality.

Fresh cherry buying prices:
The plant unit bought fresh cherries for 220 Sh/kg from smallholders, and 240 Sh/kg from large-scale farmers (who ensured only red fresh cherries, and/or larger screen size, i.e. with clonal coffee). At the same time, the unit bought dried cherries (kiboko) for 500 Sh/kg for their usual "dry" processing operations (hulling machine for dry process).
However, interviews with farmers in 2 villages gave us different buying prices (see below).

Collection organization:
The supplying area was divided into 20 zones, with one "zone leader" by zone (farmer), responsible for organizing/planning collection. The plant unit organized collection by track at 1 fixed place (collection area) in each zone. When the day was fixed (one day/week per village), the farmers were informed and had to bring their coffee to the collection area.
Constraints for the unit plant buyer: they collected little coffee when they arrived in the village collection area. They faced competition from other fresh cherry or kiboko buyers

(local traders) who came by bicycle directly to the farm and collected coffee (all types: fresh, semi-dried, and dried).
The Unit stopped collecting from smallholders in June, for this reason and those explained above (technical and marketing constraints).
The initial plan, collecting from 800 smallholders around the unit (for a quantity of 430 t of clean coffee), could be reviewed.

Marketing and financial constraints:
Approximately, exporters' management expected a premium price on the international market of around 400 to 500 Sh/kg FAQ for Robusta wet processed coffee (when ungraded FAQ was sold for 1 100 Sh/kg, wet Robusta could be sold for 1 500-1 600 Sh/kg). Comment: a higher processing cost for wet processing (water used, mechanical dryer, etc.) needed to be taken into account for the margin.
However, if the Unit did not find a buyer or could not fill a container of wet washed Robusta, the risk for it was to be obliged to sell this washed Robusta as dried coffee (without a price premium). Under these testing conditions, there was no high-incentive price when buying cherries.

To be sure to sell, financial constraints were involved: being sure to sell assumed that 4 containers could be filled (in the case of "graded washed Robusta"), i.e. 72 t of FAQ, 400 t red cherries, equivalent to 100 million Sh (=approx. 50 000 Euros). The Unit therefore needed a financial ability to mobilize capital (input buying+transport costs), before selling and recuperating the amount of 100 million Sh (without processing costs), all with no guarantee of finding a market for this product.
One strategic plan was to buy roasting equipment to roast this washed Robusta.

Farmers:
They stated 2 reasons for limited interest:

- No incentive price. They considered the price to be low compared to kiboko. The prices declared by farmers were different from prices declared by the factory plant. In the first village, farmers declared the price paid by the plant unit to be 180 Sh/kg. Other traders bought fresh cherries for 3 500 Sh/tin, at a better price (218 Sh/kg if we considered 16kg/tin). In addition, these other traders gave them credit facilities. In the second village, farmers declared the price paid by the plant unit to be 220 Sh/kg for clonal coffee and 200 Sh/kg for Robusta. Other traders in this village bought fresh cherries for 200 Sh (Robusta or clonal), and dried coffee for 500 to 550 Sh/kg. In addition, for the plant unit, farmers had to bring their coffee to the collection area themselves. If they sold to traders, they could sell from home without transport costs. But it seems the factory had an impact on increasing market prices for fresh cherries: the prices paid by local traders were around 120 Sh/kg and went up to 200 Sh when the factory plant began to buy at that price.
- They could only sell fresh cherries to the factory on one fixed day/week (the day the truck came to the collection area for the zone). For a farmer, selling fresh coffee corresponded to a strategy for acquiring quick money. Under these conditions, they wanted to sell any day. 1 fixed day/week was a constraint, especially as they had other opportunities because other traders came to buy fresh cherries on daily basis.

The choice between selling fresh cherries or kiboko depended on the following:
a) selling fresh cherries was of interest to farmers for acquiring quick money when needed,

b) selling kiboko: 1) ultimately gave them better added value, and 2) enabled them to receive a large amount of money in one go (like savings capital) to pay school fees, etc.
Farmers could use the 2 ways of selling alternately. Larger or wealthier smallholders were more able to sell all their coffee as kiboko. Those farmers would have preferred to be paid by the Plant Unit only once, at the end of the season. On the other hand, smaller smallholders would have preferred to be paid the day of the transaction and to have possibilities of selling fresh cherries on any day to acquire quick money for everyday needs.

Quality premium?
In theory, the purchase price proposed by the wet process units was Sh 220/kg of red cherries. At the same time, dried kiboko was bought for Sh 500/kg by the same units.

Converted to cherry equivalent, the price of Sh 500/kg kiboko was equivalent to Sh 200/kg. The apparent "premium" was therefore Sh 20h/kg (220-200). But this was partly swallowed up by additional costs arising from selective picking (+25%)[6]. The incentive in terms of prices to sell red fresh cherries was therefore very limited. Moreover, farmers reduced their possibility of keeping the added value arising from drying, and thus increased their apparent income.
In addition, if, at the same time, farmers had the possibility of negotiating their coffee at Sh 550/kg kiboko with some traders for well-dried coffee, the advantage of selling fresh for Sh 220/kg was completely wiped out.
In some cases, farmers had actually been paid less than Sh 220/Sh, as the managers had yet to receive a guarantee of added value for washed robusta coffee. At prices under Sh 220/kg/, it was not very surprising that factories had problemes procuring coffee from farmers. The increase in value by selling as washed robusta resulted in a quality bonus that could be shared, or which had, at least, to be sufficiently distributed to remain a financial incentive for farmers. The notion of "sufficiently" refers to thresholds that needed to be negotiated and discussed by the stakeholders, with all the parties concerned.

2. Ankole Coffee Processors

According to the company wet processing was profitable as it enhanced quality with a 100% clean cup, eliminated foreign matter, overripe and properly dried. The first consignment was sold to an Italian market which paid a reasonable price of Sh 1 800.00 per kg compared to the total FOB Mombassa cost of Sh 1 400.00. The net incremental margin was therefore Sh 400 to the company. The company confirmed that they had also received new orders from other buyers but would not reveal the source and indicated price. This type of technology transferred most of the processing costs to a central location and the coffee was processed in a uniform manner to obtain a uniform quality provided agricultural aspects were properly managed. The technology also minimized the probability of contamination as although there was a small probability of delayed processing, this technology could effectively be used to ensure timely processing. Drying could be carried out mechanically if sun drying was not possible and the cost of drying mechanically was affordable although maybe with reduced

[6] Labour costs and time for selective picking were greater:
* 400 Sh/tin for strip picking, and 4 tins/day/worker.
* 500 Sh/tin (+25%) for red selective picking, and limited to 2 tins/day/worker
(Labour costs for drying if farmer sold kiboko were around 100 Sh/tin, but not all farmers hired extra labour for drying).

profits. Analysis of the profitability was not possible as we could not access accounting records from the two factories as they considered this information to be a business secret.

According to the farmers although the factory was paying a price differential higher than the trader it was difficult to relate the price differential with addition transportation, flotation and sorting work. Most of the sorting and floatation was assigned to pickers and it was difficult to segregate and determine the wage related to the additional work and the additional price differential might not be considered a premium because there was not a precise benchmark for the coffee as prices were set by traders and not negotiable with farmers. Farmers were not paying a higher wage due to the increased task of floatation and sorting. We noted that there was a shortage of labour and the pickers were complaining about the additional work without additional pay.

While the traders were buying directly from the farm the farmers were not updated on what was happening at the buying centre, such as a change of price. Traders were closer to the farmers and had easy access to coffee. Farmers were not able to check the validity of the information provided to them by traders. Therefore sometime the company did not get enough coffee due to what the company called "unfair competition". However this competition might be necessary to prevent a monopoly of one company buying all the coffee from the area and which fixed the price alone.

Challenges:

- The change from traditional marketing to the new system. Farmers used to sell their ripe coffee on the farm or dry and sell from home or sold it to a buying store close to their homes. The buying centres were sometimes located far from the farm and required transportation. Farmers would like to avoid this additional transport cost or burden.

- The Company was operating in a risk situation in particular carrying cash and bought coffee. This had also increased the insurance cost, although not significantly, which had to be passed to the farmers who were already complaining that they were underpaid for their coffee.

- The Company was confronted with the challenge of how to handle 80% of the by-product - coffee pulp. The company had not thought about the problem of pulp and treatment of mucilage in an effective way. Therefore there was an environment–related problem pertaining to the treatment of waste water and pulp; although they had constructed lagoons for waste water treatment there was a need to filter the water from the pulp and dispose of the pulp.

- Due to competition, the Company bought coffee at night as the traders changed their buying tactics by buying at night or farmers brought coffee to the buying centre late in the evening which extended buying and selling to around 7 to 8 pm when was already dark, which increased the risk of buying poor quality, and the risk of buying the wrong volume, paying for the wrong value and being exposed to cash theft. Due to competition it was not possible for the company to refuse buying coffee although delivered at night. There was also a lack of an agreed incentive package for buying centres due to competition.

- Weak governance, rules and regulations.

- The Wet mill processor is also competing with millers as they will eventually run out of business if they don't get dried coffee for milling, as well as traders who may have no volumes and transporters who depend of hauling traders' coffee as they buy. These categories of people are people within the coffee growing areas and have significant influence on the farmers.

- The company was unable to buy throughout the year as during the tail end of the season or at the beginning of the season or during the fly crop the coffee was normally of inferior quality hence did not justify the high price demanded by the farmers. Also sometimes the crop available was too small to justify the expense of collecting from the centres. This resulted in confusion on the part of the farmer as to whom to sell and the reliability of the market was drawn into question. The farmers tended to stick with the traders whom they knew better. It was likely with divided loyalty the company would not get adequate coffee in the coming season. According to the latest information obtained on March 27, 2005 the company was experiencing problems with coffee supplies this season.

Opportunities:

Despite the challenges mentioned above there were opportunities in the wet processing technology that would enhance quality, improve prices and increase the incomes of the farmers and other players.

- Farmers needed to be organized into quality producer groups and able to supply to the wet processing plant with an option to own their coffee, hence pay processing fees to the plant and, at the same time, pay milling costs and pay marketing commission to the company marketing coffee on behalf of the farmers. The group needed to produce an economic quantity which would depend on the type of processing, marketing structures and marginal costs associated with the organization and management of the organization, compared to the net income received.

- The above arrangement would share production and marketing coffee risks in terms of ownership, quality risk and financing, as the farmers would not be paid as they delivered the coffee hence the risks alluded to above would be minimized. Farmers could deliver coffee to the factory themselves if they were organized and in return collected the pulp which could be used as fertilizer for their farms. The arrangement could start with relatively large scale farmers without an immediate need for cash as compared to smallholders. This system could be used during the initial period but the plan should be for the farmers to own the coffee till it is sold. The systems would also enhance quality as farmers could relate the final price paid for their coffee and known quality characteristics such as grade, classification, value, and volume and cup quality. The wet processing company was not in total agreement with the system as they did not understand what would be the full implications and whether the farmers were in agreement.

- It would be good if the farmers were organized by their own farmer organizations instead of the wet processing company as it could be perceived that the farmers were

being cheated on prices in compensation for the cost of extension and inputs supplied by the Company.

- A National Coffee farmers association could be a broker between the wet processing company to ensure that the relationships between the two were mutual and beneficial to all.

- The need to secure supplies of cherries to processing units led managements to establish contracts with farmers (or associations), making it possible to plan the use of factory capacity, with farmers committed to the quantities delivered. This planning could also be established with Associations acknowledged by farmers to be legitimate and which would defend their interests and organize the pooling of supplies. If the farmers committed by contract then had no other alternative but to deliver to the factory, the price could no longer be a competitive price and the parties had to agree on a price fixing mechanism that suited both parties, before the season started. National and local Associations had a role to play here. Beyond a negotiated mechanism, it was not in the interests of farmers to be dependent on a single buyer who would fix his price alone (monopsony situation); it would therefore be more in their interests to retain the possibility of selling as and when they wanted, in accordance with their preferences and their interests.

5.5.3. Socio-economic aspects

Since the objective of the study was to evaluate the economic viability of the existing traditional processing, solar drying, and the new Brazilian technologies, the socio-economic aspects were also looked into. The socio-economic related issues included the likelihood of farmers continuing with the existing drying technologies, adopting the solar technologies, or the wet processing technologies, should the EU impose quality standards (norms in the coffee chain). The farmer would change their way of processing if there was an incentive to do so. If there was no incentive smallholders might not be able to change and produce according to the standards, as the farmers might not be able to comply with the requirements due to increased costs. It was likely that large coffee traders and processing companies would be involved in large-scale production and smallholders would cease producing coffee as it might not be cost–effective for them to take into consideration the need to invest in a new technology or improve the existing traditional technologies. Since coffee production in Uganda was also cultural in addition to being an economic activity, abandonment of coffee production would have a serious negative social and economic impact, as incomes would decrease, social systems disintegrate, and poverty increase due to loss of income.

The increased costs could be supported by all the chain, part of the cost paid by the consumer can also passed on to farmers by all the participants in the chain, to ensure that farmers were paid enough to be able to continue producing good quality coffee[7]. The emerging certification programmes in the coffee industry, which are pushing for traceability to source of origin, might create more transparency in the coffee trade, which would result to fair trade that would reward farmers for their efforts and improved quality.

[7] According to Oxfam the coffee industry is valued at $ 70 billion but paying the farmer only $ 5 billion.

1. Open Drying Technologies

Drying on the bare ground was most common method of drying according to the farmers surveyed during the study. They dried on the ground mainly due to the fact that it was the most practical way of drying, they did not see why they should use other methods of drying, and any other drying methods would require them to incur additional costs for no additional reward. Farmers were not paid a differential price for drying differently. Although there were farmers drying selected picked coffee on tarpaulins, most of them dried because they were supplied with free tarpaulins by the USAID project being managed by IBERO and were paid a differential price of between Sh 50 – 100 per kg. This differential price was given for a 12% coffee m.c. which meant higher drying costs for farmers, a coffee picked by selective picking, which meant higher picking costs, and for a cleaner coffee (which reduced weight). In addition, the chain was direct, shorter, and so reduced the number of middlemen, i.e. direct transaction between exporters and farmers, which could not be developed on a large scale. These farmers also bulked their coffee together for collection by IBERO. Most of the farmers who weree under the IBERO project were not satisfied with the premium price paid to them by IBERO because they did not understand how the premium price was determined and they were not involved in determining the price.

Furthermore it was noted that the delay in drying the coffee after picking could also result in contamination according to Dr George Kulaba's survey report (draft report submitted to FAO). The farmers explained that the cause of delay was to have an economic volume for drying and they saw no reason not to delay drying. The farmers argued that whether the coffee was delayed or not there was no direct penalty to the farmer due to such delay. Although according to the Chairman of the Masaka Coffee Quality Task Force the traders might differentiate between a coffee that had been delayed and a coffee dried immediately, and did deduct kg due to other factors such as a high moisture content, they did not take into account an observed delay in drying as it was too subjective and could not be defended by the buyer if asked to explain the reason for a deduction on the basis of delayed drying. Coffee which had been delayed and formed mould which was white in colour but which had been cleaned when it was brought for sale had a distinct colour which a buyer could detect but it was very subjective. Even so, it was difficult to know how much mould formation had occurred in the coffee and if the mould had contaminated the coffee, and to what extent that influenced the occurrence of OTA. We could not obtain exact information on the number of days that the coffee could be delayed to form moulds because it depended on the level of water activity, the heap size, place and type of place the coffee was stored and condition of the coffee when picked. Differentiation of the coffee was subjective and there was no hard evidence that even if the coffee was delayed that quality had been jeopardized.

2. Solar Drying Technologies

The solar drying technologies had not been tried on the farm. Since this technology had not been tested on the farm in terms of the price and premiums to be paid for the coffee, it was difficult to establish economic viability. The challenge was to transfer this technology from the laboratories to the farm. Although the farmers had been informed about these technologies and they were willing to adopt them, they were not convinced that adopting the technology, and the associated cost, would be an advantage. Unless the buying system changed and clearly rewarded farmers for drying their coffee using these technologies there was little probability of farmers adopting these technologies as these technologies might become

additional costs to the farmer without a price differential to pay for the cost and marginal profit.

Another challenge was that there was no obvious difference between coffees dried on the ground and coffee dried by a solar dryer. It was also difficult to determine the quality differential between coffees dried on the ground and those dried by a solar dryer. Consequently, in that respect, it would be hard to pay a premium price or differential price for the use of certain technologies, so there was a small possibility of farmers adopting solar technologies. Furthermore, it was more difficult to link the level of OTA with certain drying and farming practices because OTA could occur during the time the coffee was being transported, roasted, milled, packed, and distributed. It might be necessary to ascertain the OTA level in coffee before the coffee was exported. At the same time, since most of the buying systems did not differentiate between coffees from source of origin, as the coffees were bulked together, it would be difficult to link OTA contamination with source hence impossible to penalize farmers who might be the culprits. This would require OTA determination at various levels, which might increase the cost of coffee in particular if the chain remained long as it is now.

3. Emerging Wet Processing and Drying Technologies

The emerging wet processing and drying technologies shortened the supply chain as farmers would pick and supply the wet processing plants with red cherry. The challenge was to ensure that the red cherries supplied were still fresh and not piled up and stored for some time after being picked. The catchment areas for the source of red coffee cherry might be too large for a plant to be able to collect the cherry in time and process within the required 8-10 hours after the coffee was picked to be sure of coffee quality. Another challenge was to ensure quality was the issue of ownership. When ownership of the coffee passed to another i.e. to the wet processing plant, at what price, how the price was negotiated and the price negotiating basis would influence farmers' actions that would enhance quality. The question of how farmers were organized and who organized them to supply to the wet processing plant would also guarantee a timely supply of quality coffee cherries.

Wet processing and drying technologies had also proved that they could enhance the quality of the coffee provided there were incentives for farmers to concentrate on quality production, picking and delivery to the wet processing plant. Lessons learned from other countries such as Kenya show that central wet processing technologies consistently produced uniform quality coffees that fetched premium prices on the market. Central wet processing plants come in various sizes. The largest plants can mill 3.5 tons per hour and the smallest mucilage remover sizes are 500 kgs per hour. Motorized pulpers can also be used to pulp coffee at a central location and achieve the same results.
In a situation where central processing is not feasible hand pulpers have also been used effectively and found to have produced better quality coffees. Therefore there is a good opportunity for Uganda to promote wet processing technology to improve quality and earn premium prices in the marketplace.

5.6. Conclusions and recommendations

5.6.1 Conclusions

The economic and socioeconomic analysis of the technologies indicated that most of the technologies may or may not be viable and useful to the farmer. The challenge is to come up with advice on which technologies would be adopted, and which technologies would maximize farmer interest. Provided such technology contributed higher farmer incomes, the issue coffee contamination could be minimized. Therefore, the most important issue for farmers is a price differential related to quality improvement and not whether the processing technology is viable or not. Viability of the technology will depend on price differentials.

The wet processing technology seems to be the most worthwhile technology that would minimize coffee contamination that can result in mould formation and OTA occurrence, provided it is put to test and studied for some time, over at least 3 coffee seasons. Provided proper picking is carried out and a functional quality assurance is set in place to ensure only red cherries are processed within 8-10 hours after picking, the risks of contamination will be minimized. Although Ankole Coffee Factory at Ibanda is quite satisfied with the initial results the factory was not willing to reveal their financial statements to verify the profitability of this technology. The delay in drying could be avoided if the daily pick is collected and delivered to a centrally located wet processing plant. Once the red cherry is delivered and pulped within the 8 hours required and the parchment coffee is dried properly, either by sun drying or by the mechanical dryer and stored properly in a designated silo or storage facility which will ensure quality, the risks of contamination will be avoided. Since properly dried wet processed coffee is considered to be of high quality, quality will be maintained during milling, transportation and ultimate export. The value of the coffee must be preserved so that the coffee commands a premium price from the roaster. At the same time, the roaster will preserve coffee quality because he is required to roast a quality of coffee that meets the demand of the market based on its ability to command a premium price. Therefore coffee quality is not jeopardized throughout the supply chain.

There is also a need to assist farmer level organizations so that they can produce high quality coffee and assume as many functions as possible within the supply chain while maintaining coffee quality. As long as farmers are empowered to market coffee of a known quality, value and volume and are able to negotiate the price of their coffee, the problem of contamination will be minimized.
A possible approach is to ensure that farmers own their coffee up to the point of sale of green coffee and pay the processing plants fees for processing, and a commission for marketing the farmers' coffee. This method will ensure ownership and quality, and minimize the working capital required for purchasing red cherries, as the farmers will finance the picking and delivery of cherries to the plant. It is also expected that farmers may use stocks within the processing plants as collateral to access finance, for the stocks to be analysed by an independent warehouse manager who does not have a vested interest in the coffee business, unlike buyers and sellers, to determine quality and use the warehouse receipt as evidence of having coffee of a certain quality, volume and value for sale. The introduction of a warehouse receipt system would create more transparency in the coffee industry, as for the first time in the Ugandan coffee industry, the farmer or owner of the coffee will know the quality, volume and value of his coffee before it is sold.

All the stakeholders in the coffee industry should be mobilized, which will include farmer associations acquiring relevant technologies for wet processing, which may be smaller pulpers which can pulp 500 kg per hour, motorized pulpers and hand pulpers depending on the needs and viability of each technology according to the situation of the farmers and the prevailing environment. Once this technology is adopted and is working properly, the risks of coffee contamination will be minimized and coffee quality will be enhanced.

The cost of doing business will also be minimized as exporters will not need to set up buying centres, they will be buying coffee of known quality, value and volume. Since farmers will be able to bring their coffees to the market, a commodity exchange market where coffee could be sold and bought could be established at a central location where buyers and sellers can meet and conduct business. Ugandan coffees could be of high quality, could be branded and sold under a brand name to build customer loyalty and meet the requirements of the market in establishing traceability to source of origin of coffees that are now being demanded by consumers.

The study also concluded that open drying and mechanical drying methods could be a second best technology that could be used by farmers. Farmers could use tarpaulins or construct raised papyrus mats or raised coffee wire mesh racks. This would have more impact if farmers own their coffee up to the green coffee marketing stage. As in the case of wet processing as explained above, farmers could be organized to own the added-value coffee through drying, milling their coffee and marketing a coffee of known quality, volume and value.

Solar drying, which includes box dryers and cabinet solar dryers, is not viable for an average farmer in Masaka according to current prices with no market premium to justify additional costs.

5.6.2. Recommendations

- Wet processing technologies could be promoted as a viable processing and drying technology that will minimize contamination, enhance quality, and will enhance the uniformity and consistency of coffee quality. This can be achieved with industrial units, but also small and medium size units. Organisation with industrial units needs to be negotiated with Farmer Associations, given the risks for farmers of dealing with a single buyer (in a monopsony situation) and the risk for the unit of not covering costs if supplies are not guaranteed. Financial viability need to be confirmed (we had no access to those data from private companies).

- We also recommend open drying and mechanical drying methods provided they are economic and viable.

- Solar drying is not a viable option with current prices and no market premium (to the farmer).

- The farmers, government, development partners should be encouraged to develop a strategy on how wet processing technology and other drying technologies could be developed and adopted in all coffee growing areas.

- Working through farm level organizations, farmers should be empowered to own their coffee and assume as many roles as possible within the supply chain to ensure

that they are marketing coffee which is processed by the wet processing technology or any applicable technologies and sold with known quality, value and volume.

- Farmers, government, other players in the private sector and development partners should develop an overall country business plan and strategy to finance the strategy which will include some of the recommendations in the coffee reforms. The Coffee Subsector reforms were carried out through a task force comprising the main coffee sector organizations: Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), Plan for Modernization of Agriculture (PMA), Private Sector Foundation Uganda (PSFU), The Uganda Local Authorities Association, Uganda Coffee Development Authority (UCDA), Uganda Coffee Farmers Association now NUCAFE and Uganda Coffee Traders Association.

- Government, in collaboration with farmers, development partners, other stakeholders, should put in place rules and regulations that will govern the trade based on wet processing and any other applicable technologies and negotiation bodies (price fixing mechanisms, etc).

6. Overall conclusion

1. Conclusions have been drawn for Parts 4 and 5 of the report (§ 4.5 and 5.6), which we shall not go into here.

As a complement, some remarks can be added:

2. With regard to improving coffee quality, improving the living conditions of farmers appears as a priority. The problem is not so much a lack of resources in the coffee sector, more a matter of asymmetry in the allocation of those resources, or value sharing, notably between consumer and producing countries.

In addition, many studies and projects have already made it possible to assess the situation of farmers and their needs are perfectly well known.

Today, it is increasingly difficult for farmers to guarantee a stable income due to substantial fluctuations in coffee prices. Prices have declined so much that even renewing a plantation, or its upkeep, can be problematic. Under such conditions, it is difficult to speak of "good agricultural practices". Yields and volumes are declining due to the appearance of wilt disease, input prices increase regularly, the cost of basic household requirements is growing. Under these conditions, the worry is not so much to guarantee the quality of a product (consumed elsewhere) as to produce coffee whilst reducing the costs and resources used, and ensure the survival of the household and the schooling of its children, etc.

In addition, the quality issue raised in the coffee sector is far from linked to farmers. It is above all linked to a market logic that leads to volume trading in commodities that can be sold on futures markets. Solving the quality problem is not technical but economic and social, i.e. in terms of trade organization much more than in technical change.

3. Introducing an OTA standard may lead to greater consideration of quality and therefore a remodelling of this market organization that is more conducive to differentiating between products right from the beginning of the commodity chain, which is in principal more conducive for producers.
But it might just as well lead (especially if no quality premium is involved) to a remodelling of the local commodity chain and of agriculture to the detriment of farmers. The development of private standards in the mass distribution sector has, for example, led in numerous cases to a very limited number of suppliers being used, in order to limit quality control costs, or to integration in order to ensure that production is checked by the hierarchy. In both cases, a marginalization of the smallholder market has been seen (Dolly and Humphrey, 2000, Daviron and Gibbon, 2002). There are different possible alternatives for avoiding this: 1) very rapidly set in place some simple and inexpensive measuring methods, particularly for OTA inspections, so that each stakeholder can check quality attributes and differentiate between products; this is a real challenge for research, 2) strengthen institutions (farmer associations, negotiation bodies, etc.).

Policies should focus on farmer empowerment by encouraging farmers to organize themselves into quality coffee farmer producer groups that will concentrate coffee production and farmers will manage their own affairs with very minimal outside intervention. These groups may either decide to process on a group level, or in a large organization comprising additional farmer groups forming an Association, which will assist farmers in primary processing, milling, grading, cup tasting and in negotiating the price of their coffee. Once quality is maintained from the farm throughout the value adding process, quality will be used as a negotiating tool that will make traceability possible. Traceability to the source of origin will also create an opportunity for marketing Ugandan coffee under its name and label, and make promotion through registered designations of origin possible.

Annex 1: Ugandan coffee exporters

Name of exporting company	Link with international firms
Ugacof	subsidiary of Sucafina (trader specialised in Robusta coffee)
Cargill	subsidiary of No. 3 international trader
Kyagalanyi	subsidiary of Volcafé, No. 2 international trader
Olam	subsidiary of an international trader
Ibero	subsidiary of Neumann, No. 1
Outspan Commodities	subsidiary of ECOM, international trader

Source: Ponté, 2001.

	EXPORTER	2001/02			2000/01	
		Qty	Market share		Qty	Market share
	Grand total	3 146 381	100	Cum	3 074 773	100
1	Ugacof Ltd.	488 330	15.52	15.5	507 035	16.49
2	Pan Afric Impex (U) Ltd	425 829	13.53	29.1	460 265	14.97
3	Intertrade service Ltd	261 497	8.31	37.4	166 059	5.40
4	Great Lakes	256 550	8.15	45.5	223 672	7.27
5	Olam (U) Ltd	237 829	7.56	53.1	263 878	8.58
6	Kampala Domestic Store	219 638	6.98	60.1	175 825	5.72
7	H.M.Nsamba & Sons Ltd.	192 868	6.13	66.2	89 642	2.92
8	Kyagalanyi Coffee Ltd	162 255	5.16	71.3	226 324	7.36
9	Kawacom (U) Ltd	159 790	5.08	76.4	117 508	3.82
10	Ibero (U) Ltd	127 929	4.07	80.5	191 170	6.22
11	Nakana Coffee Factory	124 818	3.97	84.5	76 073	2.47
12	Wabulungu Multi-Purpose state	104 758	3.33	87.8	91 725	2.98
13	Mbale Importers & Exporters	63 159	2.01	89.8	45 369	1.48
14	Union Export Services (UNEX)	53 481	1.70	91.5	36 477	1.19
15	Busingye & Co.Ltd.	49 315	1.57	93.1	153 300	4.99
16	Bugisu Co-op Union	42 093	1.34	94.4	27 860	0.91
17	Cetco	37 436	1.19	95.6	51 023	1.66
18	Job Coffee	31 949	1.02	96.6	0	0.00
19	Zinunula Coffee Works	25 127	0.80	97.4	22 700	0.74
20	Banga Multi-Purpose Society	21 848	0.69	98.1	82 158	2.67
21	Zigoti Coffee Works	18 009	0.57	98.7	0	0.00
22	Bakwenye Trading Co.Ltd	13 654	0.43	99.1	14 690	0.48
23	Budadiri	9 550	0.30	99.4	0	0.00
24	Joan Coffee Dealers Ltd.	6 779	0.22	99.6	21 988	0.72
25	House of Uganda Coffee	5 130	0.16	99.8	0	0.00
26	Samimpex (U) Ltd.	3 350	0.11	99.9	0	0.00
27	Nanga Farm Ltd.	1 462	0.05	100.0	1 620	0.05
28	Salati	1 280	0.04	100.0	640	0.02
29	Libra Commodities Ltd.	668	0.02	100.0	19 712	0.64
30	Cofcrop	0	0.00	100.0	8 060	0.26

Source: UCDA

Annex 2: Coffee Wilt Disease incidence by district

	District	Initial Area Under Coffee Hectares	% - age Cumulative Infection: 2002/03	Area Infected - By 2002/03	Net Area Under Robusta ha.
1	Mukono	52,000	65.60	34,112	17,888
2	Mpigi	33,000	57.60	19,008	13,992
3	Mubende	22,000	58.80	12,936	9,064
4	Luweero	20,000	56.80	11,360	8,640
5	Kiboga	10,000	54.20	5,420	4,580
6	Kibaale	5,000	55.00	2,750	2,250
7	Hoima	4,000	50.30	2,012	1,988
8	Masindi	2,000	45.00	900	1,100
9	Kabarole	1,500	58.50	878	623
10	Bundibugyo	700	77.20	540	160
11	Rukungiri	2,500	56.90	1,423	1,078
12	Bushenyi	6,000	30.40	1,824	4,176
13	Ntungamo	4,000	33.20	1,328	2,672
14	Mbarara	5,000	32.30	1,615	3,385
15	Masaka	37,500	11.20	4,200	33,300
16	Sembabule	3,500	12.45	436	3,064
17	Rakai	8,000	6.50	520	7,480
18	Jinja	5,000	22.85	1,143	3,858
19	Kamuli	6,000	28.85	1,731	4,269
20	Iganga	10,300	23.90	2,462	7,838
21	Bugiri	2,000	10.00	200	1,800
	Total	**240,000**	**44.50**	**106,796**	**133,204**

Source: Baseline Survey 2002

Annex 3: UCTF Members (2002 Year Book):

Exporters (13):

Exporter members	Position in market share (volume) Oct 2001-Sept 2002	Shareholders
Ugacof Ltd (Sucafina)	1	MNC
Pan Afric Impex (U) Ltd	2	
Intertrade Services Ltd	3	Local
Great Lake Coffee Co.	4	
OLAM (U) Ltd	5	MNC
Kampala Domestic Store Ltd	6	Local
Nsamba Coffee Works Ltd	7	Local
Kyagalanyi Coffee Ltd (Volcafe Group)	8	MNC
Kawacom Uganda Ltd	9	
Ibero Ltd (Neumann Coffe Group, Germany).	10	MNC
UNEX Ltd (marketing arm for the co-operative unions).	14	Local
Banga Multi-purpose society Ltd	20	

(MNC: multinational corporation).

Coffee Traders:
Andira Netherlands BV
Euro Commodities Ltd
Icona Café
Gentrade Limited: Agent

Processor:
Global Technical works

Coffe Buyer:
Esco Ltd

Commercial bank:
Allied Bank International
Crane Bank Ltd
Nile Bank
Stanbik Bank Uganda Limited
Orient Bank Ltd
Standard Chartered Bank

Miscellaneous:
Audit Control and Expertise Ltd: credit support organization
TOMIL: suppliers of packing material
ACME Cargo Ltd: clearing and forwarding agent
Safi Uganda Ltd: clearing and forwarding
Transami: clearing and forwarding
Interfreight: international forwarder and transporter
UCRA: Uganda Coffee Roaster Association

Annex 4. Cost of equipment

BUDGET FOR 2 X 4 SQUARE METRE CABINET SOLAR DRYER

MATERIAL	QUANTITY	UNIT COST (SHS)	AMOUNT
Iron sheets (gauge 30)	6	5,000	30,000
Wire mesh	8		40,000
Timber	8		40,000
Plywood	4		48,000
Chimney	1		10,000
Polythene (gauge 1000)	20		40,000
Nails (1 " 3 " 5")	4		6,000
Eucalyptus poles	6		9,000
LABOUR			50,00
Total			**273,000**

Source: John B. Kawongolo

Note: From the optimization experiment the loading density varies from 30 to 60 kg Therefore, this dryer is able to handle about 1 tonne of fresh cherries.

IVORY SOLAR DRYER (2m x 3m = 6 SQ.M)

Description	**Qty**	**Unit cost**	**Amount**
Nails (1" 3" 5")	4	1,500	6,000
Coffee mesh	6	5,000	30,000
Timber	8	2,500	20,000
Polythene (gauge 500) (m)	5	1,500	7,500
Labour (40% of cost of materials)			20,000
TOTAL			**83,500**

Source : John B. Kawongolo

GREENHOUSE EFFECT (GHE) SOLAR DRYER – (5 M X 6 M) = 30 SQ.M

NO.	**EXTERNAL**	**QTY**	**UNIT COST**	**AMOUNT (SHS)**
1	External Shell			
	Flat Iron sheet (gauge 30)	9	10,000	90,000
	Polythene (gauge 1000) (m) 1.5. Role)	150	1,500	225,000
	Angle iron (11/2" x 11/2")	14	15,000	210,000
	Flats	28	5,000	140,000
	Welding rods (boxes)	3	13,000	39,000
	Hacksaw blades	10	1,200	12,000
	Pipe	8	10,000	80,000
	SUB TOTAL			**796,000**

2	Drying Unit			
	Coffee mesh	20	5,000	100,000
	Timber (3" x4")	10	5,000	50,000
	Timber (1"x 12")	10	5,000	50,000
	Nails (1" x 2" x 3" x 4")	6	1,500	9,000
	Chimney	1	30,000	30,000
	Sole tape	10	2,000	20,000
	SUB TOTAL			**259,000**
3	Others			
	Paint	6	15,000	90,000
	Brushes	3	2,500	7,500
	SUB TOTAL			**97,500**
	TOTAL COST OF MATERIALS			1,152,500
	Labout 30% of the total cost			345,750
	OVERALL TOTAL COST Materials and Construction			**1,498,250**

Source : John B. Kawongolo

Bibliography

Daviron B. and Ponté S., 2005. The coffee paradox. Global markets, commodity trade and the elusive promise of development. Zed Books, London, 295 p.

Daviron B. and Gibbon P., 2002 (eds.). Global commodity chains and African export agriculture. Special issue of *Journal of Agrarian Change* 2 (2).

Dijk J.B. van, Doesburg D.H.M. van, Heijbreok A.M.A., Wasir M.R.I.A. and de Wolff G.S.M., 1998. The World of Coffee Market. Utrecht: Rabobank International.

Dolly and Humphrey, 2000.

Gilbert C.L., 1996. "International Commodity Agreements: An Obituary". World Development 24 (1): 1-19.

International Commodity Body (ICB), 1996. "Coffee Market Development and trade in Eastern and Southern Africa". Project document for the ICO.

Ponté S., 2001. Coffee markets in East Africa: local responses to global challenges or global responses to local challenges. CDR Working paper 01.5, Center for Development Research, Copenhagen, 48 p.

Shepherd B., 2004. Market power in international commodity processing chains: preliminary results form the coffee market. Groupe d'économie mondiale, Sciences Po, Paris. 37 p.