GHANA COUNTRY FINAL REPORT

« Comment développer les métiers agroalimentaires en Afrique subsaharienne ? »

Étude de cas Ghana

Promising jobs in the Ghanaian agro processing sector and how to strengthen them

Sandra Barlet-GRET
Aba Amissah Quainoo-MEL Consulting
Cécile Broutin-GRET
Martine François-Gret

GRET

BARLET Sandra (Gret), QUAINOO Aba Amissah (MEL Consulting), BROUTIN Cécile (Gret), FRANCOIS Martine (Gret), *Comment développer les métiers agroalimentaires en Afrique subsaharienne? Etude de cas Ghana / Promising jobs in the Ghanaian agro processing sector and how to strengthen them*, Accra, AFD, Février 2012, 39 p.

GRET
Professionnels du développement solidaire

Campus du Jardin tropical
45 bis avenue de la Belle Gabrielle
94736 Nogent-sur-Marne Cedex, France
Tél.: 33 (0)1 70 91 92 00
Fax: 33 (0)1 70 91 92 01
gret@gret.org - http://www.gret.org

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ACRONYMS

AAGDS	Accelerated Agricultural Growth and Development Strategy
ADRA	Adventists Development and Relief Agency
AEAs	Agricultural Extension Agents
AESD	Agricultural Extension Services Directorate
BECE	Basic Education Certificate of Examination
CAADP	Comprehensive African Agricultural Development Programme
COTVET	Council for Technical and Vocational Education and Training
CPTC	COTVET Preparatory Technical Committee
CRAN	Christian Relief Aid Network
CSIR	Centre for Scientific and Industrial Research
ECOWAS	Economic Community of West African States
ERP	Economic Recovery Programme
ESP	Education Strategic Plan
FAO	Food and Agricultural Organization
FASDEP	Food and Agricultural Sector Development Policy
FBOs	Farmer Based Organizations
GDCP	Ghanaian – Danish Community Development Program
GEPC	Ghana Export Promotion Company
GETFUND	Ghana Education Trust Fund
GHAPOHA	Ghana Ports and Harbours Authority
GLDB	Grains and Legumes Development Board
GOG	Government of Ghana
GPI	Gender Parity Index
GPRS	Growth and Poverty Reduction Strategy
GRATIS	Ghana Regional Appropriate Technology Industrial Service
HND	Higher National Diploma
HRMD	Human Resource and Management Directorate
ICCES	Integrated Community Centres for Employable Skills
ICT	Information Communication Technology
IUU	Illegal Unreported Unregulated
JHS	Junior High School

KNUST	Kwame Nkrumah University of Science and Technology
MDG	Millennium Development Goals
MIS	Management of Information System
MoESS	Ministry of Education, Science and Sports
MoFA	Ministry of Food and Agriculture
MoMYE	Ministry of Manpower, Youth and Employment
MTADP	Medium Term Agricultural Development Programme
NABPTEX	National Board for Professional and Technician Examinations
NACVET	National Council for Vocational Education and Training
NDPC	National Development Planning Commission
NEPAD	New Partnership for African Development
NERIC	National Education Reform Implementation Committee
NGO	Non Governmental Organization
NVTI	National Vocational Training Institute
OIC	Opportunities Industrialization Centre
POs	Producer Organizations
PPRSD	Plant Protection and Regulatory Service Directorate
RSSP	Rice Sector Support Project
SARI	Savannah Agricultural Research Institute
SAT	Sinapi Aba Trust
SHS	Senior High School
SIU	Seed Inspection Unit
TNA	Training Needs Assessments
TTIs	Technical Training Institutes
TVET	Technical, Vocational Education and Training
UCC	University of Cape Coast
UDS	University for Development Studies
WASSSCE	West Africa Senior Secondary School Certificate of Examination
YMCA	Young Men's Christian Association
YWCA	Young Women's Christian Association

MAIN CONCLUSIONS

Market and value chain development potentials for rice and cassava

Rice and cassava are both part of the 5 food security commodities[1] selected by the MOFA in the national rural development Program. They present both a potential of income and employment generation, especially on importation substitution for rice and of reduction of rural poverty.

Cassava and rice are consumed nationwide. The first market to aim at in terms of priority and urgency is the local market. There is indeed a growing demand in urban and semi-urban areas for agrifood products, mainly due to an expanding urban population. For some crops like rice or cassava, processing is both a compulsory step and a major factor of local value adding to the final product.

The various interviews carried out during this study have confirmed that agroprocessing enterprises in these two value chains have a strong potential that can be mainly developed by answering to an increasing local demand for processed products. Issues concern as well, even if this seems to be a second priority, export development.

Key jobs for the development of these value chains are not specific to one value chain

Most of the issues we found concerning the jobs that are critical to reach the full potential of these two value chains are similar for several reasons:

- Cassava is perishable and cannot be stored in its fresh form for long periods after harvesting, so nearly all production is processed. The main subproduct is gari, which is consumed everywhere in the country and produced mainly by micro and small enterprises. The second main subproduct is cassava flour, whether it is high quality cassava flour (HQCF) or not. HQCF has a particularly important market development potential for industrial use in the plywood industry.
- Most of the rice local processing is done by small mills (500kg to 1ton/hour). There are a few medium-sized mills (1 to 3 tons/hour) and very few big mills (roughly 20 to 30 mills in capacity of 4 tons or more production per hour according to interviews).
- The industrialization level is still low in the two selected value chains. For both, there are a lot of micro processing enterprises who work at a very local level (for their own production or as service provider). A few medium-sized enterprises cover larger production zones and very few big enterprises sell more on urban markets. For cassava as for rice, notice that medium processing units that were met do not run at full capacity. Developing the crop production and have it processed on a more stable basis all year long is an issue, as well as having processing enterprises sized that answer to the local production capacity. Many small processors can be more effective and have more viable business models than a few bigger that induce transport costs. This is as well an issue of maintaining economic activity in rural areas and near production.
- There is a lack of organization and exchanges between the different actors of these value chains, which results in few common understanding and expression of problematics and a fairly weak lobbying capacity.

[1] Cassava, cow pea, rice, maize and yam are the five priorities defined by the Ministry of Agriculture (MOFA) for food security.

The selected jobs are those who appear to be crucial for the development of agro processing enterprises:

1. Micro to small enterprise manager;
2. Medium-sized enterprise manager;
3. Medium-sized enterprise operation supervisor;
4. Service provision: repair and maintenance of equipment.

Nota Bene

- Large enterprises were not selected because their small number does not justify an intervention in training development. Furthermore, most of them have skilled workers who are being trained internally or have the capacity to send them abroad for further training.
- Although promising in terms of demand and potential impact, street vendors and small restaurants were neither selected because their needs are mostly similar to those of micro processing enterprises (quality, food safety, business management skills, cooking).

Common needs for competencies reinforcement and existing support

Technical know-how is a major issue for agroprocessing enterprises, and especially quality processes, food safety, and equipment choice, maintenance and repair. The concerned positions at company level are managers of micro/small enterprises or operation supervisors in larger ones (medium-sized). They are most of the time literate (basic education or more) but didn't get any specific technical training on their processing activities: the competencies were acquired on the job.

⇨ *Individual technical advising services are not very developed for micro to medium-sized enterprises (CRI/CSRI, FRI, Grib for rice but little is done in terms of in-depth advising, no sector-specific active body for cassava).*

⇨ *Some initial agrifood and machine engineering trainings exist, but at a higher level than micro and small enterprises (MSEs) need.*

Managerial and marketing know-how are key competencies, especially for micro and small enterprise managers, who in most cases have no management background.

⇨ *These support services largely exist on a private basis (that medium and large enterprises can access) and through donor-supported initiatives (for micro and medium enterprises).*

Information and comprehension of the economic environment are essential for entrepreneurs' decision-making, such as simple booklets of existing machineries, main products and processes, equipment, list of services providers, suppliers, packagers, etc.

⇨ *These information and training services do not exist as such.*

A lack of a broader transversal approach on processing issues

The skill needs of agro processing enterprises, whether in cassava or in rice value chains, are quite similar. Some issues are indeed true for all food crops (except for the cocoa value chain, which is much more

structured, largely industrialized and export-oriented). Similarities also concern the lack of adequate human resources reinforcement initiative: some general management reinforcement exists, but no in-depth technical support.

Up to a few years ago, major interventions have largely focused on production. They now have shifted to a demand-driven value chain approach and thus also concern processing issues. In the rice value chain, different initiatives are taking place (RSSP, Up-land rice, Low-land rice, Government irrigation projects throughout the country). In the cassava value chain, the Ifad Roots and tuber improvement project (RTIMP) and the C-Ava[2] interventions have a demand-driven value chain strengthening approach.

The major technical issues that all agro processing enterprises meet at micro and small levels - food quality, equipment choice, maintenance, and repair, hygiene and norms - are not deeply taken into account. Although some group trainings or workshops are being organized in both value chains, an individual and mid/long term on-the-job advising/mentoring of these enterprises seems to be more appropriate.

For the time being, no broader agroprocessing entry has been adopted by donors and in interventions: agro processing issues do not seem to be a subject of interest. However, MOFA has adopted such a cross-cutting entry through the Women in Agriculture Directorate (WIAD). Such a broader approach should be reinforced in order to develop training and advisory programs on a common basis and reach a minimal number of enterprises.

Recognition and communication issues on agroprocessing

Young people are not attracted by agro processing activities: there is no specific training dedicated to this type of activities and what they see from it are very small enterprises (ex. gari processors) that do not require particular skills and that generate low incomes. Entrepreneurs that go into agro processing activities often do it by default. There is thus a need of communication/ information on the possibilities that agro processing offers.

Concluding remarks

According to these two value chain studies, skills development in the selected "promising jobs" seems to be a major issue, which could have an impact on agroprocessing development.

However, it seems more relevant to develop an "agrifood approach" for crops (except for cocoa) than a sector-specific one. Indeed, there seems to be a large base of common needs that can be addressed together, thus allowing to have a minimum scale and innovative intervention.

The consultants thus recommend to reinforce the developing initiatives for micro to medium enterprises:

- Initial training in agrifood, for middle-management: Polytechnics project (could be then be expanded to other Polytechnics) and such projects that allows to reach lower qualification levels (none has been identified)
- Vocational technical mentoring of managers (could be done by Polytechnics, CRI/CSRI for instance, for medium-sized enterprises as well as for MSEs)
- Developing a local capacity of service provision on equipment fabrication, maintenance and repair (Gratis, Suami and other workshops that have a training objective as well).

[2] Financed by the Bill & Melinda Gates Foundation.

Notice that if initial training is to be developed with success, there should be a revalorization of agro processing and TVET, which both remain a choice by default for students who do not have other options than this type of training and of jobs:

- Social recognition (media campaigns presenting existing jobs, sectors and products with a potential to develop, success stories, presentation of jobs you can get to after TVET, etc.).
- Institutional recognition: with TVET agroprocessing diplomas/certificates and with a recognition of qualifications for professionals.

Last, there should be some coordination between sector ministries such as the Ministry of food and agriculture (MOFA), the Ministry of Education (MOE), the Ministry of employment and social welfare (MESW), the Ministry of women and children affairs and the Ministry of trade and industry (MOTI). One of these ministries should take the lead in consultation with the others. Agroprocessing should as well be incorporated into initial and vocational skills training through the TVET policy (initial training, apprenticeship, vocational training).

I. RECALL OF OBJECTIVES, METHODS AND PROCEDURE

The purpose of the study is to analyze the opportunities and constraints on agrifood sector development in Sub-Saharan Africa regarding human capital. More specifically, the study has the following objectives:

1) Inventory Promising Carriers in the Agrifood Sector

The goal is to identify careers that generate income and/or jobs in a lasting manner in the agrifood value chain taking into account the diversity encountered in the commodity chain in question, the size of businesses, and market characteristics (local, regional or export). The analysis will be more detailed and specific for one or more commodity chains in each country. These more detailed analyses will serve as the basis for reflection.

2) Identify the Opportunities and Constraints on the Emergence of these Promising Carriers

Based on detailed studies of specific commodity chains in each country, the analysis will take into account the similarities in some operations across commodity chains, the territorial (rural/urban) dimension, and the nature of the target markets (local, national, export).

3) Propose Recommendations on Support for People and Policies

The recommendations shall aim to be operational in each country. They shall seek to lift hindrances to ensuring that training matches qualified human resources needs so as to help develop and implement the careers identified as promising.

The study has been based on a detailed analysis of the agrifood sectors and the training sectors in four African countries: Ghana, Senegal, Cameroon and Madagascar. In each country, a national consultant and a GRET consultant have produced a detailed analysis of the agrifood sector and the training sector. This will lead to recommendations on policy and training systems to ensure a better match between the skills supply and demand in the agrifood sector. In each country, one or two specific commodity chains have been chosen for more detailed analysis.

In Ghana more specifically, the two selected value chains were chosen with the AFD in Accra during an initial start meeting. Main results have been debriefed with the same team and forwarded by AFD to the Ghanaian Donors Agricultural Group in order to give its members the opportunity to react. We especially thank CIDA for its very constructive remarks.

More enterprises and actors were met for cassava processing than for rice processing since the mission duration did not allow the consulting team to go both in rice processing zones, which are far from Accra. The field visits were made in Kumasi, where many cassava processing actors are located and in Great Accra, where some rice growing and processing actors can e encountered. The other inputs concerning rice processing come from the MEL knowledge on this subject and from bibliographical sources.

II. BACKGROUND – SOCIOECONOMIC CONTEXT IN GHANA

1. Demographic transition and urban young population

Ghana is one of the five English-speaking members of the Economic Community of West African States (ECOWAS). It occupies a land space of 238,533 square kilometers and recorded a population of 18.9 million people during the 2000 census. The country's population growth rate reaches about 2.7%, having dropped from a high of 3.0 but still far from replacement rate. Within five decades, the country's population virtually quadrupled from 6.7 million in 1960 to almost 25 million people in 2011 (Ghana Statistical Service, 2005 and 2006 and more recent estimates). A country profile of Ghana providing highlights of demographic and socio-economic indicators is presented in Appendix 1 to Appendix 4 for further understanding of the context.

According to the 2005 census figures, women accounted for 50,49% of the population. Also, approximately 41% of Ghana's population consists of children below 15. Youth in the 15-24 age range constitute 18% of the total population while people in the 25-59 age range account for about 33% (Ghana Statistical Service, 2006, pp. 3-4). The country is still in a transition from high fertility to low fertility, and its population growth is expected to run into the latter part of 21st century even though replacement fertility level might be reached by 2035.

During the past four decades, the urban population has grown rapidly from 23% of the total in 1960 to 43.61% of the 2000 population (Ghana Statistical Services, 2005). This rural-urban drift is not only putting pressure on education and other social services in urban areas but is also creating an urban unemployment crisis that is difficult to contain through skills training and job creation.

2. Structure of Ghana's economy

Ghana is one of the fastest growing economies in the world. According to the World Bank (2012) the GDP growth rate in 2011 was about 12.7, which is one of the highest GDP in Africa . The country is well endowed with natural resources. It has signed a Millennium Challenge Corporation (MCC) Compact in 2006, which aims to assist in transforming Ghana's agricultural sector, which accounts for 28% of GDP and employs 56% of the workforce, mainly small landholders. The services sector accounts for 50,7% of GDP, while industry only accounts for 21% of GDP and 15% of the labour force.

The structure of Ghana's economy has not changed much since the country attained independence in 1957. The country still depends on the export of primary commodities such as cocoa, gold, diamonds, manganese and wood products. Some impressive gains have been made in the non-traditional export sector which again consists mainly of handicrafts and unprocessed food items such as pineapples, mangoes, yam, pepper and bananas.

See Map of the country in *Appendix 1.*

Ghana is committed to the achievement of the MDGs and aims to attain a middle-income status by the year 2015. Of particular interest in this context is the use of TVET to achieve MDGs #1, 3 and 8, which are poverty reduction, gender equality and empowerment of women, and the development of a global partnership for development.

3. Ghana's agricultural policy background

Agriculture is the main stay of the Ghanaian economy. Until recently however, there have not been any comprehensive policy documents that have spelt out all the key issues in the agricultural sector. During the post-independence era, Ghana witnessed significant growth mainly through large commercial farms (state farms). However, they were later badly managed by the state.

Agriculture in the 1970s suffered sustained decline until the introduction of the Economic Recovery Programme (ERP) in the 1980s. From 1991, the Ministry of Agriculture developed and implemented a Medium Term Agricultural Development Programme (MTADP) which provided policy guidelines that attained an average agricultural sector growth per annum of 2.3% (1991-1995). Ghana realized that at that rate of growth, it would be impossible to achieve its target as middle income country by 2020 (now revised to 2015).

Hence, the introduction of the Accelerated Agricultural Growth and Development Strategy (AAGDS) in 1996 to increase the pace of agricultural growth and forge linkages in value chain development (MoFA 2001). Following the AAGDS, in 2002 the first Food and Agricultural Sector Development Policy (FASDEP I) was developed as the framework for the implementation of strategies to modernize the sector. The current policy (FASDEP II) has been subsequently developed as a result of a review of FASDEP I (completed in 2007 and forwarded for Cabinet approval).

FASDEP II is more comprehensive in the sense that it captures the concerns of all relevant agricultural stakeholders in a decentralized, democratic and consultative manner that has never been done before. It also embraced institutional issues even within the West African Sub-regional context by engaging both the Comprehensive African Agricultural Development Programme (CAADP) of the New Partnership for African Development (NEPAD). Similarly, the new policy engulfs key objectives of the Economic Community of West African States (ECOWAS) agricultural policy, and Millennium Development Goals (MDGs) that are agriculture and rural development related. It is equally explicitly connected to the Growth and Poverty Reduction Strategy (GPRS II) which is the broader national development paper. FASDEP II emphasizes on sustainable use of resources towards commercialization of agriculture with a market driven growth in mind (MoFA, 2007a).

The key pillars of the FASADEP II are:

- Food security and emergency preparedness
- Improved growth in incomes
- Increased competitiveness and enhanced integration into domestic and international markets
- Sustainable management of land and environment
- Science and Technology applied in food and agriculture development
- Improved institutional coordination.

The agricultural sector in Ghana contributes as high as 37% of GDP in 2005 and 35.8% in 2006. The main staple crops produced in Ghana are maize, cassava, yam and plantain. In general, these crops are produced and consumed across the country.

III. MAIN ISSUES IN CASSAVA AND RICE VALUE CHAINS

This report has attempted an overview study of five important commodity chains in Ghana, each of which has been selected for the unique contribution it makes to the Ghanaian economy. They are five staple crops: maize, cassava, rice, yams and cowpea. To broaden this analysis, two additional value chains have been studied: fish and pepper.

Cf. these studies in *Appendix 2.*

The following criteria were used to select the two other value chains:

- Interest of the French Development Agency in Ghana
- Demand and offer on local market
- Development potential
- Contribution to food security.

The value chains were selected in accordance with the AFD study supervisors in Accra and Paris.

1. Cassava value chain

Cassava is the dominant root and tuber crop in the country in terms of production volumes and geographical coverage. It is an important staple for rural and urban families both in the fresh and processed states. Cassava's contribution to the agricultural Gross Domestic Product (GDP) is about 46% in Ghana, which reflects its growing importance as a cash crop and urban food staple. Cassava is cultivated as a monocrop or intercropped, either as the dominant or subsidiary crop. The average annual yield for cassava for the duration 2002 - 2008 was 12.7MT/Ha out of a projected achievable yield of 28.0MT/Ha.

1.1 Production Volumes and geographic distribution

Cassava is produced by small-scale farmers in almost every region of the country. However, production is concentrated in the south and middle belt of Ghana, accounting for about 78% of the total cassava production in Ghana (FAO, 2000). Compared with other major staples, cassava thrives across a wider range of ecological zones. Cassava tolerates poor soil, adverse weather and pests and diseases more than other major staples. The leading cassava producing region in Ghana in terms of volume is the Eastern region with 4, 310,11 1 MT. This is followed by the Brong Ahafo and Ashanti regions with 3,481,273 MT and 1,613,607 MT respectively (SRID-MoFA, 2006).

The following table shows the national acreages under cassava cultivation and their respective production volumes from 1999 to 2009.

Table 1. Cassava: Area Planted and Production Volumes (1999 - 2009)

Year	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Area Planted ('000Ha)	640	660	726	794	807	784	750	790	801	840	886
Production ('000MT)	7,845	8,107	8,966	9,731	10,239	9,739	9,567	9,638	10,218	11,351	12,231

Source: MoFA, Annual report (2009)

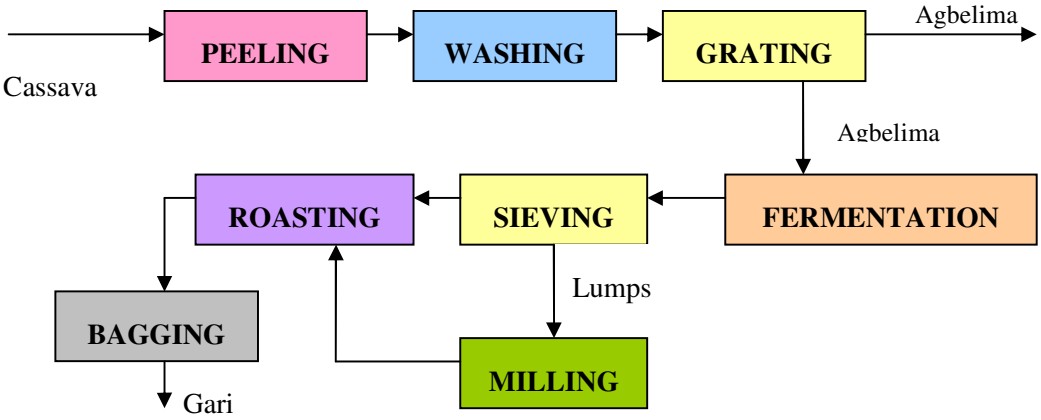
1.2 Main actors along the value chain and their relations

Cf. *Appendix 4* that provides information on the different segments of the cassava value chain.

Ways of processing cassava

In Ghana, cassava is usually processed into peeled and dried pieces called konkonte, cassava chips, flour, starch or dough popularly known as agbelima and gari. The following figure gives the flow diagram for the production of gari and agbelima.

Illustration 1. Gari and agbelima processing activities



Source: analysis of the root a tuber sector, GIZ, November, 2011

Gari processing involves the peeling of fresh cassava, washing and grating. Traditionally, manual graters consisting of perforated metal cans are used. Improved processing methods involve the use of mechanical graters.

- After grating, the mashed cassava is put in sacks and left between 3 to 5 days with heavy objects placed on the sack to allow the starchy liquid to drain while the dough undergoes fermentation to get the desired gari flavor.
- Double screw presses are used in the improved method to expel water from the dough.
- The fermented cassava dough is then removed from the sack and sieved to remove lumps and root fibers.
- The moist grits are then roasted while stirring in aluminum pans.
- The larger lumps are milled again to obtain fine grits, which are added to the moist grits for roasting.
- The gari obtained is bagged and stored to be sent to the market. All the activities involved in local processing are largely undertaken by women who also grow cassava for their own use.

Table 2. Differences between MSEs and SMEs mains processing steps

	Micro to small enterprises / groups (Kwerembeso group)	**Small to medium enterprises/groups (Joss Mossah)**
Peeling of fresh cassava		
Washing	None (barely done in micro/small enterprises)	
Grating	 +Manual sieving	(see machine on photo above)
Fermentation (double screw press)	 (*Yebesa group*)	
Roasting		
End product		

Source: field visits

Post-harvest activities along the value chain

After harvesting, the cassava crop is typically sold as fresh roots (used immediately for different meals) or processed into peeled and dried pieces (konkonte, cassava chips, flour, starch or agbelima, gari).

Women's groups are key actors in the trading and processing (gari) activities in the cassava value chain. From what the field mission saw, processing cassava can be undertaken by women working either on their own and grouping only when there is a bigger order (example of the Yebera group), or by women having common equipment. In this second case, the group that the mission saw still had individual accounts for input and final product (each woman brings her own cassava and takes her part of processed product: example of the Kweremfeso gari processors association). The women group that the mission met either sells the gari or works with a miller. Most of the time, the miller seems to be a service provider.

The processing and marketing segments of the cassava value chain require strong upgrading in infrastructure. Processing equipment (graters, presses, mills, stoves) is easily adopted but expensive, not standardized and often of poor quality. Access to credit for investment in equipment remains a challenge. The chains have generally a low labor productivity and a low innovation rate (artisanal mechanization) and deliver products of an irregular quality. Most of the women group the mission met were processing mainly for a local production. For most of them, buyers were coming to their places, sometimes to buy in large quantities. When selling to traders, women did not know where the product was to be sold.

In addition to the women's groups, a number of **cassava processing companies, mainly small and medium scale**, operate in the country. A major player in cassava processing in Ghana is the Ayensu Starch Company, the first cassava production and starch processing company that was established under a special initiative by the president of Ghana, called the Presidential Special Initiatives (PSI). However, the company is facing serious challenges among which are low cassava yields, falling international starch prices and a rising demand gari. Since its inception in 2001, Ayensu has managed to sell only about 2000 tons of cassava starch to the European market at $200 per ton, which falls short of even the 1995 price of $358 per ton. Other smaller companies such as Josma Gari Processing Factory in the Ashanti region, produce gari and cassava flour.

The industrial utilization of cassava (for products such as ethanol, starch, high quality flour, etc.) offers great promises for the commodity, especially for export as long as it doesn't prevent the raw material to serve the national market.

In order to take advantage of this opportunity however, a number of constraints need to be addressed among which are:

- fragmented and unstructured supply lines, which leads to high transaction costs
- pricing: need to achieve higher levels of improvement in efficiency gains in cassava production in order to bring down costs.

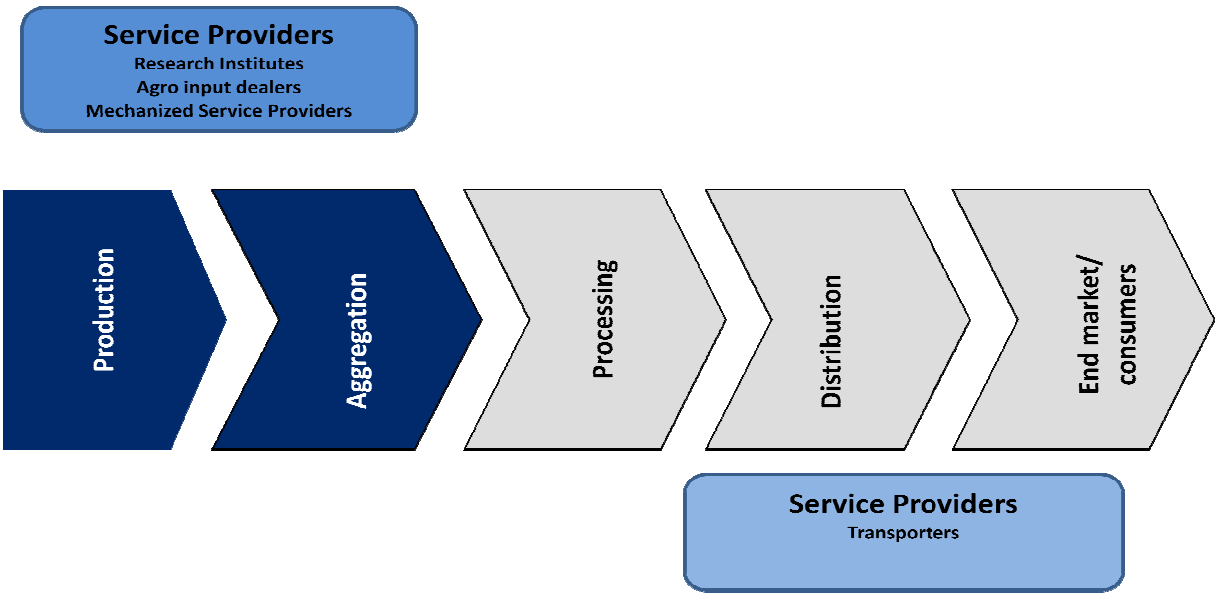
Therefore, continuous efforts to bring down the cost of production and to organize supply lines are of high importance in any effort to upgrade the cassava value chain and increase its employment generation potential.

Main actors on the cassava value chain

The main stakeholders in the cassava value chain include research institutions, government organizations, equipment and input suppliers, farmers, processors, marketers, transporters, financial institutions, regula-

tory institutions, donors, training and technical assistance providers whose activities have a direct influence on the efficient functioning and productivity of the value chain.

Illustration 2. Main actors on the cassava value chain



Source: analysis of the root a tuber sector, GIZ, November, 2011

Equipment fabrication

Locally manufactured cassava processing machinery are drum graters (rates à tambours), horizontal disc graters, cassava chippers, screw presses, hydraulic presses, cassava dough disintegrators, sieving machines, grading machines, plate mills, hammer mills and mechanical dryers.

Input providers/ processing operators

- Gari processing factories – Ejisu Kwamo, Adansi South, Fomena, Tepa etc.
- Cassava flour mills
- Starch factory - Ashanti Mampong
- Chop Bar Keepers – for fufu.

Table 3. Main constraints and opportunities of cassava processing entreprises

Constraints	Opportunities
Weak / no stakeholder associations	Possibility of applying the VC committee approach
No platform established for linkages among various actors within the cassava value chain	Use of the media to create awareness and establish linkages
High cost of processing equipment	Increasing demand for processed cassava products
Lack of competitiveness	Introduce cottage level processing plants to produce flour and starch for export and domestic market
Diseconomies of scale	Availability of media to carry information on diverse uses for cassava and cassava products and on (individual and joint) establishment of cottage processing units
Inefficient processing technologies	By-products used for animal feed.
Low profitability of gari processing	Working capital available from EDIF, Banks and Venture Capital
Inadequate knowledge in food safety and quality standards	
Inadequate utilization of by-products	
Limited number of cottage level processing units (cassava flour and dough)	
Inappropriate packaging / poor packaging	
Limited utilization in non-traditional products (feed, composite flours, starch and starch derivatives)	
Low uptake of new/improved products from research	
Inadequate capital to acquire sufficient cassava for all year round processing	

Source: MOFA (draft) work and mission

See detailed table in *Appendix 3*.

1.3 Consumption habits for processed products

Processing technologies for cassava in Ghana can be divided into three broad categories: (a) dry cassava products - fermented or unfermented; (b) fermented grated cassava and (c) starch and tapioca.

The production of dried chip in very dry climate zones is often a very laborious and time-consuming occupation and is invariably carried out by women. Drying of cassava roots is the simplest preservation method used in the Northern Region of Ghana. Over 80% of the cassava produced remains on small-scale farms which range from 2 - 5 acres. The tubers are peeled, cut into pieces and sun-dried. Drying is normally done on the concrete floor, roof tops, roadsides, or wooden platforms built over fireplaces in traditional kitchens. Leftover peels are fed to animals to prevent waste. The dried chips are normally pounded or milled by existing commercial plate mills to prepare kokonte. Kokonte, a flour product, is prepared from low cyanide varieties that are widespread in Ghana. Cassava chips are used solely for food requirements for drying. The quality of dried cassava chips processed by traditional methods is often poor, causing fungal or bacterial contamination. The flour is mixed with boiling water, prepared into a thick starchy paste and eaten with soup. In the grain-flour consuming areas of the North, it is used in combination with sorghum, maize or millet flour, either to improve the texture of the prepared food or as a cheaper supplement, and then referred to as tuozaafi (T.Z.), the traditional dish in the North of Ghana. It often supple-

ments staple foods or even provides hunger relief where yields of other traditional staples are declining, such as in the North.

Other very popular cassava products in Ghana are fufu, gari, agbelima, agbelikaklo and yakeyake. In all these preparations, the roots undergo a fermentation process while they are immersed in water for some days. In the case of fufu, the peeled or unpeeled roots are watered for some days, then dried in the sun and pounded into flour. The dried fragments possess a distinctive, pleasant taste due to the fermentation. In the West African preparation of gari or atieké, fresh roots are peeled, grated and then left to ferment; the pulp is finally cooked on heated plates (Silvestre, 1989). Gari is the most commercialized product in Ghana because of its long shelf-life. The processing of agbelima is nearly the same as for gari but differs in being terminated after fermentation. If the dough is mixed with salt and moulded into balls, which are fried, it is referred to as agbelikaklo; and if these balls are only steamed they are called yakeyake (Hahn, 1988).

1.4 SWOT Analysis for Processing of Cassava in Ghana

Strengths

- The Cassava crop is an indigenous plant and therefore does not need any adaptation to soil condition on Ghana. Cassava is a very hardy crop that adapts well to a wide range of growing conditions soil types, and fertility levels.
- The crop is remarkably drought resistant and relatively free from pest attacks.
- Agronomic practices for the crop are not complicated and the planting materials do not require a sophisticated breeding programme.
- The crop yields more calories of food per unit input of labour than probably any other root crop in Ghana.
- The plant combines high energy and high levels of vitamins, minerals and dietary fibre.
- It is an important animal feed.
- Processing through fermentation leads to a reduction of cycoprogeric glycosides.
- Processing leads to the introduction of flavour and therefore several dietary uses for the crop.
- Processing leads to a lowering of acidity in the fermented crop.
- The crop can be processed into various industrial products such as starch, glues, cassava beer, cassava alcohol and cassava vinegar.
- Cassava products find several significant industrial uses in the manufacture of textiles, bread, fructose syrup industry and substrate for dextrin's used in manufacturing of glues.
- The ease of processing is an advantage given the poor using of labour intensive tools and equipment in rural and peri urban areas.

Weaknesses

- The long distances that purchasers of various materials have to undertake on poor rural terrain to obtain huge quantities of the crop.
- The growing of low starch content varieties such as Afisiafi, which are not ideal for industrial processing.

- The poor agronomic practices of farmers whereby they undertake mix farming and therefore usually grow the crop on a subsistence level.
- Existing farmer yields do not match the large quantities demanded by commercial processing plants.
- The absence of relatively large commercial farms growing large quantities of crop.
- The problems associated with purchasing in weights as compared with volume on the local market against the needs of commercial purchasers.

Threats

- It is estimated that Ghanaians eat more than 60% of all cassava processed into gari, starch, flour and powder.
- About a third of the harvested produce is fed to animals.
- High cost of electric power for processing activities.
- Waste disposal problems for the sludge which is a by-product from processing gari.
- The financial implications could be high for running a solely owned farmer processing plant.
- Prices negotiations between farmers and middle men/women are poor, leading to low produce prices for farmers.
- Farmers are slow in adopting new varieties and high yielding agronomic practices due to their low level of education.
- Marketing strategies are inadequate for promoting the adoption by the general public of the diverse uses of processed cassava products.
- High volumes of water are required to process and produce good quality starch.

Opportunities

- Promoting the cultivation and processing of cassava crop has potential for reducing rural poverty.
- The external export market exists for processed cassava starch with a huge potential in the neighbouring ECOWAS sub region.
- The application of irrigation systems could expand all year round cultivation of the crop.
- There are huge opportunities for tapping into the research findings at IITA on the industrial uses of cassava crop.
- Opportunities for commercial use of cassava processes by products by Tiles Cement manufacturers, Unilever Ghana (in the manufacturing of food flavouring), and Guinness Ghana (used in brewing trails), soap and pharmaceuticals among others.

2. Rice value chain

2.1 Production, importance in agriculture in Ghana

Rice is important to Ghana's economy and agriculture, accounting for nearly 15% of the Gross Domestic Product (GDP). The rice producing area represents about 45% of the total area planted with cereals. The rice sector is an important provider of rural employment.

The motive behind rice production is mainly for food security, and secondary for food security.

Domestic production of rice in Ghana has been less than consumption needs, for a long period of time.

Demand for rice began to outstrip supply due to population increase and improved standard of living.

Unreliable production and marketing arrangements have also contributed to this situation. Consequently, Ghana imports up to the equivalent of 200% of its local production in order to compensate for the short fall in supply (Dogbe, 1996). Rice is by every account an important crop in the Ghanaian staple diet and its availability throughout the year is of great importance, yet it will be very difficult for the country in present circumstances to achieve self-sufficiency in rice production. This could be achieved through area expansion or increased output perunit area. However, production constraints such as land tenure problems, removal of subsidy on inputs, absence of water control systems, lead to high-risk and non-intensive cropping practices. Other problems include low yields and low profitability, reduction of the productive capacity of the soil, coupled with over liberalization of rice trade in Ghana. Locally cultivated rice is often unattractive to prospective buyers or consumers, and sometimes not available to them at all. Domestic production of rice in Ghana has been inferior to consumption needs, for a long period of time.

Demand for rice began to outstrip supply due to population increase and improved standard of living.

2.2 Main actors along the value chain and their relations

Key rice value chain actors include: producers, processors, traders, service providers, mills in rural and peri-urban location, large mills and large scale marketers.

Producers

Producers consist of seed producers and growers of rice paddy. Focusing on paddy growers, farmers generally do not have much market power and often do not have the choice to determine the right moment to sell their paddy, since they usually need cash at harvest. Small holder poor producers to a large extent depend on in kind and cash loans from other rice chain actors to finance their production activities which often lead to low margins and returns.

In the four major regions where the bulk of locally produced rice is cultivated – Northern, Upper East, Upper West and Volta – farmers are typically small scale with land sizes below 2 acres and mostly organized in Farmer Based Organizations (FBOs) with assistance from MoFA or NGOs. Some larger scale individual farmers however work with small farmers using out grower schemes. The larger farmer provides land preparation, inputs, farm maintenance and harvesting services which the small farmer pays for with produce at harvest.

In general, producers do the threshing themselves or employ people (men and women) to do it when production is important, but then only for maximum 3 months. Threshing is thus not considered as an enterprise, even if it concerns a large number of men and women. It is widely done manually, in a traditional and labour intensive way.

Processors

Processors either purchase paddy from farmers or finance farmers to produce paddy. The main distinction between the processors is that those in the three Northern regions parboil rice while those in the Volta Region do not. In the three Northern regions, processors parboil rice before milling due to the prevailing dry climatic conditions which reduces the moisture content in rice. Rice is indeed dry in these regions because of the Harmattan, and parboiling facilitates of hulling. Processors in these regions parboil rice before sending it to mills for further processing. Parboiling is a labour intensive process and the activity is carried out in groups. Individual processors also exist: they hire labour for parboiling of their paddy at the harvest season. Parboiling activity thus cannot be considered as an enterprise, since it is not done all-year long. In the Volta Region, processors do not parboil rice but buy and store paddy for processing.

Parboiled rice is preferred in the North since people have got used to this taste. It is also sold and consumed all over the country, at a roughly similar price than unparboiled rice. Nevertheless, according to interviews, it cannot be concluded that it is preferred to unparboiled rice.

Processors purchase paddy for storage when prices are low at harvest.

Traders of paddy

These include larger farmers, processors, aggregators and brokers who both buy and process paddy on their own or on behalf of larger marketers, trading companies or millers. The traders are key actors for 'pulling' the rice value chain and financing producers and processors. In all the four regions, some traders arrange financing for producers and processors either from their own sources or through financial institutions. Traders are a category of actors who purchase paddy and/or processed rice for themselves or on behalf of others.

Packaging and marketing – that consists of buying, trashing, packaging and selling - is often achieved by processing groups. The packaged products are mostly bought by urban upper class consumers. The main packaging and marketing actors are: women groups, who package the product that they bring to the mill; some medium and large-sized mills, which have internalized a packaging function; and some intermediaries.

In Northern regions, packaging and marketing actors are mostly enterprises groups. In the Southern regions, packaging and marketing are most often undertaken by individuals who have organized themselves in small groups.

Rice providers

Rice providers are individuals within farming communities. They own machinery and equipment such as tractors, power tillers, crawlers, combine harvesters and threshers that they hire to farmers. In all the four regions, there was consensus that service providers could be financed to obtain equipment which can be rented out to other farmers.

Small mills in rural and peri-urban locations

Mills are often the only places where rice milling services are available for a cluster of rice farming communities. Some of these mills serve as storage and marketing facilities for the processors who are their customers. Many of the mills located in rural and peri-urban areas in the Northern regions are old and experience frequent breakdowns. Most of these mills do not have the full complement of equipment, especially de-stoners and sorters, which improve the quality and grading of milled rice. Mills can work as private service providers for people who bring their own paddy (*mini-rizeries*). They also sometimes belong to processing groups. Last, they can process bought paddy (nuclear farm model: *moulins*). Small community/village most often mills do more as service providers for others.

Most of the mills in rural areas have a very small capacity (500kg to 2 tons a day) and work with local producers. Millers mainly use Chinese, Japan, Korean and Indian models. Some are locally built, in villages for community consumption or by Ghanaian fabricants, like Gratis or Suami (see Gratis illustration 7). Machines are rudimentary, some phases in the process are mechanized. Rice is either directly marketed or sold to intermediaries. If the mill acts as service provider, the product is given back to the producer. In general, these small mills process locally produced rice. This can be for local consumption - paddy is then sold processed and unpackaged, in sacs or basins on the local markets. Rice can also be sold to intermediaries, who transport it. This size of mill is less expensive (around 4 500 to 6 000 Cedis to equip) than bigger ones and more adapted to community needs.

Medium sized and large mills

The larger - medium to large - mills provide services to individuals, companies and organizations that want to process paddy rice. These mills often stock paddy, milled rice and provide storage facilities for their customers. All the other regions apart from the Upper West region have medium to large mills, some of which are underutilized for want of repairs.

There are 3 to 4 medium sized mills in the country (Volta region and North), which can process around 3.5 tons a day. Equipments are mainly mechanized (silos, stoners, conveyor system, different grids according to quality/markets). These mills buy paddy and sell it to large retailing companies, package and market it or export it directly. They usually, according to interviews, hire 15 to 20 workers.

There are 1 to 2 big mills in the country which can process up to 5T a day: the Afife Rice Mill in the Volta Region, the Nasia Mill in the Northern Region and Worawora Mills in the Volta Region. They are entirely mechanized. They buy paddy and sell it to large local companies or/and export it. For instance, Olam (does many commodities, for instance dominate trade on cashew) buys from farmers, then produces, processes and sells (locally and exports). Big mills have good technicians, some of which have been trained abroad.

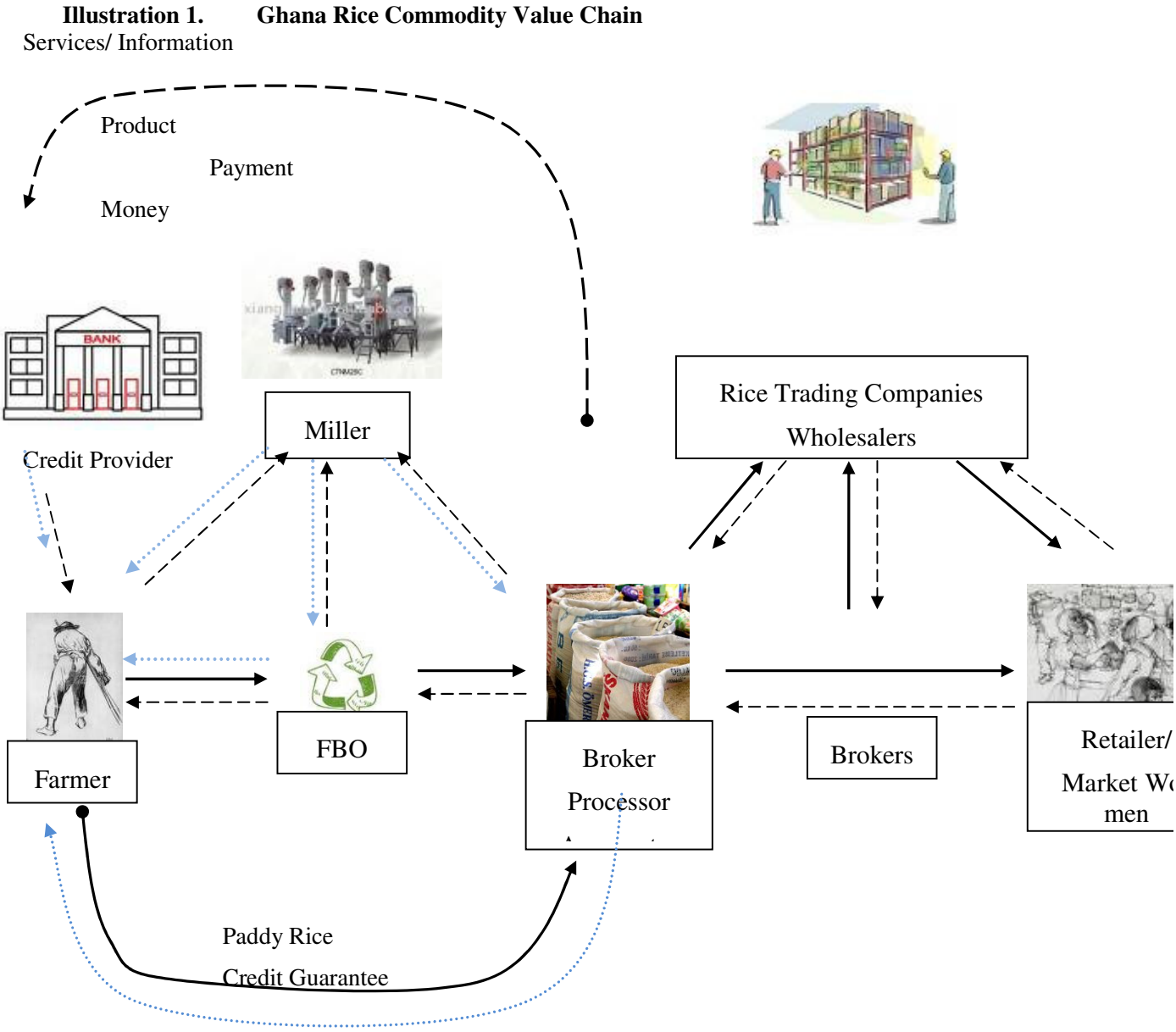
These medium and large mills compete with imported and local products. They have a capacity of anticipation of their activities, of needs formulation, of autonomous development. They also have an easier access to finance and BDS, which helps them to partly finance the services they need. Their staff is trained internally or, when training does not exist in Ghana, abroad.

Large Scale Marketers

These are mainly individuals and companies that purchase paddy and processed rice on a large scale. They often sell processed rice to large trading companies. Large scale marketers are key actors for “pulling” the rice value chain by providing secure markets for both paddy and processed rice. They sometimes arrange financing for the producers and processors either with their own resources or through financial institutions. Some of these large scale marketers are also large scale producers who organize clusters of FBOs and processors.

Large scale marketers include Brada Rice Ventures, based in Tamale – Northern Region, which often finance rice farmers (to supply paddy) and processors (to supply milled rice). They often stock paddy, milled rice and provide storage facilities. The large scale marketers fund their operations with prepaid orders and loans from commercial banks.

Illustration 1. Ghana Rice Commodity Value Chain



2.3 Consumption trends for processed products

Rice is generally consumed in urban areas by middle/upper classes, since it is rapid to prepare (at home and in restaurants). Perfumed rice, especially jasmine and Togo Mashal, are particularly appreciated by consumers.

Urbanization and changing consumer preferences are the main drivers of significant growth in per capita rice consumption, as urban populations consume significantly more rice than rural populations. From a steady level of 7-8 kilograms per year through 1990, per capita rice consumption increased to 11.5kilograme per year on average during the 1990s and climbed considerably to 27 kilograms per year for the period from 2001-2005. Future increases are projected by the Ministry of Food and Agriculture based on a combination of overall population growth, rising incomes, and increasing urbanization.

The ministry has a strong interest in reducing reliance on imported rice to improve food security and conserve foreign exchange. It therefore seeks to encourage domestic rice production until it exceeds rice demand, based on investment in commercial rice farming.

Foreign investors interested in commercial scale rice farming have the opportunity to achieve attainable yields of 4.0-4.5 metric tons per hectare from irrigated, mechanized farming of aromatic, long-grain varieties to meet Ghana's significant and growing rice demand. Ghana's Ministry of Food and Agriculture estimates that demand for rice in Ghana will increase at a compound annual growth rate of 11.8% from 939,920 metric tons to 1,644,221 metric tons between 2010 and 2015.

3. Mains common issues in rice and cassava value chains

"Promising jobs" are jobs with high market potential for enterprises development, both in terms of income and employment generation. They have been identified in the different types of enterprises, according to the typology built in first part of the study (on the basis of a bibliographical analysis). They are the same for rice and cassava and present very similar issues in terms of human capital reinforcement needs.

A common feature is that **these enterprises (in the rice and cassava value chain) are not attractive to young people**. Young people generally do not know these processing jobs and there is no educational curricula leading to them. Moreover, the processing activities they see in their surroundings are most of the time ran at a very small scale by entrepreneurs who have no technical background, do not earn well their leaving and are not in capacity of investing to develop their business. They are not aware of processing development potentials and haven't heard of success stories. This may be true in a far broader way for all micro to small/medium processing enterprises, and seems not to be limited to the cassava and rice sectors.

Lastly, **some jobs have been identified but were not selected**:

- Storage and warehouse: mills always have a storage place (silo or other). Warehouses also exist, some of which are engaged in processing activities. This job has however not been further studied since this is not an agroprocessing activity but an activity some processors do (for them or renting place for others).
- Meals fabrication and restaurants: they are mostly informal activities selling meals in the streets or in restaurants, and are widespread in both rural and urban areas. They have not been selected because they are closer to restoration than to processing activities.

3.1 Micro agroprocessing enterprises

Characterization

For rice as well as for cassava, milling is generally done by a service provider. Artisanal milling of rice barely occurs, only in remote areas, but even there, women prefer to find a mill than doing it themselves. There is a strong price competition. Barriers to entry are however low on activities:

- Cassava processors are mostly women. They process mostly gari, even if some do flour. They often work in groups, whether they put raw material and finished products in common or not. They rely heavily on family labour.
- Rice processing especially consists in milling. In the North, parboiling is as well very developed (see explanation in rice processing actors description above). This is not done (not needed) in the South of Ghana. Parboiled rice is consumed throughout the country, although it is not necessarily preferred by consumers. Its price is roughly the same as unparboiled rice. Parboiling is a seasonal activity, directly done by the producers and cannot be considered as an entrepreneurial activity as such.
- Generally speaking, ways of doing are very basic even when individual processors are organized in groups (see processing illustration 1).
- Products are sold locally or to intermediaries. Most microprocessors sell in bulk (in big-eg. 50kgs bags) on the street.

Education and job-related competencies are very low:

- Know-how related to the processing activity is very weak.
- Processors have a basic education level. Most of them can read and write.
- There is no specific processing education: processors have learnt by working with their parents (most often with their mothers).

Processing is often carried out in unhygienic conditions. For rice as well as for cassava, products are laid directly on the floor (ex of rice drying: stones mix to grains), with animals around (see photos on cassava). Some unsanitary practices have also been noticed (ex. pans used are not stainless). No quality control or rule is applied during processing.

Main constraints and issues

Operations are carried out on a very small-scale. Processing activities are labour intensive (mostly carried out manually) and time consuming, which is mainly due to a low investment in equipment, that is often limited to kitchen pots.

Operations are not properly costed: family labor is not perceived as a cost and there is no knowledge of breakeven price calculation.

There is also a lack of know-how concerning quality and hygiene standards (food quality, consumer health etc.) as well as for quality working conditions. Some operations such as roasting for gari are very binding (great heat) and probably has effects on women health.

Furthermore, processing areas are scattered and not organized. There is a quite strong isolation in job exercise. Even when processors are grouped, they have no access to information on activity development potentials, on ways of doing, etc. Their know-how is mostly limited to familial environment training and practices, with innovation.

However, group organization presents a potential to shift to a semi-industrial production process (by buying common equipments). Such steps have been seen in both cassava and rice processing, where invest-

ments in equipments have been supported by partners: by RTIMP in the case of the "Good practices centers" for cassava, or by an older MOFA irrigation project in the Ashaiman region with rice (see illustration 5). Mains constraints to a shift to semi-industrial processing are the capacity to invest, the know-how on equipments, group management and processing know-how.

The difference between micro and small enterprises when it comes to group enterprises is small since the ways of doing are quite similar (equipments, know-how, clients, etc.). They have been presented as microenterprises.

Illustration 2. The Yebasa gari processing group

30 women work together, but each manages individually her products.

Each woman buys her own raw material. The processing (peeling, washing, grating, fermentation, sieving) is done in common and the processed product is then shard according to the initial input quantities. Each woman cares for her milling by working with a service provider, M. Abdou Karim. M. Karim works for this group and contracts individually with each woman. His mill doesn't work all yearlong. Women roast cassava separately as well.

Illustration 3. The Kweremfeso gari processors association

In this group, 40 persons (30 women, 10 men) work in common: men grow cassava, women process it. Women have different roles in the processing activity: some only peel, other roast, etc. Some women buy raw materials and employ some other, who are paid to the task. Common work ends when it comes to selling: the group wishes to sell together to a bulk buyer but doesn't manage to.

The group has been created 4 years ago. It has then been selected as a Good practice center in the frame of the Ifad RTIM Project.

Roughly, individual earnings from these two groups (Kweremfeso and Yebasa) are found to be quite similar: 100 Ceedis/person/week. Employed women earn less than the ones that invest money and employ them.

Nota bene: packaging has not been identified as a big issue, since there exists local fabrication (plastic bags, cans, bottles, etc.) for all sizes of enterprises.

3.2 Small processing enterprises

Characterization

There are many small mills in the country (500kgs to 2 tons/hour). Either they act as service provider, for people who bring their own paddy, or process bought paddy (nuclear farm model). Small community/village mills are more often services providers, but there is no unique rule. There are few small cassava processing enterprises apart from group enterprises. One – Joss Mah - is presented below. Machines remain rudimentary. Process include some mechanization phases.

Rice and cassava are either directly marketed or sold to intermediaries, who sometimes then export them. If the mill acts as service provider, it is given back to producer. Millers process locally produced rice and cassava.

For cassava, clients are middle and upper social classes (niche markets), mostly in (peri) urban areas, who buy packaged products. Rice produced by small mills is consumed in urban or rural areas throughout the country.

Illustration 4. Joss Mah, cassava processing enterprise in Kumasi region

The enterprise has started in 2005 in maize and cassava farming. The manager then realized there was a potential for cassava processing and set up a plant, with support from RTIMP. The manager is retired from banking and married to the Ashanti region traditional chief. In 2009, it became a RTIMP Good practice center (cost of building this Good practice center, with machines: 70 000 Ceedis – around 50 000 USD; partly paid by RTIMP, partly by the entrepreneur). This allowed the enterprise to get improved varieties of cassava and introduce it in communities, which then were mostly growing maize (and not cassava). They trained them to cassava producing and bought cassava for the ones who agreed.

In 2005, 10 persons worked for the company (only farming). In 2010, the enterprise counted 25 employees (15 farmers and 10 processors: mainly men for farming and processing, except for peeling and roasting). Joss Mah is the biggest enterprise in Ashanti region.

Today, the company produces gari and high quality cassava flour. Its objective is to intensify production and has acquired (partly supported from Gratis, coupled to individual investments) equipment (not yet used) for this. The company processes 18 tons of fresh cassava a week. It sells gari locally, and indirectly exports (30% to the UK) because some intermediaries make orders in advance. High quality cassava flour is not yet exported. They buy 30% of their production from local farmers and want to increase this percentage. An important issue is on production quality stability.

The company counts 2 supervisors and 3 farm managers, other employees are unskilled. They do not feel major competencies issues, since they are already supported by RTIMP. One difficulty is the staff turnover ("when properly trained, people leave"). Equipment is a main issue, since it is difficult to find in Ghana. Gratis has developed models specific to this size of enterprise, which was of a great help.

The company's objective is to sell to supermarkets, once Food and drug Board certification will be obtained.

They are in the process of equipping themselves to turn to High quality cassava flour production (HQCF). This rapid evolution can be attributed to educational level of the manager, investment capacity and a strong social network.

Illustration 5. Ashaiman rice processing group, near Tema

As a result of an irrigation project implemented with the Ministry in charge of Agriculture (MOFA), a mill was set up in Ashaiman in 1994. This cooperative has been a Grib member since 1993.

Today, a cooperative of 93 farmers (rice, maize, ocher) having fields ranging from 1-1.5ha work with this mill. The mill belongs to a service provider, who employs 4 persons (manager and 3 workers). Machines have been donated by

the Japanese cooperation. Farmers bring paddy, then the miller sell rice to brokers and farmers share profits from their farmer bank. Farmers profit seems roughly to account for 150-200 Ceedis/month. The mill, which has a capacity of 5 tons/hour, does not seem to work at full capacity (estimation at 55% capacity).

Some people come from hundreds of kilometers to mill rice because they don't have themselves a destoner (2 in the mill: one on paddy, one on polishing).

One of their major constraints concerns reparation of equipment and finding spare parts.

Main constraints and issues

The following main constraints and issues have been noticed :

- inability to operate and maintain machines to produce good quality on a steady basis;
- lack of knowledge on norms and hygiene;
- mills and enterprises are often not properly set up: production, organization, hygiene. However, products' quality and norms are compulsory to integrate "modern" distribution channels;
- limited product innovation;
- processors usually have neither capital nor access to capital to enable them to afford cassava processing equipment.

3.3 Medium to large enterprises

Characterization

The few medium to large rice mills (3 to 4 medium mills, 1 to 2 big mills) are mainly (medium) or completely (large mills) mechanized and are mainly working for exports. They employ a skilled and specialised workforce.

Concerned products:

- cassava: gari, high quality cassava flour (HQCF), plywood cassava flour (slightly fermented), Agbelima products (Nota bene - starch is not a major product).
- Rice: polished rice production. There are few rice sub products.

Illustration 6. Praise exports (met concerning cassava processing, among others activities)

The enterprise was created and registered in 1994 with no large investments and then employed 2 persons. The founder had experience in industrial products processing. He was partly trained and had lived in the UK, on the company's major export market.

Today, the enterprise only works at exports, from local raw material. It exports 10 tons cassava a month. Cassava is one of the many processed and exported products. For all products, the enterprise globally exports 70 tons/year. It has 97 employees, most of whom are permanent: 8 managers, 4 technicians, 6 supervisors and the manufactory workers. The enterprise works on 3 sites: the first receives raw material (washing and begin of processing), the second mills and dries, the third packages.

The company buys fresh cassava in bulk from open market, on processing sites in the Volta region. The truck drivers buy at one outlet (at one farmer: they buy his whole production as well as the one from other

farms). Cassava is bought fresh for quality reasons (farmers don't have grids to avoid moisture). Its processing is 85% mechanized (dehydration, milling, sieving). All the packaging are locally made.

The company has limited resort to business services providers, mainly the Ghanaian Export Promotion Council (one training a year on standards, trends and export marketing).

Concerning its management team, the enterprise does not have critical human resources difficulties: its staff is educated in Ghana (University of Ghana in food industries, food sciences, Institute of export and shipping management, Polytechnics, etc.), sometimes abroad (but not for the majority), and had experience before joining the company. Short-term vocational training courses can be identified when needed, but most of the training is done internally.

Main constraints and issues

The following main constraints have been noticed:

- repair and maintenance: technological complexity (production processes, maintenance, spare parts);
- managing inputs on a regular basis since they buy them from producers;
- upgrading skills and equipments - big mills have been in place for 15-20 years;
- High competition: competitors are at the same time on international, regional and local markets:
    - Rice: Polishing rice makes a product difference that urban upper class consumers are ready to pays for. Perfumed rices are as well appreciated
    - Cassava: mechanized processing is often not a viable venture. Products have indeed to compete with traditional products which are underpriced since traditional processors rely on family labour which is not perceived as cost. To process cassava profitably, the plant has to be located in very high cassava producing areas (low raw material costs and high production capacity).

3.4 Service provision – equipment maintenance and repair

Characterization

- Ways of doing similar to craft (as well in training: traditional apprenticeship models with the craftsman);
- Are located close to microenterprises;
- Variable sizes, from micro to small enterprises (from field visit: 2 to 6 persons including apprentices).

Main services provided

- Equipment fabrication, maintenance and repair
- Packaging and marketing (not selected since it is not directly about processing).
- Rice threshing (not selected since it is not an entrepreneurial activity, but an income generating activity, often directly performed by the producer).

One interesting element is that some enterprises also produce equipment (for small mills in villages, but as well as for larger enterprises like Suame or Gratis – see illustration 7):

- Equipment production presents a potential for the development of off farm activities in rural areas and thus an employment potential;

- It has as well an import substitution interest;
- For processing enterprises, having the machine fabricant in the near about ensures them to get a good maintenance and the possibility of getting spare parts.

Main constraints and issues

- High potential in equipment provision for local companies: all enterprises lack of equipment, import substitution challenge, maintenance issue (for the same price, enterprises can have their equipment maintain or repaired if they fabricant is in the surroundings).
- Has to be ran in a professional way, with qualifications and not just on-the-job training. Ex: 3-year apprenticeship from Gratis (level: Junior or Senior secondary school).
- Technical: models/plans of machines, knowledge of other machines, of materials.

Gratis is the most structured and specialized firm that the field mission identified in Ghana. It still has to adapt and invent equipments that meet local needs. Thus, for this kind of activity, access to information on existing equipments for micro to small enterprises in other countries is a main issue.

There is a market potential for processing equipments. People generally prefer foreign equipment, but spare parts are difficult to order and to repair rapidly.

Illustration 7. The Gratis Ghana Foundation

Gratis Foundation evolved out of the Ghana Regional Appropriate Technology Industrial Service (Gratis) Project. The Gratis Foundation objective is to promote industrialization by developing and disseminating technology (equipments processing 250kg to 2 tons/hour) to industry, particularly SMEs.

Gratis established intermediate technology transfer units (ITTUs) now designated as regional technology and business centres (RTBCs) in nine regions of Ghana. These RTBCs transfer appropriate technologies to small-scale industrialists through training, manufacturing and the supply of machine tools, plants and equipment. GRATIS co-ordinates the activities and provides back-stopping to its network of RTBCs and also supports the activities of the pioneer ITTU established in 1980 at the Suame in the Ashanti Region. (See http://www.gratisghana.com).

Gratis is at present in 23 district centers, all RTBCs being on the same model (support from REP project).

Example of the RTBB in Kumasi region:

1. Training of young people who dropped out of secondary schools (3-year apprenticeship-scheme in 3 domains, one of which is metal fabrication) + visiting apprentices during attachment (follow-up); about 10/year.

2. Research, design and development of improved equipment (production, selling, vocational training):

- Improving equipment: downscaling imported models to the local needs – example of the imported gari roaster (Joss Mah Enterprise): Gratis is developing a smaller one, which will be far cheaper (has costed 9 000 Ceedis), so as to then disseminate the model. Some of the developed models have for instance been adopted by RTIMP.

- Master classes with professional manufacturers of processing material (including former students who have started their business), to update them on new technologies: teach them (for free) how to manufacture machines. Gratis Kumasi follows-up on about 100 enterprises in different domains (tailors, palm-oil, cashew, gari processors, etc.)

There is a 3-6 month guarantee period on the equipment sold: maintenance is free and Gratis teaches enterprises basis on maintenance and reparation. Prices are still higher than other local fabrications for microenterprises.

3. Visiting apprentices on attachments (about 6 apprentices/year), welcome them during holidays at Gratis, so as to get them ready for working for industry or to create their own business on equipment manufacturing, maintenance and reparation.

4. Processing centers: farmers give them raw materials. After a pre-agreement on quality and quantity, the center processes for the farmer.

Remark: the main training needs identified by Gratis are in agro processing industry, in particular because people don't know how products behave when processing them. There is a huge need on advising on food technologies.

IV. ANALYSIS OF THE TRAINING OFFER

This part of the report is drawn from: H. F. Akplu and J. Y. Amankrah (2008), *Technical and Vocational Education and Training Sector Mapping*, Learn4Work Dutch Schokland Programme on TVET.

1. Current status of the education system in Ghana

The present structure of education in Ghana, which starts at the age of 6 years, is a 6-3-3-4 structure representing 6 years of primary education, 3 years of junior secondary school, 3 years of senior high school and 4 years university course. Students who successfully pass the senior secondary school certificate examination can also follow courses at a Polytechnic, Teachers' Training College, Agriculture College or other tertiary institutions.

The first 9 years forms the basic education and is free and compulsory. The basic education is designed to expose children to a wide variety of ideas and skills and instill attitudes that will help them cope creatively with their environment and stimulate them to be an asset to their country.

1.1 Qualification framework

Ghana has a unique TVET qualification framework which provides parallel alternative route to academic education for those who go through the TVET route.

Table 4. National TVET Qualifications Framework Levels

Levels	Qualification Band	Equivalent Academic Qualifications
9	Doctorate Degree (Professional/Technology)	Doctorate degree
8	Master's Degree (Professional/Technology)	Master's degree
7	Bachelor's Degree (Professional/Technology)	Bachelor's Degree
6	Higher Diploma	No Equivalence
5	Diploma	Diploma
4	Certificate II	WASSCE
3	Certificate I	No equivalence
2	Proficiency II	BECE
1	Proficiency I	No Equivalence

Source: http://www.cotvet.org/q-framework.php

Levels 5 to 9: these diploma depend from the National Council for Tertiary Education

Levels 1 to 4: these basic education diploma depend from NVTI: L1&2 NVTI; L3&4: NVTI and department of technical education (MoE).

Cf. Levels description in *Appendix 4*.

1.2 Curricula

The curriculum used in schools is work-oriented:

The primary school level curriculum consists of English, Ghanaian language and culture, mathematics, environmental studies, integrated science, religious and moral education and physical activities such as music, dance and physical education.

The junior secondary school level makes a distinction between agricultural and general science and incorporates subjects such as pre-vocational skills and pre-technical skills. Also, social studies and French as a 3rd language are added.

The senior secondary school curriculum has core subjects and elective subjects. Every student takes four core subjects: English, mathematics, integrated science (incl. science, agriculture and environmental studies) and social studies (economics, geography, history and government). Students also choose 3 elective subjects from 5 available programmes: agriculture programme, general programme (arts or science option), business programme, vocational programme and technical programme.

Basic and senior secondary school run a 40 week school year and students are tested using an internal continuous assessment (30% of final score) and an external examination conducted by the West African Examinations Council (70% of final score).

The provision of technical, vocational education and training (TVET) cuts across several government ministries with the Ministry of Education, Science and Sports (MoESS) and the Ministry of Manpower,

Youth and Employment (MoMYE) being the dominant providers. The main delivery institutions are the informal apprenticeship system, public and private vocational training institutes, and public technical institutes, and the polytechnics. Ghana has an extensive informal apprenticeship system that absorbs a large number of young people who are not able to continue schooling after basic education.

The major areas covered by informal apprenticeship include auto body works, motor vehicle mechanics, masonry, carpentry and joinery, dressmaking, hairdressing, refrigeration and air-conditioning, tailoring and weaving (e.g. Kente weaving). There is no national control over, supervision of, or mechanism for capturing data on the informal apprenticeship system. Until the New (National) Apprenticeship Programme is launched, no reliable data can be provided on enrolment in informal apprenticeship, yet we know that it is the largest supplier of skill training in Ghana. Data on enrolment in TVET is limited to formal TVET, and even then, no comprehensive data is available on private TVET.

1.3 Facts and figures on enrolment and expenditures in TVET

Three categories of facts and figures are presented to give a brief view of TVET in Ghana focusing on: (a) enrolments, (b) gender parity and (c) expenditure on education in general and TVET in particular.

Enrolments

Putting enrolment in TVET in a proper perspective, it is desirable to begin with an overview of enrolment in formal education institutions which lay the foundation for formal TVET provision. Table 5 gives an overview of enrolment at various levels of education in Ghana. Enrolment in TVET in the Ghana context applies only to the formal TVET system which consists of public and private registered institutions. Some private TVET institutions register with NVTI, others with the Ghana Education Service and still others with NACVET. These authorities are not able to monitor and collate enrolment and other service delivery information for private TVET institutions.

Table 5. Enrolment Profile, Levels of Education

Level of Education	Type of Institution	2004/2005 Enrolment	2007/2008 Enrolment
Kindergarten	Total	778,109	1,262,264
	% Private	38.8%	17.1%
Primary	Total	3,077,489	3,622,724
	Private	631,576	631,942
Junior Sec/High School	Total	1,048,367	1,224,964
	Private	195,137	209,473
Senior Sec/High School	Total	333,002	454,681
	Private	N/A	58,842
Public TVET (MoESS & NVTI)			
Technical Training Institutes (MoESS only)	Total	21,424	18,432*
NVTI Institutions (MoMYE)**	Total	7,297	6,660**
Special Education Institutions (MoESS only)	Total	2,666	3,315
TERTIARY INSTITUTIONS		2004/05	2006/07
Polytechnics (all public)	Total	24,983	28,695
Professional Institutes	Total	1,361	4,350
Universities	Total	73,408	88,445
	Private	3,470	18,278

Source: Constructed from Ministry of Education, Science and Sports (2008).

Education Sector Performance Report, 2008.

*Notes: * This figure is for 2006/2007*

*** Figures obtained from NVTI, MoMYE*

Formal TVET begins only after basic education, that is, after the completion of Junior High School. In the public system, the main TVET institutions are the Technical Training Institutes (TTIs), the National Vocational Training Institute (NVTI) centres, and the polytechnics. The figures in the 2007/2008 column of Table 2.1 show that the TTIs and the NVTI centres together enrolled only 25,092 trainees, representing only 0.055 percent of total enrolment in Senior High School. Enrolment in TTIs was a paltry 0.04 percent of total enrolment in Senior High School. At the tertiary level, polytechnic enrolment represents 38.4% of total enrolment in both public and private universities. The obvious conclusion is that the public education system channels less than 1% of post-basic education enrolment into formal TVET.

There are hidden social disparities and discrimination in the post-basic education channeling of students. Junior High School graduates who do not go to public schools do not benefit from public support for edu-

cation in terms of fee waivers, subsidies, educational facilities, trained teachers, textbooks, and the like. They do not enjoy the benefits of the GETFund[3] to which their parents contribute indirectly when they spend on goods and services. Even students enrolled in NVTI centres do not currently benefit from the kind of government support given to students enrolled in mainstream Ministry of Education, Science and Sports institutions. With a transition rate of just about 31.5% (MoESS, 2008, p. 50) at least 65% of junior high school graduates will not make it to the senior high school, meaning they must go to NVTI, private TVET institutes, or disappear into the informal economy (including informal apprenticeship).

Gender Disparity in Enrolments

Gender disparity in access to education is narrowing at the basic education level in Ghana . At the kindergarten level the Gender Parity Index is close to 1.00 (Education Sector Performance Report, 2008). However, the index drops marginally as the level of education goes up, meaning a higher proportion of females drop out of school than males. Those who drop out are likely to disappear into the informal economy.

The gender gap is much wider in the NVTIs and TTIs than it is in the senior high school. Between 2004/05 and 2007/08 academic years female enrolment in senior high schools ranged between 42.4% and 49.5% (in 2005/2006 only) of the total but appears to hover around 44% (Education Sector Performance Report, 2008). In the main public TVET institutions, female enrolment is very low, accounting for a maximum of approximately 29% in the NVTI centres, 17% in the TTIs, and 30% in the polytechnics. The higher female enrolment ratio in the NVTI again emphasizes the fact that females have better representation where public benefits are lower.

The higher female enrolment ratio at the polytechnic can be explained from the fact that polytechnics recruit mainly from the senior high school where females are better represented. However, female enrolment in polytechnics is mainly in the applied arts and business subjects, not in engineering and science-related fields. In general, enrolment in TVET subjects is gender biased; some trades and courses are dominated by males while others are dominated by females. Catering and hospitality, dressmaking or fashion, hairdressing, and secretarial programmes are dominated by females while electrical, electronic, the building trades, and all mechanical engineering-related fields are heavily dominated by males

Distribution of government expenditure

TVET institutions managed by the ministry of education receive on the average only 1% of the education budget. In 2008, for example, the TVET sector received only 0.6% of the education budget compared with 3.4% for kindergarten, 35% for primary, 16.3% for junior secondary, 12.6% for senior secondary and 23% for higher education. In addition to the underfunding of the public TVET sector, student fees which are regulated by the ministry of education, amount to only about USD100 per academic year. It must be noted, however, that state TVET institutions do benefit occasionally from allocations under the Ghana Education Trust Fund (GETFUND) for procurement of training equipment and physical infrastructure development as well as staff capacity building. The inflows into the GETFUND, which was created by an Act of Parliament to support education development, represent 20% of the value added tax (VAT) on all goods and services. The GETFUND is not meant to replace but instead to complement the annual government subsidies to the training institutions. It is important to note that, by law, it is only training institutions under the ministry of education that can benefit from the GETFUND.

Tuition fees charged by private TVET providers are generally based on a cost-recovery formula, although training costs at NGO and Church-sponsored institutions are heavily subsidized. One of the strengths of

[3] The Ghana Education Trust Fund (GETFund) was established by an Act of Parliament in 2000 (Act 581) with the object of providing finance to supplement the provision of Education at all levels by Government.

the informal apprenticeship system is that it is self-financing, with no government support. Some have argued that the neglect of the traditional apprenticeship sector is discriminatory and that a more equitable funding mechanism should be found to support the apprenticeship sector where most of the less privileged of society acquire employable skills.

Expanding the contribution base of the SDF and the enactment of policies and regulations to allow state institutions to charge more realistic fees to partially recover training costs as well as giving them greater autonomy over the management of internally generated funds may contribute to funding sustainability of the TVET system.

2. TVET policies

Although the reform of the TVET sector features prominently on the education and training policy agenda in Ghana, **there is no legally-binding technical and vocational education and training (TVET) policy** in place. However, although the 2004 TVET Policy has no legal basis, it remains the only reference policy document for TVET reform in the country.

TVET policy in Ghana has undergone many changes in the past. However, the 2004 TVET Policy and the Education Reforms of 2007 represent the turning points in efforts to revitalize the TVET system.

The draft TVET policy was endorsed at a National Forum on TVET in May 2004.It noted that the TVET system was fragmented and uncoordinated with about 9 ministries and their agencies having the legal mandate to make policies and deliver training programs specific to their manpower requirements. Indeed, apart from the ministry of education, various other ministries such as the ministries of employment and social welfare, agriculture, local government and rural development, trade and industries, transport and communication, tourism, energy, and youth and sports established their own training institutions with their respective independent human resource development agenda. While the informal sector operated within a deregulated environment, the delivery of higher level TVET in higher education institutions was regulated by the Acts establishing the institutions.

One of the major recommendations of this 2004 policy document and in response to the need to harmonize the skills training environment, the government by an Act of Parliament (Act 718) established the **Council for Technical and Vocational Education and Training (COTVET)** in 2006. COTVET role is to coordinate and oversee all aspects of technical and vocational education in the country. COTVET which became operational only in 2008 is now recognized as the sole authority responsible for TVET in Ghana. Its role includes inter and intra-ministerial policy coordination of all technical and vocational skills development initiatives in the country. COTVET is as an apex body under the Ministry of Education and is now recognized as the sole authority responsible for TVET in Ghana. Its role includes inter and intra-ministerial policy coordination of all technical and vocational skills development initiatives in the country.

It is to noticed that COTVET has adopted the competency based training (CBT) approach and has piloted it in a number of trade areas in two technical institutes and one polytechnic. However, efforts are still ongoing regarding the modalities for greater involvement of industry in the development of the guidelines and procedures for implementing CBT.

Although the 2004 policy document has no legal basis, it remains the only widely-acknowledged reference material for promoting the development of TVET in the country. However, the fact that the document is not backed by law has prevented or unduly delayed the application and enforcement of the strategic initiatives recommended in the policy document.

In the **2007 TVET reform**, 11 priority sectors were defined, amongst which: "Fisheries and aquaculture"; "agriculture and agro-related industry". The reform aims, amongst other, at:

- improving the efficiency and management of the TVET system, which led to the establishment of the Council for Technical and Vocation Education and Training (Cotvet);
- improving the training's quality and relevance by achieving a demand driven and competency-based system, in which skill standards are determined by industry, enterprise-based training is recognized and an open-access system, incorporating flexible delivery modes is implemented;
- and reaching sustainable funding for TVET by establishing a skills development fund.

Other policy documents which have impacted TVET delivery in the country include the Ghana Poverty Reduction Strategy (GPRS I, 2003-2005) and the Growth and Poverty Reduction Strategy (GPRS II, 2006-2009) documents which clearly recognize the importance of TVET in acquiring skills for employment and poverty reduction, and the Ghana Industrial Policy of 2010 which acknowledges that the country's industrialization is hampered by an inadequate supply of skilled labor to support the manufacture of capital goods. The document also identifies entrepreneurial and management skills as priority skills development areas.

The National Telecommunications Policy adopted in 2004 is also likely to be one of the drivers of the TVET system in the country. The objective of the policy is "to provide high quality and affordable access to information and communication services to help transform Ghana into a knowledge-based society and technology-driven economy". One of the strategies to be implemented under the policy is to promote affordable internet connectivity to all schools, including TVET institutions. Already the National ICT Secretariat, which is charged with implementation of the ICT Policy, has set up a computer laboratory in all public sector formal TVET institutions. Twenty-six of these institutional computer labs have access to the internet. Training of ICT instructors is also part of the ICT policy agenda.

2.1 Main actors in the TVET sector

The main actors in the TVET sector are training providers, technical and financial assistance providers, certification, supervision, and regulatory agencies, and service support groups. They fall into the following six categories: (a) Government ministries; (b) Artisan, trade and professional associations; (c) Private proprietors of vocational training institutions, including NGOs; (d) Industry groups; (e) Development Partners; (f) Certification, supervisory, and regulatory bodies.

Government ministries such as the Ministry of Education, Science and Sports, Ministry of Manpower, Youth and Employment, Ministry of Food and Agriculture and the Ministry of Tourism and Diasporan Relations are all providers of TVET; they own, fund, and manage training institutions; they also make policies for skill training within their political mandates.

Artisans, trade and professional associations are the largest providers of skill training in the TVET system. The associations include the Ghana Tailors and Dressmakers Association, the Ghana Hairdressers

Association, the Association of Garages and the Ghana National Association of Farmers and Fishermen. These associations provide skill training through the informal apprenticeship system in areas such as tailoring and dressmaking, hairdressing, autobody works, automobile mechanics, masonry, electrical and electronic repair, air-conditioning and refrigeration and carpentry. Together, this group probably provides about 80% of the skill training needs of young people in Ghana – literate and illiterate.

Private proprietors of vocational training institutions (for profit and not-for-profit) may be individuals or organizations. As these providers may register with the NVTI, MoESS, Registrar-General and other government agencies, it is difficult to establish the actual numbers. Religious bodies such as the Roman Catholic, the E. P. Church, and the Presbyterian Church of Ghana all have vocational training institutions. A UNESCO survey (2003) that sampled 30 vocational institutions in Ghana found that one third of them were owned by religious bodies. The Presbyterian Church has a special unit called Vocational Training for Females which is an advocacy group, a training provider, and promoter of non-traditional female skills training for females. Other NGOs that are active in the TVET sector are the Young Men's Christian Association (YMCA), the Young Women's Christian Association (YWCA), the Ghana Federation of the Disabled (and its affiliates), and the Opportunities Industrialization Centre (OIC).

Industry groups such as the Association of Ghana Industries and the Ghana Employers' Association are becoming active in the TVET sector. Previously, they were passive providers of opportunities for industrial attachment (or work-based learning) but now they are engaged in negotiations and in the piloting of more structured industrial attachment with tertiary TVET institutions.

Development Partners: Donor involvement in TVET has been on a low scale compared to other areas of development. Few notable donor interventions can nevertheless be noted, namely: the Japan International Cooperation Agency (JICA) which gave technical and financial assistance for the development of a master plan for Technical education (2000-2011); the Royal Netherlands Government, who assisted Ghana in refurbishing 15 technical institutes and 5 secondary/technical schools under the VOTEC resource Centres Project; the World Bank, which funded the Vocational Skills and Informal Sector Support Project; IFAD, who supported a rural enterprise project, aiming at establishing and expanding self-employment and rural micro enterprise through vocational training and skills development interventions; DFID and ILO.

Certification, supervisory, and regulatory bodies (not detailed).

2.2 Gouvernance of the TVET system

Formal TVET institutions fall within the control of the Ghana Education Service (GES) which is the policy implementation agency of the Ministry of Education. The GES mandate also covers the entire pre-tertiary education system. The policies and guidelines for running of GES Technical Institutes are therefore identical to those of senior secondary schools. Community participation in the institutions is mainly through representation on the Board of Governors of the institutions. The ministry of employment and social welfare also runs school-based National Vocational Training Institutes (NVTI) whose mandate covers the lower levels of TVET qualifications. Governance of privately-owned institutions is guided by the owners or bodies that set up the institutions. This multiplicity of governance structures also translates into multiple training and certification standards which sometimes creates confusion in the employment market as to their appropriateness within the different job classifications.

At the pre-tertiary institutional level, the head of institution is responsible for managing the institution but has no mandate to engineer change in the existing curricula or develop new training programs to respond to demand from the labor market. This is because the TVET curriculum is nationally prescribed and often the teachers lack the expertise to design new curricula. Instructor training is seen as a major challenge that needs to be addressed. The TVET system is in dire need

of teachers with high level "dual" qualifications. TVET teachers need to be pedagogically and technologically qualified. Due to financial constraints, getting teachers to undergo periodic attachments in industry to update their practical skills has not been successful. Teaching in most TVET institutions has therefore become more of theory than practice.

Informal TVET represented by the traditional apprenticeship sector is unregulated. However, the proposed reform of the sector includes the introduction of CBT into the traditional apprenticeship system and the establishment of linkages with the formal TVET institutions.

COTVET is leading the process of developing a National TVET Qualifications Framework (NTVETQF). The draft framework consists of 9 levels from the lowest (Proficiency I) to the highest which corresponds to the Bachelor of Technology degree. The QF is designed to harmonize and recognize skills acquired from different learning environments: formal, non formal and informal. COTVET has actually set up a National Apprenticeship Committee (NAC) to support and guide the operations of informal apprenticeship schemes.

2.3 Demand and supply

The demand for TVET in Ghana is strong but the supply side is weak and has low capacity. There is strong demand for skill training, especially at the artisan, craft, and technician levels.

This strong demand is due primarily to the size of the youthful population of Ghana and the growing expansion in universal basic education. As Junior High School enrolment has reached the 1.2 million level, it means that on average about 400,000 young people will complete basic education each year and must move on to Senior High School (SHS) or seek skill training for future employment.

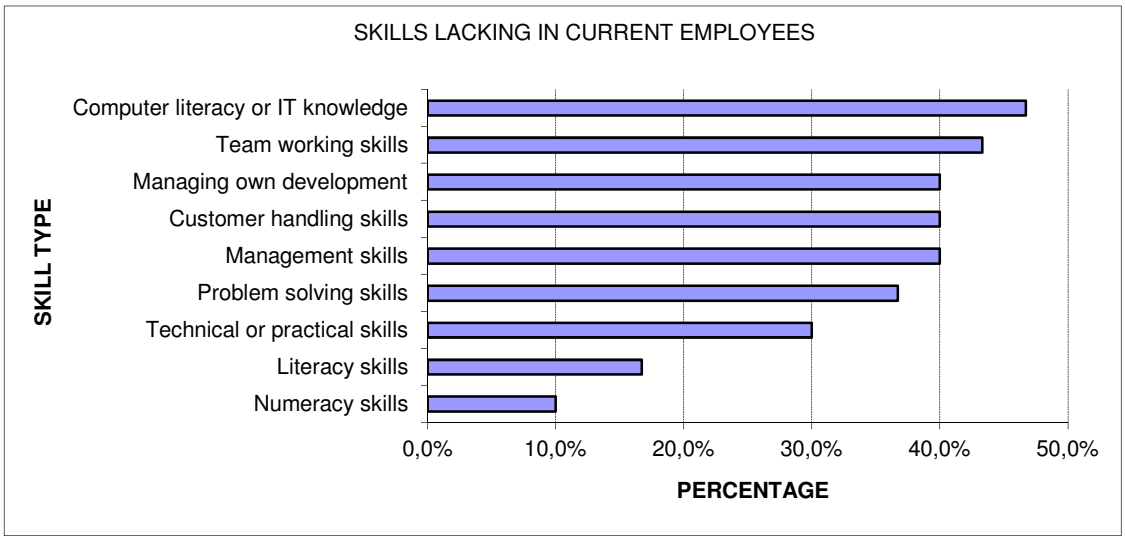
About 65% of that number cannot enter SHS. Then there are the dropouts from basic education level and the cumulated numbers from previous years whose options are skill training or entry into the labour market without skills. Among those who complete SHS, only about 40% will enter the university or the polytechnic; the rest must enter the labour market or seek some form of skill training. The overwhelming demand for education and training at all levels has distorted the difference between social demand for TVET and economic demand for TVET. Some institutions talk of "demand-driven programmes" by which they mean programmes which parents and students are willing to pay for.

One disturbing aspect of the demand for skill training is that the quality of basic academic skills (literacy and numeracy) with which prospective trainees seek admission is very low, as reported in the Education Sector Performance Report, 2008: "Thus, the effective level of literacy (e.g. proficiency in English on the NEA) achieved is 26.1% of the 85% of the population that attained P6. This is 12.3%. Thus less than 25% of Ghana's youth reach proficiency levels for P6 English, and 10% attain proficiency in P6 mathematics (MoESS, 2008, p. 16)."

Assessing the demand side, the quantity is overwhelming while the input quality is low. The basic academic skills (literacy and numeracy) are the foundation for successful skill learning, and deficits brought from the primary school through JHS to post-basic TVET create serious problems for skill acquisition and the learning of related theory.

The inability of the TVET system to be more responsive to the demands of the economy was recently captured in a report issued by the Ghana Employers Association (GEA) on the skills gaps in the country (Table 9). It is interesting to note that the survey report identified a huge shortage of "soft" skills in the Ghanaian workforce.

Table 6. Skills gaps and shortages in Ghanaian enterprises



Source: GEA Skills Gaps Rapid Survey (2006)

The supply side of the TVET sector consists of informal apprenticeship providers (individual master craftsmen and women and the various trade and professional associations), and formal public and private TVET training institutions. The informal aspect of the supply side (the informal apprenticeship system is larger but has not been captured through systematic documentation. The private ones may be for-profit or not-for-profit. As the private providers register with different government ministries and bodies, their actual numbers are not certain.

Table below shows the main providers that constitute the supply side of formal TVET in Ghana, as reported in the Education Sector Performance Report (MoESS, 2008). The figures for private TVET do not reflect the true picture. Out of 700 questionnaires sent out by the Education Management Information System (EMIS), only 273 (130 public and 143 private) responded, meaning "there is much information that is not currently being captured" (MoESS, 2008, p. 131) especially on private TVET in the country. Also, the NVTI reported having 337 registered private vocational training institutes and 160 public ones (Personal Communication, 27/11/08). There could be overlaps between the survey results obtained by the EMIS and the registrations undertaken by the NVTI.

Table 7. Formal and public non-tertiary TVET Institutions, 2007/08

Ownership/Location	Type of Institution	Number	
		2006/2007	2007/2008
Ministry of Education, Science and Sports	GES Technical institutes	24	25
Ministry of Manpower, Youth and Employment	NVTI Centres	28	21
	Integrated Community Centres for Employable Skills (ICCES)	31	35
	Social Welfare Centres	11	13
	Leadership Training Institutes	7	9
	Opportunities Industrialization Centre (OIC)	1	1
	Community Development Centres	22	22
Ministry of Food and Agriculture (MoFA)	Agriculture Training Institutes (Farm Institutes)	1	1
Ministry of Roads and 0Transport	Roads & Transport Training Centre	0	0
	GRATIS Foundation	4	4
Private TVET	Total Private Institutions*	129*	143*

Source: Ministry of Education, Science and Sports (2008).

Education Sector Performance Report, 2008.

Note: * These figures are from MoESS only and may not include private institutions registered with NVTI.

In general, the supply side of the TVET sector is weak due to decades of neglect and lack of government support (UNESCO, 2003; Report of the President's Committee on Review of Education Reforms in Ghana, 2002). The weaknesses are numerous but the major ones are: inadequate capacity of existing institutions; inadequate supply of consumable materials used in training, obsolete training equipment; poor infrastructure; teaching staff who lack practical skills and work experience; outdated textbooks and curricula; and weak links with industry.

The Education Sector Performance Report 2008 (MoESS, 2008) concluded that "Infrastructure in TVET institutions continues to be poor with only 80% having functional electricity." In short, the supply side of the TVET sector is not able to cope with the demand for skill training from learners and also produce the quality that industry needs – because of infrastructural and resource constraints.

2.4 Access to TVET

TVET in Ghana is delivered at both the secondary and postsecondary (higher education) levels. At the secondary level, total enrollments in the formal public and private sectors stood at 71,848 as at 2010. At the postsecondary (polytechnic) level, data on higher level TVET is sketchy. According to the 2011 Education Sector Performance Report (ESAR), the total number of registered pre-tertiary TVET institutions is 306. There are at least another 150 unregistered providers.

Table 8. Enrollments in formal TVET institutions

	2007/8	2008/9	2009/10	2010/11
Public Institutions	43,908	48,348	39,608	42,541
Private Institutions	23,452	25,929	24,547	29,547
Total	67,360	74,277	64,155	71,848

Source: ESAR and EMIS 2010 (Ministry of Education)

Generally, enrolling in a TVET institution is the second choice of school leavers from the basic education (junior high school) level, most of whom prefer to enter the academic stream of senior secondary schools. The available data shows that only 1 in 10 basic education graduates enroll in TVET institutions (ESAR 2010). The reasons for the low attractiveness of TVET include the poor image of TVET and the perceived career advantages and greater economic returns that general senior secondary school education offers. The high cost of investment in school-based TVET and the fewer number of public TVET institutions, compared with senior high schools, also account for the low enrollments in TVET. Furthermore many of the good TVET institutions are located in the urban centers, thus limiting access to rural dwellers.

Table 9. Number of formal TVET institutions

	2007/8	2008/9	2009/10	2010/11
Public Institutions	130	133	130	137
Private Institutions	143	163	154	169
Total	273	296	284	306

Source: ESAR 2011

The above data refer to public institutions under the Ministry of Education, the Ministry of Employment and Social Welfare, Ministry of Food and Agriculture, and the Ministry of Local Government and Rural Development. The data for institutions operating under five (5) other ministries and departments are not covered in the above tables. However, it is generally believed that there are about 200 public and 430 registered and unregistered private TVET providers.

2.5 Informal sector participation

The informal sector dominates in the acquisition of skills with 82% of the workforce employed in the labor market. Skills training in the informal sector is usually carried out in a traditional apprenticeship environment where master crafts persons pass on their skills to learners. As the

quality of training delivered depends on the knowledge and skills of the master crafts person, there are no uniform standards in the sector. In general, the academic background of the learners is low, the training is not structured and learners may take different lengths of time to graduate even within the same trade area. Access to training in the informal sector is unregulated and open to anyone who is willing to learn. The use of local languages as the medium of instruction is a key attraction. However, the low academic standard of both the trainers and trainees is a major handicap to the infusion of modern technology into the learning process. COTVET has recently embarked upon a training program for master crafts persons to upgrade their pedagogical and professional skills in order for them to support the National Apprenticeship Program (NAP).

The NAP is targeted at junior high school leavers who drop out and are not able to continue their studies at the senior secondary school level. NAP is managed by COTVET and training is offered by selected master crafts persons in their workshops. The duration of training is 1 year and successful trainees are provided with free start-up equipment to create their own businesses. The cost of the training is subsidized by the government to the tune of about USD100 per trainee per year. The program trained 5,000 young people in 2011 and 8,000 are under training in 2012. However, the effectiveness and impact of the NAP is unknown, as an evaluation of the program is yet to be conducted.

A recent initiative to address the challenge of youth employment through non formal internships and business creation support services is the Local Enterprises and Skills Development Program (LESDEP) which was started in 2010 under the Ministry of Local Government and Rural Development. LESDEP is a public-private partnership program that offers training in technical and entrepreneurial skills to the unemployed and facilitates the creation and management of businesses by the beneficiaries of the program. The training internships, which are free for the beneficiaries, take between 3-6 months in the workshops of identified local master crafts persons or in nearby public or private technical/vocational schools.

The strategic approach is to develop local entrepreneurs within the fabric of local economic activities and create businesses using simple, environmentally-friendly and low-technology equipment. Beneficiaries are given business support services and start-up equipment and tools on credit (without collateral) and easy repayment terms. Refund of cost of start-up capital equipment is by installment over a period of 6-24 months. The LESDEP currently supports the youth to start their own businesses in the following major areas: transport services (water tanker and goods delivery vans, transportation of farm produce from the farm gate); food and catering services; mobile and laptop repair services; agricultural equipment repair services; agro-processing and packaging (fruit juice, palm fruits); fish farming; dressmaking; beauty salon services; barbering services; fabrication of blocks and bricks; video and photography services; and mobile toilet services.

Since its inception, LESDEP has trained 17,000 youth throughout the country and successfully set-up 8,000 of them in self-employment over a 2-year period. Government budgetary support to the program is about USD50 million in 2012.

A much older government program which was created in 2006 under the Ministry of Youth and Sports to address the problem of youth employment is the National Youth Employment Program (NYEP). The NYEP targets the youth between 18-35 years who benefit from 6-months training in any of the training modules of the program after which they are employed in relevant government departments and agencies, such as water and sanitation services, security services, school

teaching assistantships, health assistantships, and fire prevention services. Unlike the LESDEP which emphasizes entrepreneurship and self-employment, NYEP places the beneficiaries in paid employment and actually pays them a monthly living allowance. This strategy has serious implications for sustainability and there have been frequent agitations by NYEP beneficiaries for non-payment or late payment of their allowances. In 2011, the World Bank supported the NYEP with an amount of USD65 million and about 108,000 youth have been trained and employed over the past 5 years. However, questions remain as to the cost-effectiveness of the NYEP.

3. Agroprocessing-related training supply

3.1 Agriculture training structures and courses offered

There exists a formal agricultural training system and structure that is operated and managed under the mandate of the Ministry of Food and Agriculture (MoFA) led by its Human Resource and Management Directorate (HRMD).

The human resource and management directorate (HRMD) of MoFA

The Directorate is responsible for the total training, examination and certification for the agricultural sector to ensure that the manpower needs and requirements are met at all levels including for MoFA system itself, the various agricultural training institutions, research facilities, demonstration sites as well as for the private agricultural practice. It also operates and manages these training institutions that fall under the remit of the Ministry.

The HRMD carries out Training Needs Assessments (TNA) for the ministry and its affiliate/ constituting bodies, defines qualifications required at all levels and conducts training to persons to play specific roles. Training may be local or international and is at all levels; professional, technical and secretarial/ support services. All recruitments and promotions within MoFA are handled by the HRMD in collaboration with the heads of the respective Directorates involved as well as liaise between MOFA and the Head of Civil Service.

Training structures

The formal training structure is comprised of the following levels:

- Local training/ Farm institutes (HRMD)
- Agric Colleges (HRMD)
- Public/ Private Tertiary Institutions (Universities)
- Independent Training Programmes

Local training / farm institutes

These are operated and managed by the HRMD of MoFA. They offer tailor measured training in crop production and animal husbandry as well as other cross-cutting training relating to specific interests and careers such as management, nursery establishment, control of production environment etc. Cross-cutting training may be packages to cover non-technical skills such as Home management, functional literacy, family planning etc.

Their training programmes are delivered in short to mid-term modular courses spanning between 3 months to 1 year as initial or continuing training for internal recruitment or private/ independent practitioners or farmers.

These institutes awards certificates to trainees upon examination under the accreditation and authority of the National Council for Vocational Education and Training (NACVET). The basic entry requirement is Basic Education i.e B.E.C.E.

Currently there are three such farm institutes in Ghana located at:

- Asawanse – Central Region
- Wenchi – Bring Ahafo Region
- Adidome – Volta Region

Agricultural colleges – diploma awarding

These are also operated and managed by the HRMD of MoFA. They offer full three year courses in: crops, livestock, economics and statistics.

The colleges have a basic entry requirement of Senior High School Certification i.e. W.A.S.S.S.C.E in addition to having worked within the MoFA setup for a minimum of two years. Upon completion one is engaged to the level of Technical Officer within MoFA. These colleges award Certificates and Diplomas; Diploma holders are admitted to the level of production officers within MoFA.

The following are the presently operating agricultural colleges in Ghana;

- Kwadaso Agricultural College – Ashanti region, which is affiliated to the University of Cape Coast (UCC)
- Ohawu Agricultural College – Volta Region
- Damango Agricultural College – Northern Region and
- Kpong-Tamale Animal Health College - Northern Region, which specializes in the technical training of veterinary officers.

Public / private tertiary institutions and universities

These are autonomous tertiary institutions operating under the oversight and regulation of the Ministry of Education and the Ghana Education Service respectively and under accreditation of the National Accreditations Board but with curriculum and technical input from MoFA.

They run full four year programmes and award general and specialized degrees at all levels i.e. 1st and 2nd Degrees in the following:

- General Agriculture
- Post Harvest Technology/ Management
- Agricultural Economics
- Animal Science
- Crop Science
- Horticulture and
- Agricultural Engineering which is either a specialization under the General Agricultural programme or as a completely separate programme under the Engineering Faculty.

Other related programmes that support the agricultural chain are also run in the following areas:

- Food science
- Nutrition

- Natural Resource Management
- Home economics and Catering

The basic entry level is W.A.S.S.S.C.E with at least two (2) years working experience in the MoFA setup. Qualifying MoFA employees are usually offered study leave with pay for the duration of the programme and return at Assistant Agricultural Officer level.

Presently, degree programmes in Agriculture are being run in the following universities:

- Kwame Nkrumah University of Science and Technology (KNUST), Kumasi – Ashanti Region
- University of Ghana, Legon – Greater Accra Region
- University of Cape Coast, Central Region
- University for Development Studies, Tamale - Northern Region and
- Some private universities.

Independent training programmes

These exists at various levels within established farmers organizations, private companies, NGOs, Development Support programmes etc. These programmes are largely built on practical basis with some theoretical foundation geared towards achieving targeted results for participants. They are mostly delivered as part of social responsibility packages of private companies working in communities as community development activities. These companies may or may not be operating directly within the agricultural chain but have an interest in acquiring social by-in of community members, eg, fertilizer and other suppliers, large scale mills, mining, quarry, timber, processing companies and the like.

These training programmes mostly award certificates of participation to trainees only to serve as evidence and are mostly delivered by trained extension officers of MoFA, international resource persons, identifiable successful private farmers, technical experts such as agronomists, veterinary doctors, processors etc. They are usually delivered as short-term training not exceeding two (2) weeks.

Many development oriented agencies, NGOs, Companies and Farmer Groups are involved in the delivery of such training programmes, such as: Care International, World Vision, Cocoa Abrabopa, Kuapa Cocoa, USAID, EU Projects, Ghana Manganese Company, Golden Star Resources, Akuafo Adamfo etc.

As presented at the Second Pan-Commonwealth Forum on Open and Distance Learning in Durban, South Africa, July 29- August 2, 2002 by R. A. Aggor, C.K. Osei, and K. Alluri innovations are being piloted in agricultural training, such as the Continuing Education for Agricultural Agents in Ghana Using Open and Distance Learning Methods and Materials Pilot Project.

Informal agricultural training

This is an unregulated regime of training involving pre-apprentices, apprentices, model farm centres etc. This category probably caters for, by far, the bulk of training activities within the agricultural sector (though no reliable data is available to confirm this).

Evidence of this abounds within the economy across all regions. It starts as parental/ guardian transfer of knowledge and skills to children in rural farming areas, to the involvement in communal farming labour activities of specific communities to the purposed engagement of apprentices on an established farm as a training regime to prepare them towards establishing and operating their own farms as well as for income purposes either in cash or in kind.

3.2 Agroprocessing training structures and courses offered

The following institutions in Ghana provide courses in Food Technology, Post Harvest Technologies and Agricultural Education but do not specifically focus on agroprocessing as core areas of study:

Tertiary Institutions in agro processing

- The University of Ghana's Department of Crop Science has a Course in Crop Science and Food Technology for Undergraduate and Post graduate Degrees. This course focuses on Post Harvest Technologies.
- Kumasi Polytechnic has recently begun offering a First Degree Course in Food Technology.

Vocational Training Institutions in agroprocessing

Several vocational institutions in the country provide courses in general agricultural education and animal husbandry such as the Youth Leadership Institute, a vocational training Centre at Afienya and the Tema Technical Institute. These courses are basic and often do not provide enough opportunities for practical exposure.

Two vocational institutes have also incorporated agricultural development training in their curriculum: Ho Vocational Institute based in the Volta Region and the Abetifi Vocational Training Institute in the Eastern Region. However the courses of these two institutions also focus on growing crops and animal husbandry but do not concentrate on agroprocessing.

3.3 Programs aiming at women participation in training

Some examples below illustrate some non-sector-related initiatives.

Total female enrollment in formal TVET programs over the period 2007-2011 has fluctuated between 45% in 2008/9 to about 50% in 2009/10. Most females are enrolled in the traditionally female-dominated trades such as cookery, dressmaking and cosmetology. Female participation in the male dominated trade areas like engineering is limited because of the lack of girl-friendly training facilities and female role models in such professions

The Government, with support from the African Development Bank, has recently launched a skills training project aimed at preparing more girls for gainful employment as well as getting more girls into traditionally male-dominated occupations. The Gender Responsive Skills and Community Development Project (GRSCD) is funded by the African Development Bank and is expected to benefit 500 females over a 5-year period.

An important program that has had significant success in not only increasing access and participation but also in promoting the creation and expansion of enterprises by young women is the Church-sponsored Vocational Training for Females Program (VTFP). The VTFP targets women between18-30 years who have acquired basic skills in any occupational area from the informal (traditional apprenticeship) or formal sector. The VTFP offers job placement services based on its database of trainees and employers. The program also offers enterprise development services to females and facilitates the activities of a network of women entrepreneurs. The selection of beneficiaries is done in consultation with the local authorities and church leaders in the areas where the applicants reside. Successful applicants benefit from an initial input capital of free business equipment and tools. However, beneficiaries who wish to expand their businesses can access loans of between USD 250 – USD 1000 from the program. The VTFP is funded by the Protestant Development Services (EED) of Germany. Although a few of the beneficiaries are

engaged in occupations such as automobile body repairs and welding, most of them are in the traditional female occupations of catering, hairdressing and dressmaking. The available data indicates that about 600 young women have been supported by the VTFP over the past six years.

Finally, COTVET has recently (2012 – after the field mission tkk place) established a **Women in Technical Education** (WITED) desk within its informal sector Division to promote girls in TVET through advocacy and guidance and counseling services.

3.4 Existing agroprocessing training in rice and cassava value chains

Training specific to cassava

No strong link were identified between enterprises and training providers. The following projects were identified as good practices:

- RTIMP (Ifad) "**Good practices centers**": small/medium size enterprise are identified as "good example". Others can come and visit or be trained on how to process with improved infrastructures/equipments (ex. For JossMah enterprise, investment of 70 000 Ceedis – around 50 000USD). See RTIMP illustration below.

  The assumption is that small/medium size enterprises are the best example for the smaller ones, that can by coming and visiting them, concretely see how they could step by step evolve. These micro/small enterprises can visit the GPC and be trained on-the-job on processing, with improved infrastructures/equipments. For instance, Joss Mah enterprise (see illustration 4) is a GPC).

- WIAD (Women In Affairs Department - from MOFA) works on technologies dissemination on food safety and hygiene (for own consumption and for sale), nutrition and processing. Its public are mostly women, but not only.

  ⇨ *Issue: reinforce capacity of MOFA's regional offices: WIAD divisions at regional and district levels.*

- Rural enterprise project (REP)[4]: REP is a project funded by IFAD and the government of Ghana (total cost 9.3 million of which 7.7 million funded by IFAD) implemented from 1995 to 2002. Its objective was to increase rural production, employment and income in order to alleviate poverty through the increased output of small off-farm enterprises. This was being accomplished by:
  - facilitating access to new technology and business advice;
  - promoting easier access to financial services;
  - improving the efficiency of existing small rural enterprises;
  - supporting the creation of new enterprises;
  - and removing communication constraints through feeder road rehabilitation.

The project has three components:

(i) *Support for the Promotion of Rural Small scale Enterprises*, which includes the establishment of Business Advisory Centres, the construction of Rural Technology Service Centres, and the development and transfer of appropriate technologies;

[4] Source: IFAD, Interim Evaluation of the project /2000: http://www.ifad.org/evaluation/public_html/eksyst/doc/agreement/pa/gh_38sf.pdf

(ii) *Rural Finance Services Support,* which includes lines of credit to eligible participating banks, supported by training for groups and individual beneficiaries in managing credit, deposit facilities, and a monitoring unit for participating rural banks under the Association of Rural Banks that also provided training to selected rural bank staff; and

(iii) *Infrastructure Support,* which includes rehabilitation of 100 km of feeder roads and a further 15 km of spot improvements to improve mobility and access to markets.

Amongst the activities undertaken for the promotion of rural small-scale enterprises, those connected with services provided by *Business Advisory Centres* were credited with much of the success of the project. Thirteen Business Advisory Centres have been created and have implemented successful programmes to train more than 4 000 individual clients in income generating and business management skills. From this training, about 1 900 new businesses have been established as of June 2000. These new businesses have employed 6 000 people. More than 3 500 existing businesses have also received business skills counselling. This allowed existing businesses to employ a further 5 000 workers. Hence a combined total of 5 400 new and existing businesses (and their owners) plus approximately 11 000 people employed by them have been directly reached by the project, the majority of whom were women.

Illustration 8. The Root and Tuber Marketing Programme (RTIMP)

RTIMP Task:

Improving access of resource-poor farmers, farmer groups and rural communities, including women, to improved post-production technologies, which is achieved through :

- identification and sourcing of improved post-production technologies
- training of manufacturing companies on new technologies
- demonstration of new technologies to processing enterprises
- manufacturing the new technologies for processing enterprises;
- training stakeholders on new processing technologies.

Main achievements

- Training on the production and utilization of cassava flour: a total of 25 persons the MoA, KNUST, the Polytechnics, Bakers' Associations, Caterers, and NGOs were trained;
- Training in utilization of cassava flour in 67 districts: a total of 2,600 cassava processors, pastry makers and bakers (97% women) were trained;
- Recipe trials and organoleptic assessment of 8 cassava recipes.

Impact of the activities

- recipes from IITA, FAO and the Home Science Dept of the University of Ghana were collated;
- assessments were conducted at the CSIR-FRI on the suitability and acceptability of the recipes, so as to adapt or standardize them where necessary.

- awareness on cassava was raised: Cassava is not only a food crop, but also as a cash crop;

- the use of High Quality Cassava Flour (HQCF) was introduced in the bakery industry;

- a broader range of more productive Root and Tuber processing equipments were made available, that can now be manufactured and/or repaired locally;

- scientific information/literature was disseminated as well as locally produced and international technologies that can now be used to improve the processing and utilization of cassava roots.

Training specific to rice

The Ghana rice inter-professional body (Grib, see illustration 10 further) – has been created as an inter profession, but is today mostly representative of micro and small enterprises. It sometimes offers training, for instance on production organization, on hygiene, and rubber roller of machines. It also provides training on group management, technology transfers and rice value chain organization.

4. Existing business development services for agroprocessing

The general agroprocessing (-or larger) business development services are hereunder described as well as the ones specific to rice and cassava. The list, which is not exhaustive, aims at giving an overview of existing services.

Business capacity building

- Business Capacity building by Business Advisory Centres/NBSSI
- NGO Self-help Africa (SHI) in partnership with TRAX Ghana who is working on a range of sustainable agricultural and environmental conservation activities amongst rural communities in the North of Ghana
- Quality, standards, certification and analysis:
  - GSB (Ghana standard board): focus on the conception/definition of the standards
  - FDB (Food & drug board): concentrates on licensing aspects: gives a certificate for processors to sell their products (one certificate per product); checks food and quality standards
  - FRI (Food & research institute) - cf. insert below
- Promotional services: packaging, labelling
- Processor linkages: farmers, research, exporters, traders, FBD, GSB, register department, FRI
- Fabrication & provision of equipment e.g. GRATIS Foundation, Suame Magazine
- Processing technologies (MOFA, RTIMP, FRI).

Processing:

- MOFA; IFAD; RTIMP; C:AVA: Activities to improve the cassava value chain
- GRATIS Foundation; K&A Engineering Works Ltd; Agbemskod Engineering Ltd: Development and production of cassava processing equipment for industrial production
- Equipement fabrication and maintenance: Gratis, Suame magazine

Illustration 9. C : AVA : Cassava : Adding Value for Africa / Ghana (2008-2013)

The Cassava: Adding Value for Africa (C:AVA) project's objective is to develop value chains for high-quality cassava flour (HQCF) in several SSA countries, amongst which Ghana. C:AVA focuses on three key intervention points in the value chain:

1. ensuring a consistent supply of raw materials;

2. developing viable intermediaries acting as secondary processors or bulking agents in value chains; and

3. driving market demand and building market share (in, for example, the bakery industry, components of traditional foods or plywood/paperboard applications).

The project seeks to improve smallholder households as well as generating employment at the village and intermediary level, reduce raw material costs for end users, reduce need to import wheat (particularly relevant with increasing prices), develop the capacity to upgrade other similar food ingredient value chains, and, where comparative advantage exists, the opportunity to export HQCF. The project is led by the Food Research Institute in Ghana.

In Ghana, 36 have been mobilized, of which 9 are of medium scale. Potential processing capacity is in excess of 5,000t. 7,814 farmers and farmer-processors' capacity has been considerably strengthened including: enhanced organizational skills, business management, agronomic skills, access to improved planting materials, access to market information and linkages to specific actors higher up the value chain. It was estimated that 20,000t of the higher yielding cassava varieties would be available for harvest by September 2011 (yield 20t/hectare compared with national average of 12t/hectare), which would increase the competitiveness of cassava. For calendar year 2010, it was projected that 650t of HQCF would be marketed. Firm orders amount to 1,765t but the processors cannot meet this due, in particular, to insufficient working capital.

Introduction of flash-drying technology from Nigeria would reduce processing costs significantly. The option of installing a flash dryer is being considered as part of a business plan being prepared for one of the current C:AVA processors, who has invested over $75,000 in building and equipment for processing cassava in the Brong Ahafo Region.

The vision of success in Ghana is that by April 2013, more than 18,122 farmers, processors and employees of 11 cassava processing enterprises will benefit directly by about $118/annum per beneficiary. The main risk to this approach is that working capital is not available to processing enterprises, but the project planned to make this accessible.

http://cava.nri.org/country/ghana.html

Marketing: development and implementation of marketing strategies to enable dissemination and sale of cassava products and derivatives: RPMIC; RTIMP; C:AVA.

Financing

- EDIF (export development and investment fund)
- Banks
- Venture capital
- Microfinance institutions.

Generic services

- Credit provision (Financial institutions)
- Research (inputs, agronomic practices, consumer preferences) CRI, Universities, MOFA, FRI
- Information and education
- Organizational Development services
- Transport services
- Human Labour services (especially for harvesting) Credit provision (Financial institutions)
- Research (inputs, agronomic practices, consumer preferences) CRI, Universities, MOFA, FRI
- Information and education
- Organizational Development services
- Transport services.

Existing research Institutes

- Food Research Institute, Accra – Development of processing equipment and processing technologies, food safety and cassava product development and packaging
- Crops Research Institute, Kumasi – Plant breeding work and Variety trials
- Soil Research Institute, Kumasi – inventory of the soil resources of the country, research and provide advice on maintaining soil fertility Suitability
- Savannah Agricultural Research Institute, Nyankpala via Tamale - Plant breeding and variety and agronomic trials.
- Plant Genetic Resources Centre, Bunso - In-vitro storage of plant genetic resources and storage of root and tuber crops
- Biotechnology and Nuclear Agricultural Research Institute (BNARI), Kwabenya, Accra - Research and technology transfer institution.
- Kwame Nkrumah University of Science and Technology, Kumasi – Agricultural research and development, engineering and equipment manufacturing
- University of Ghana, Legon, Accra - Agricultural research, and development of processing technologies
- University of Cape Coast, Cape Coast. Agricultural research, and training
- University for Development Studies, Tamale. – Has Departments of: Agricultural Economics and Extension, Agricultural Mechanization and Irrigation Technology, Agronomy, Animal Science, Biotechnology, Horticulture and Agribusiness. They undertake agronomic and breeding research and training in cassava development.
- IITA, Accra – Development of agricultural solutions with partners to tackle hunger and poverty: reduction of producer and consumer risks, enhance crop quality and productivity, and generate wealth from agriculture. Work on cassava and maize.

Illustration 10. Food Research Institute (FRI)

The FRI has played an active role in the development of cassava processing technology in Ghana. In addition to manufacturing of cassava processing equipment, including the introduction of mechanical and solar dryers, the FRI has developed improved technologies for processing cassava into traditional and non-traditional products. These include the processing of agbelima and akyeke into more convenient shelf-stable dehydrated products, the production of kokonte using solar and mechanical drying to yield very high quality products, the production of unfermented cassava flour and the production of fufu flour using cassava and other root crops.

Some of these technologies such as the production of agbelima and fufu flours have been adopted by industry and are being commercially produced. To facilitate the dissemination of improved cassava processing technology and adoption of mechanized cassava processing in the country, the FRI in collaboration with the IRI established the Cassava Processing Demonstration Unit (CPDU) at Pokuase in a joint project with the African Regional Centre for Technology based in Dakar in 1987. The project was funded by the UNDP through the Economic Commission of Africa to serve as a focal point for accelerating the dissemination and training of entrepreneurs, traditional cassava processors and technicians engaged in the fabrication of food processing equipment. The CPDU has a full range of pilot scale cassava processing equipment and machinery, runs training programmes and assists entrepreneurs to set up cassava processing units and routinely produces cassava products for sale to the general public as a means of familiarizing them with upgraded products.

Farmers organisations

There are various NGOs and Private Voluntary Organizations that are involved in assisting farmers and which could serve as effective vehicles for organizing farmers and channeling assistance to them and a few key ones involved in the cassava subsector are listed below:

- Christian Rural Aid Network (CRAN), Hohoe
- Association of African Women in Development (AAWID) Wenchi, Sunyani
- Associates for Sustainable Rural Development (ASRuD), Ho
- Progressive Youth in Community Development (PRYCOD), Ho
- Christ Apostolic Agency for Relief And Development (CAARD), Atebubu
- Social Development and Improvement Agency, (SODIA), Bechem

The main professional rice body is the Ghana rice inter-professional body (Grib).

Illustration 11. The Ghana rice inter-professional body (Grib)

The Grib has been created in 2004 as an interprofession. It counts all over the country 144 member groups, some having up to 1 000 members. 9 000 individuals are at the total represented.

It is organised at a regional level and financed by its members, government and donors (the Grib has been traditionally supported by the French cooperation). Although2/3 of its employees are in Accra, the work is mostly done in the regions by the farmers organizations. Grib today mostly represents micro, small and medium enterprises, which account for 90% of its members.

Its domains of activity have evolved from production support to raising awareness on post-harvest technologies and building up connections in the rice value chain. The Grib works on:

- providing advocacy on policy issues,

- training its members, especially on innovative knowledge transfers,

- facilitating research - for instance with the FRI Grib works on alternative uses of rice (as biscuits),

- technology transfers on processing. For instance, “Good concentration areas” have been set up (2 in the North, 1 in the South) to share practices.

He Grib has recently tested small activities:

- equipment in 2009 of two communities with mills through banks (similar to a leasing to the community);

- buying of a colour saughter; facilitation for women to acquire parboiling equipment (by investment facilitation) and training on production – but this action is not always well targeted;

- testing of rice intensification system.

5. Incorporating agroprocessing into agricultural training, a major issue for value chains development

Agroprocessing is done mainly at the farm family level and it is also artisanal for crops such as cassava and rice.

It must be stressed that all persons interviewed for this study agreed that agroprocessing is a vibrant sector for job creation and poverty reduction. However, the education system at the moment does not give enough focus on post harvest technologies, specifically agroprocessing which has a high artisanal and micro, small and medium size enterprise development in Ghana.

There was also consensus from persons interviewed that the incorporation of agricultural value chain analysis into the agricultural education curriculum would be very useful for creating diversified job opportunities along various value chains.

Officials interviewed at the National Vocational Training Institute (NVTI) mentioned that there was an attempt in the past with the Spanish Cooperation to examine the introduction of agro processing into vocational skills training since there was great potential in employment creation, and the establishment of cottage industries in food and fruit processing. However, this initiative did not materialize. The concept was to look at agroprocessing for job creation through training in the various crops and specializing in agroprocessing through apprenticeship. The NVTI mentioned that there are no existing studies in vocational skills training in the area of agroprocessing.

Stakeholders agree that **agroprocessing training opportunities** can be considered at the various certification levels (Certificate; Diploma and Degree in Food Processing). In addition, agroprocessing training programmes should look at:

- Providing skills for processing crops and fruits;
- Providing skills for diversification of processing businesses all year round because of seasonality of crops and fruits;
- Training should be practical and knowledge based;
- Training must incorporate entrepreneurship development and business management skills;
- Training must look at issues relating to safety and the environment with the objective of focusing on the health status of farm families to increase food production; and
- The courses must be very practical and encourage students to consider setting up their own businesses.

Needs of training institutions

In order for the training institutions themselves to become relevant to offer agroprocessing training courses:

- The training curricula must be first be developed;
- The trainers need orientation and training in food processing technologies;
- Facilities at the training institutions must be upgraded to included agroprocessing equipment and technologies;
- Food processing facilities which are regarded as “good examples” and “Good Practice Centers” should be established and be made available for practical work and internships for both trainers and trainees;
- Such training centers should be focused in rural areas to reduce rural – urban migration.

V. IDENTIFICATION OF HUMAN RESOURCES NEEDS GAPS IN PROMISING JOBS AND RECOMMANDATIONS

1. Gaps in promising jobs

To sum up, most of the raised problematics, as well as human resources issues, are not sector-specific. They can be summarized as follows:

Technical know-how : Technical know-how is a major issue for agroprocessing enterprises, and especially quality processes, food safety, equipment choice, maintenance and good utilization.

The concerned positions in enterprises are managers of micro/small enterprises or operation supervisors in larger ones (medium sized). Most of the time, these are literate (basic education or more) but did not get any specific technical training on their processing activities they have learnt on the job.

Management and marketing : Managerial and marketing know-how is a key competency, especially for micro and small enterprise managers, where in most of the case the manager/entrepreneur has no management background.

One of the first and most obvious lack of competencies which is often stressed when speaking of transversal know-how is basic accounting and calculation proficiency: pricing and costing, which is an important element to work on productivity improvement, operating account proficiency (for instance to be able to introduce credit demands), etc.

Information and communication: Information and comprehension of the economic environment is essential in entrepreneurs decision-making: simple booklets of existing machineries, main products and processes, equipment, list of services providers, suppliers, packagers, etc.

> ⇨ *One hypothesis could be that these promising jobs could be alike in various low industrialized value chains in different countries. This will be studied in the frame of the synthesis report (4 countries).*

1.1 Micro to medium processing enterprise manager

Key identified human resources issues for microenterprises

Technology improvement : technology understanding, production practices, products diversification, capacity of equipment maintenance. One main issue is related to simple technical know-how: basic hygiene competencies (for instance clean floor to avoid stones in rice).

Basic management and entrepreneurship : eg. Book keeping, registering, simple written contracting with partners, marketing. Basis on social and fiscal laws - not even specific to agroprocessing; entrepreneurship training. One issue on management concerns group management, budgeting, eventually common equipment management and product qualification.

Knowledge of local economic environment: lack of information on market and products diversification potentials, simple technical updates => equipments, basic processing guides; market information and marketing know-how; importance of taking into account gender issues; allow processors to see how processing can be done a better/different way. The RTIMP Good practices centers (for cassava) could have an interest in this last aspect.

Concerning information, one major issue lies on sector structuring: besides farmers based organizations (FBO), the sector is not well structured: one of the major issues for enterprises development could be the

possibility for enterprises to exchange among them. Concerning cassava, processing enterprises are not well structured at farmer based organization level, and other forms of exchanges ar very few from what the mission observed. The structuring of cassava processors is however not really an issue since the chain is more difficult to organize: cassava is highly perishable once harvesting (even if the harvesting window is large: 6 months for traditional crops, 4 for improved varieties). Concerning rice, Grib does propose services to its members, largely micro to small producers and processors.

Education level : there is not much demand for functional literacy training (according to Grib), since most of microprocessors can read and write.

Key human resources issues for small agroprocessing enterprises managers are:

- Management, quality, hygiene (good practices), norms. Most small processors in traditional and small-scale cassava processing plants also have limited managerial capacities and training due to little formal education.
- Need of information on economic local environment: marketing (channels, opportunities), basic knowledge of fiscal and social law, existing business development services.
- Waste processing (like compost or rice oil, which is highly valuable in some countries like Japan).

Existing answers

The initial training offer is limited.

No initial training specific to agro processing has been identified. The existing offer is very light and incorporated in agricultural teaching. It comes to teach (future) farmers on processing activities so that they can have an income generating activity in complement to their farm. Moreover, this complementary course for farmers is not systemically taught in agricultural training centers, as shown by the Kwasado Agricultural College example.

Illustration 12. The Kwadaso Agricultural College (Kumasi region)

The Kwadaso Agricultural College welcomes 390 students. It offers 2 diplomas (3 year-courses): one in general agriculture and the second in agricultural extension. It proposes as well on a private basis as week-end "top-up program" (in 2 years). Young people aim with the general agricultural diploma at becoming private established farmers, and the ones having the agricultural extension diploma at becoming extension agents. None is taught to become a processor. They do internship periods with farmers (1,5 month/year in the second year) and not with processors.

Farmers do some small-scale processing to supplement their production activities.

Rice and cassava are both (among others) integrated in the diploma curriculum. The College has been equipped with some processing machines (maize shelling and cassava gari processors given by MoFA), which are useful for the two diploma courses but are not really used.

Processing activities are moreover barely known by the students, who see only their low side: interviews show that what young people know from processing activities is what they see: microenterprises, which require very few qualification and are at mostly practiced as a second choice.

Some vocational trainings exist.

Crops research institute/Council for scientific & industrial research (CRI/CSIR) welcomes few trainings, according to projects/donors (for instance, at the moment some trainings are offered on sweet potatoes, from production to processing). They mainly work on the production side.

Gratis, as illustrated above (illustration 7) provides vocational trainings to its FBOs members on machinery/equipment maintenance, reparation and fabrication.

Moreover, some cassava and rice specific trainings exist:

- Cassava: the RTIMP (Ifad) "Good practices centers"(GPC)
- Rice: Grib regularly exchanges with micro to small enterprises involved in the rice value chain on their issues.

Managerial and marketing know-how is a key competency to acquire and especially for the micro to small enterprises managers, where in most of the case the manager/entrepreneur has no management background.

Individual technical advising services are not very developed for micro to small enterprises (CRI/CSRI, FRI, Grib for rice but little is done in terms of more in-depth advising, no sector-specific active body for cassava).

No specific service exists in Ghana that provides information to the smallest enterprises managers. Through sector-specific initiatives (like RTIMP for cassava) and bodies (Grib for rice), small processors can still have access to some information.

Main recommendations:

- ⇨ *Agroprocessing could be developed as a complementary activity in initial training.*
- ⇨ *There is a challenge, so as to develop agroprocessing activities, that young people better know them as well as their earning and employment potential. There should be an initiation to agroprocessing at low initial training levels, since this activity mainly concerns these levels. This could have impact on young people professional orientations.*
- ⇨ *A challenge on developing vocational training, at NVTI levels (1 to 4)*
- ⇨ *Managerial transverse support services largely exist on a private basis (which medium to large enterprises can afford), through donor-supported initiatives for micro to medium enterprises.*
- ⇨ *Agroprocessing vocational training exists but remains scarce.*
- ⇨ *It should largely be extended and downscaled into advising and mentoring services.*
- ⇨ *There is a huge lack of information, on nearly all business domains (local economic environment, ways of doing/contracting, basics on hygiene, existing equipments, products, markets, etc.). Simple booklets of existing machineries, main products and processes, equipment, list of services providers, suppliers, packagers, etc. would already be of great support.*

Specific notice on medium size enterprise manager

According to the team's observations, small- and medium-sized enterprises process more sophisticated products (example of Joss Mah enterprise), since there is more value added to the products. There are higher barriers to enter these markets since they require material and a higher level of know-how and organization.

There are more business development services and credit facilities for these enterprises, which are for most of them registered.

But roughly, these medium-sized enterprises managers unanswered needs are similar to those of micro and small enterprises, even if more sophisticated:

- Technology improvement is not such an issue for the manager as it is for the operation supervisor
- basic accounting is not an issue for the manager, since it is more sophisticated: either the manager has specific competencies, or there is an accountant at this post.
- Human resources management: a lot of possibilities of support do exist, whether private or subsidized: cassava RTIMP, GPC; all sectors: Gratis, Empretec, etc.
- Getting information on market potential and on business environment (importance of the knowledge of the value chain actors and their relations).

1.2 Small to medium enterprises operation/plant supervisor

This function consist on managing all the process, from raw material reception to final packaging.

Key human resources issues

Generally, operation/plant supervisors in medium-sized enterprises have a low educational level. Most of them have dropped out quite early from the school system.

Before entering at this post, all did not have expertise in food processing or food technology and learnt on the job.

Thus, when it comes to higher production levels and more sophisticated equipments, the technical issues are becoming crucial for the enterprise health. Getting technical support is the main issue to maintain or develop the activity:

- Quality issues: hygiene, norms, production processes, inputs management
- Technology knowledge: capacity of choosing equipment, etc.;
- Equipment maintenance and reparation.

Existing answers

Initial training exists for two types of function on middle management - **Polytechnics Kumasi** intends to develop a new Bachelor program of "technology programme in food technology" (in it Head of hospitality, catering and institutional development). But it is not for these functions: the level is far higher than for operation/plant supervisors in medium enterprises and should be downscaled to be adapted to SMEs.

Illustration 13. Polytechnics Kumasi

Polytechnics in Kumasi trains young people to become middlemen and supervisors in industrial use of local and foreign products.

They propose food science (mainly cooking) courses, in which processing know-how simply allows to give a longer shelf-live to products. This is mainly about training future house keepers in hotels, front office managers, restaurant managers and chefs in the kitchen.

They project to develop a new Bachelor course in food technology. The content will be: chemistry, nutrition, microbiology, food commodity and post-harvest technologies. It will train young people having high-school level who want to become (polyvalent training) either quality insurance manager, food production technician/analyst, product development manager or self-employed. The main needs for these jobs are in industries with high water contents (tomatoes, fruits processing, cassava).

This course will as well aim at SMEs, who face a strong lack of middle to supervision staff and need to fill this gap. Moreover, most of the qualified people are in the South of Ghana (near Accra) and there is an issue of developing and keeping competencies in the Middle belt and in the North.

There would be a challenge as well in getting on-farm transformation units (drying, then the processor can come to get it at anytime).

There are 10 Polytechnics Schools all over the country. Maybe others will be interested by such a new course.

Some vocational training exists concerning machineries: how to get equipments, be able to use, maintain and repair them: **Gratis, Suami Magazine**.

As for MSEs, some vocational training exists through sector-related projects or bodies, but remain insufficient (Grib on rice, RTIMP on cassava – but both focus more on small enterprises).

Main issues and recommendation:

Main issues are:

- Technical processing expertise (production, selling), best done by advising/mentoring.
- Basic technical expertise and knowledge of equipments (so as to choose and maintain them)

⇨ *Recommendation to adapt and simplify existing training (such as Polytechnics) to basic TVET levels and/or to develop from this knowledge an advising and mentoring services for processing SMEs.*

1.3 Service provision: repair and maintenance of machines

Main existing actors are: Gratis, Suami Magasine, private micro/small enterprises.

As presented above, there is a need to develop reparation and maintenance services provision. A more detail feasibility study should be carried out so as to identify the local fabrication equipment needs.

Key human resources issues and recommendations

Main issues:

- Identifying existing processing equipment abroad
- Being able to adapt existing equipment to local enterprises needs.

The enterprises for which needs seem to be the most crucial are the small to medium ones. Indeed, micro-enterprises can access to existing basic equipment, and large enterprises to imported material but there is a lack of equipment and of information about what exists, for which processing purpose at a small to medium enterprises level. These enterprises meet difficulties in accessing appropriate technologies. For instance, concerning cassava, thanks to Gratis equipment development, RTIMP Good practices centers were able to access improved ovens.

There is thus a double need at this level: accessing information and (initial and vocational) training so that professionals are able to adapt and manufacture equipments. Would this option be chosen, the type of trainings to be developed should be specified in a deeper study.

- Management/general: reinforcement similar to small enterprises.

Recommendations:

- ⇨ *A support to this kind of enterprises in identifying equipment plans, manufacturers would be useful (this kind of service has already existed in the past and would still be needed - see InterDev, or Réseau TPA).*
- ⇨ *More services would certainly be useful for processing enterprises:*
  - *Structuring of equipment fabricants: exchanges, expression of common challenges, difficulties and needs (since Gratis is already in regular contact and provides services to them).*
  - *Apprenticeship could be reinforced with an alternation between on the job and in classroom learning (dual form).*
  - *Equipment advises could be subsidized so as to be done on a deeper/more regular basis (it is today mostly offered on a free basis, since micro/small enterprises cannot afford to pay for it).*

1.4 Medium to large enterprises issues (no job selected)

Key human resources issues

Enterprise manager: business advice for developing sales, bettering organization, etc. Issues on local market selling as well as on exports.

Operation/production supervisor : No expertise in food processing (on the job learning): priority on getting technical advice/mentoring to develop activity (priority/major need on the technical entry). Technical advice on quality, hygiene, machinery choice, etc.;

Machine technicians and specialized workers: use and maintenance of machines; hygiene.

- ⇨ *These enterprises have needs but have not been selected since the number doesn't in itself justify an intervention in training. Most of them have skilled workers, who were either trained internally or sent abroad to be trained.*

1.5 A lack of a broader transversal approach on processing issues

Agro processing businesses, whether in cassava or in rice value chains, have been found to present a lot of similarities in terms of competencies needs. Some issues may indeed be true for all food crops (except from cocoa, which has a very different structuring, being largely industrialized and export-oriented). Similarities have also been found for what concerns the lack of adequate human resources reinforcement initiative: some general management reinforcement exist, but no in-depth technical support.

Up to a few years ago, major interventions have largely focused on production. They now have shifted to a demand-driven value chain approach and thus also concern processing issues. In the rice value chain, different initiatives are taking place (RSSP, Up-land rice, Low-land rice, Government irrigation projects

throughout the country). In the cassava value chain, the Ifad and the C-Ava[5] intervention have a demand-driven value chain strengthening approach.

The major agroprocessing cross-cutting technical issues of food quality, equipment (choice, maintenance, repair), hygiene and norms that all agro processing MSEs share are not deeply taken into account. In both value chains, some group trainings or workshops are done, but it seems that there should be an individual and mid/long term on-the-job advising/mentoring of these enterprises.

For the time being, no broader agroprocessing entry has been adopted by donors and interventions: agro processing issues do not seem to be a subject of interest. However, MOFA has such a cross-cutting entry through the Women in Agriculture Directorate (WIAD). Such a broader approach should be reinforced so as to develop training and advisory programs on a common basis and reach a minimal number of enterprises.

1.6 Recognition and communication issues on agroprocessing

As heard through interviews, young people do not want to become processors: it is not taught and they do not see the development potentials that these jobs can offer. What they see from it are mostly the micro-enterprises, which do not require particular skills and are not good-earning activities. These enterprises are often not ran as a deliberate choice of the entrepreneur to go into this business, but rather a second choice.

There is thus a need of communication/ information on possibilities agroprocessing offers.. The recognition of these jobs can be tackled at two levels:

- Convincing young people and the broader public opinion (especially family and professionals) that agro processing jobs are valuable (social recognition). This can be done through different ways, but globally the challenge is to communicate on the potential for development of different value chains and products and on success stories of entrepreneurs earning well their living and contributing to local employment and development.
- A certificate or diploma recognizing the competencies for doing this job: this "institutional" recognition could be done at an initial training level, through which young people could see that agro processing can be a career choice. This would also be valuable for professionals, so that their competencies can be recognized and improved through vocational training.

2. Recommendations for an AFD intervention

According to these two value chain studies, there seems to be a major issue to reinforce human resources needs in the selected "promising jobs", which may have an impact on agroprocessing development in these two value chains.

However, it seems relevant to develop an "agrifood approach" for crops (except from cocoa) rather than focusing on a specific value chain, since there seems to be a large base of common needs that can be addressed together and thus allow to have a minimum scale and innovative intervention.

The consultants thus recommend to reinforce the developing initiatives for micro to medium enterprises:

[5] Financed by the Bill & Melinda Gates Foundation.

- Initial training in agri food for middle-management: Polytechnics project (could be then be expanded to other Polytechnics) and such projects that permits to reach lower qualification levels (none has been identified);
- Vocational technical mentoring of managers (could be done by Polytechnics, CRI/CSRI for instance, for medium-sized enterprises as well as for MSEs);
- Developing a local capacity of service provision on equipment manufacturing, maintenance and repair (Gratis, Suami, and other workshops that as well have a training vocation).

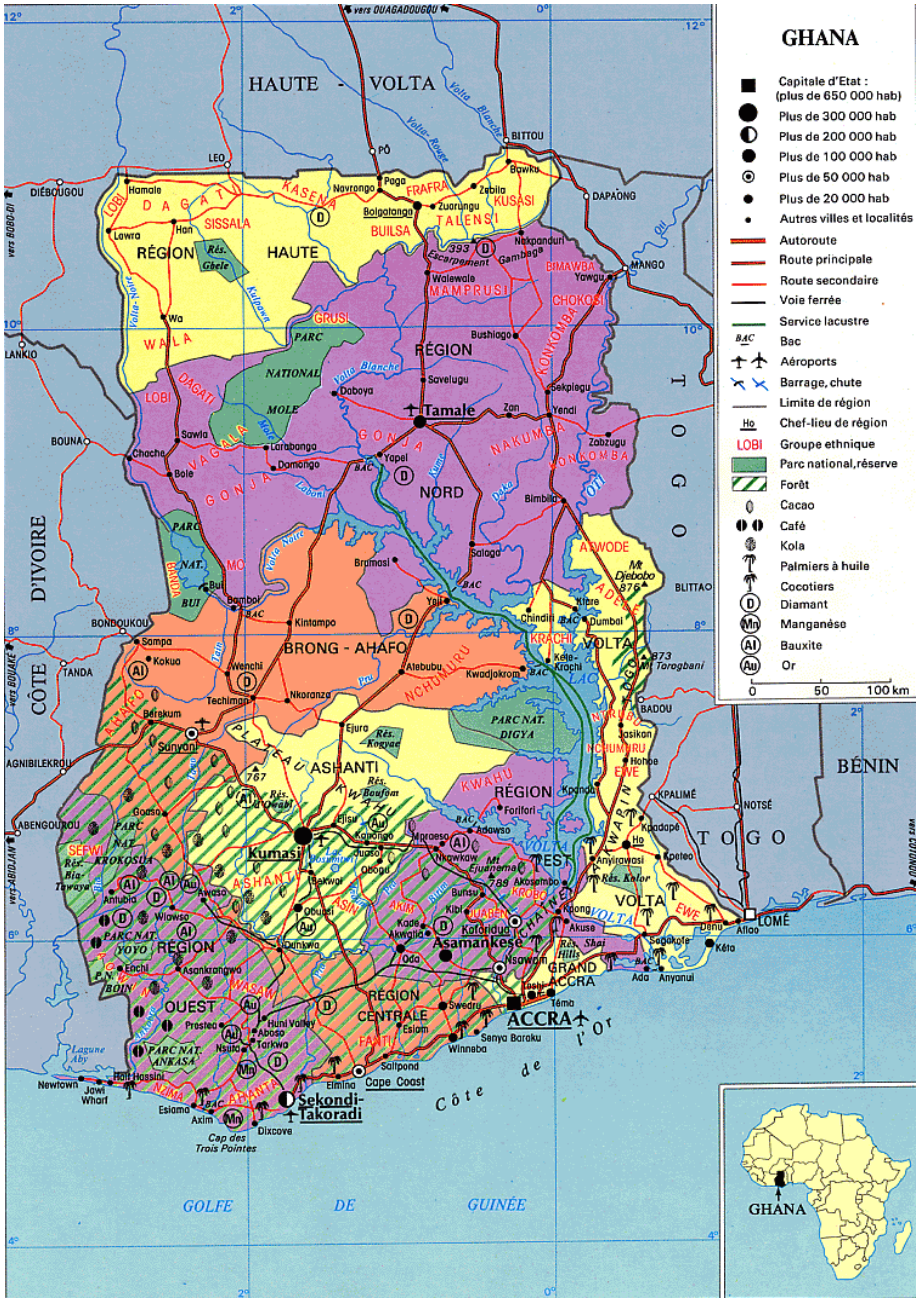
Notice that if initial training is to be developed with success, agro processing and TVET will have to be valued, since both remain a choice by default for students who do not have other options than this type of training and jobs. This could be done through:

- Social recognition (media campaigns presenting success stories, presentation of jobs that can be occupied after TVET, etc.).
- Institutional recognition: with TVET agroprocessing diplomas/certificates and with a recognition of qualifications for professionals.

Last, there should be some coordination between the sectoral ministries such as the Ministry of food and agriculture (MOFA), the Ministry of Education (MOE), the Ministry of employment and social welfare (MESW), the Ministry of women and children affairs and the Ministry of trade and industry (MOTI). One of these ministries should take the lead in consultation with the others. Agroprocessing should as well be incorporated into initial and vocational skills training through the TVET policy (initial training, apprenticeship, vocational training).

VI. APPENDIX

1. Map of Ghana



Source: http://www.izf.net/upload/Documentation/Cartes/Pays/supercartes/ghana.htm

2. Value chains analysis (other than rice and cassava)

2.1 Maize value chain

Maize (Zea mays) is a major staple crop in Ghana. It is also an important component of poultry and livestock feed and to a lesser extent, a substitute in the brewing industry. Maize is an important commodity in West Africa sub-regional trade, particularly between Ghana, Burkina Faso, Mali, Togo and Niger through mainly informal trading. Maize is grown in the whole of Ghana but the leading producing areas are mainly in the middle-southern part (transitional and forest zones); with an estimated 15% grown in the northern regions of the country.

On average, the volume of maize produced in Ghana has increased annually by 3.1% (1997 – 2006)1. Currently, the national average maize yield is estimated at 1.6 tonnes per hectare. Using improved technologies, yields of 4 - 5 tonnes per hectare have been recorded in on-farm demonstration fields. Lower yields have been attributed to traditional farming practices, the use of low-yielding varieties, poor soil fertility and limited use of fertilizers, low plant population, and inappropriate weed control. There is believed to be significant potential for improving yields through the use of hybrid maize varieties.

Farming is dominated by smallholder production, estimated to contribute over 90% of national food production with the majority of these small-holder producers being among the poorest households in Ghana.

Maize is virtually grown in the whole country. However, the main areas accounting for more than 60 % of the 1,188,836 tonnes produced in 2006 are in the in the middle parts of Ghana or the transitional zone (Table 1). The area includes Brong Ahafo and parts of Ashanti and Eastern regions of Ghana. An estimated 15% is grown in the three northern regions of the country. On average, the volume of maize produced in Ghana has currently increased annually by 3.1% (1997 – 2006)3.

Regional Maize Production, Area Cropped and Yields in Ghana 2006

Regions	Metric Tonnes (MT)	Area (Ha)	Yield (MT/Ha)
Western	73, 210	51, 102	1.43
Central	166, 847	102, 648	1.63
Eastern	209, 542	133, 844	1.57
Greater Accra	2, 134	2, 879	0.74
Volta	48, 286	35, 330	1.37
Ashanti	164, 226	138, 793	1.18
Brong Ahafo	363, 595	191, 691	1.90
Northern	98, 157	85, 644	1.15
Upper West	48, 128	36, 714	1.31
Upper East	14, 712	14, 355	1.02

Source: Statistical Research and Information Directorate (SRID), MOFA (2006)

The number of households involved in maize production in the Brong Ahafo and Ashanti regions, are estimated to be between 600,000 – 1,000,000.

Estimations of Consumption of White Maize Produced in Ghana (2006)

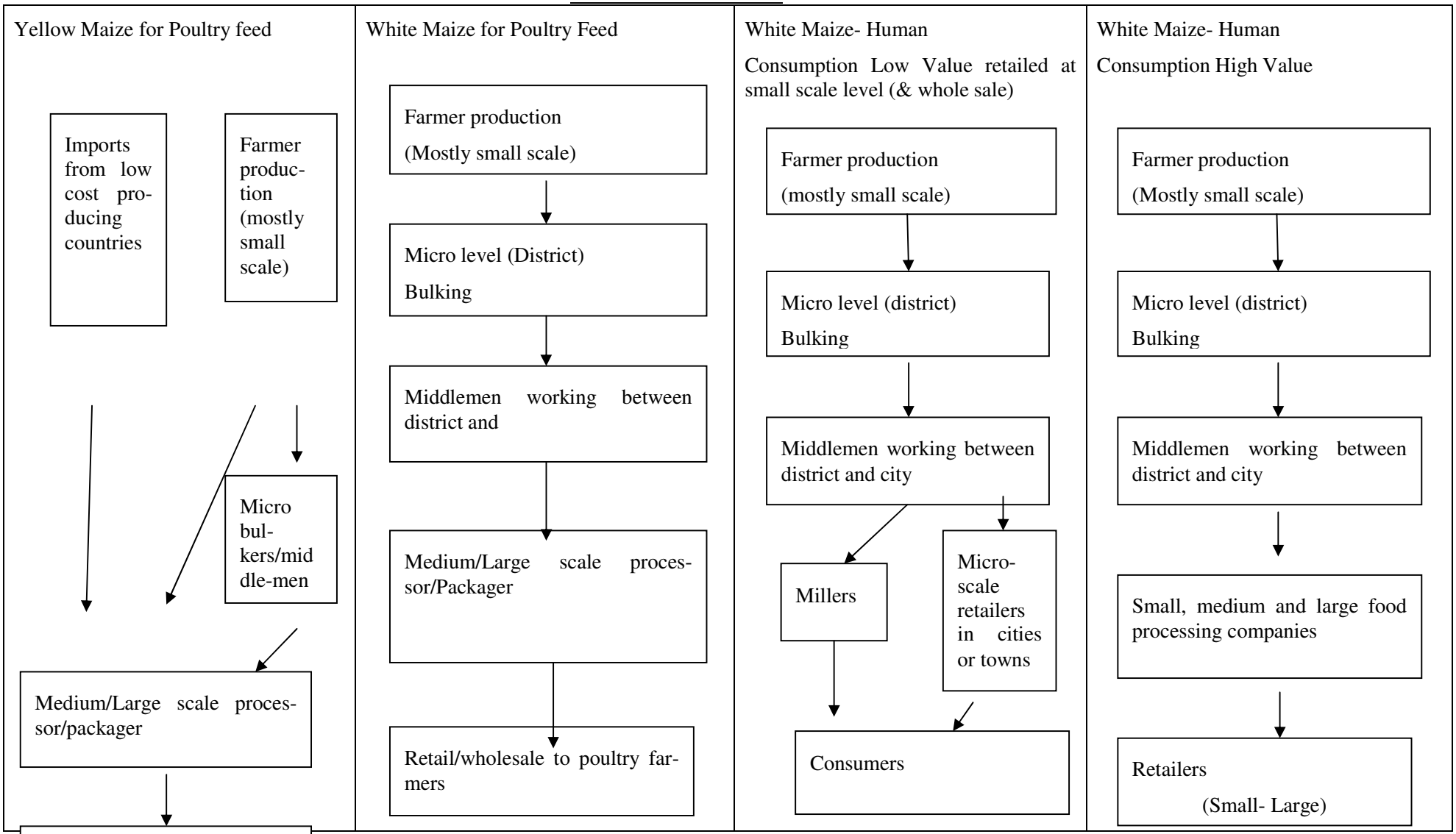
Tonnes	Production/Consumption	% of Total Consumption
1,189,000	Total National Production	
675,000	Household consumption at a subsistence level	57%
150,000	Poultry & fish feed	13
170,000	Formally traded for human consumption (mostly wholesale)	14%
194,000	Informally traded for human consumption	16%

Source: Statistics, Research and Information Directorate (SRID), MoFA (2006). Additional figures(*) are estimates based on interviews.

2.1 Maize market chains in ghana

The cost and mark-up structures of yellow and white maize are very different, as are their end uses. White maize is mostly for human consumption; however, some is used as poultry feed. Yellow maize is virtually all used for poultry consumption. The following Figure #1 provides an overview of four value chains of maize, each with either a different end market or a different maize variety. For reasons of bulking and cost-efficiency, virtually all these market chains work through low-cost bulking agents working at the micro-level and intermediary level.

Value Chains of Maize



2.2 The market chain of yellow and white maize for poultry feed

There are many similarities between the yellow and white maize market chains post-purchase by the medium or large processing companies. Bulking of quantities for white maize occurs by micro level bulkers who initially buy maize from farmers and transport it to the district towns (up to a maximum of approximately 5 tonnes per agent). For further bulking to occur 'middlemen' or 'intermediary-bulkers' will buy, transport and store the maize. These activities are usually undertaken by Town/district level Commission Agents.

Most of value-adding in this chain occurs by medium or large sized companies. Processing involves transportation, cleaning, packaging, marketing and retailing activities. The end product is often whole grains sold for the buyer to mill and mix additives themselves or sometimes pre-milled and with additives (soya, fishmeal etc.) added. However, the main differences between the value chains of white and yellow maize is that until recently, virtually all yellow maize has been imported.

2.3 The market chain of white maize for human consumption

Low value white maize retailed at the small scale level and wholesale including maize consumed at the subsistence level, and human consumption along the low-value chain is probably the largest segment of maize consumption. Initially micro level bulkers buy maize from mostly small-scale farmers. Maize that is consumed in cities (Kumasi, Accra etc.) or towns, outside the maize production triangle is bulked further by 'middlemen' or 'intermediary-bulkers' who often own or have access to trucks and have capital sufficient to trade in larger quantities.

Maize is most often sold at the retail level unmilled (still in grain form) and many households still mill the maize for domestic use with 'pastel and mortar' (heavy wooden pole and wooden bowl for grinding the maize) or take it to a machine-milling service (also known as corn-mill or hammer-mill) (see Section 5. for more details).

Maize sold at the 'micro' retail level in an unpackaged form was found to be selling at between 0.7 and 0.9 Ghana Cedis per kg. A large proportion of the maize for human consumption is milled in large-scale mills and sold in bulk to institutions (army, schools, World Food Programme etc.). However, maize that does not progress to the larger cities or towns outside the maize producing area, will move off the chain at earlier stages (e.g. maize to be consumed in Sunyani will often be bought straight from the farmer or bought from the micro-level bulkers, by-passing the inter-city middlemen).

2.4 The market chain of white maize for human consumption

At the high value end of the market chain, there has emerged demand in Ghana in recent years for pre-mixed and attractively packaged foods that contain maize (fufu, kenkey, banku, porridge etc.). Such products at a retail price, can range from US $ 1 to 2 per Kg. This segment of the market is small compared to other segments. This market chain differs from the low-value maize products chain, at a point from the 'middlemen' onwards, where food processing companies become involved and more value-adding occurs.

2.5 Overview of relevant institutional stakeholders in maize production

The following is a description of the main institutions currently involved in maize production promotion in Ghana.

2.5.1 Public Institutions in the Maize Value Chain

Ministry of Food and Agriculture and Formal Research Services

The goal of MoFA is to create an environment for sustainable growth and development of the agricultural sector. The ministry therefore exists to promote sustainable agriculture and agribusiness through efficient policies and co-ordination, monitoring and evaluation of the sector (MoFA, 2007c).

As in all crops including maize, MoFA is responsible for the overall co-ordination of projects and programs in the maize industry through the Directorate of Crop Services (DCS). The DCS's annual planned activities broadly include the following (MoFA 2008):

Improvements in maize production and productivity levels

Capacity building for stakeholders [producers/ Farmer Based Organizations (FBOs) etc.]

Promotion of maize value chain development as a concept in the industry

Sustainable land and environmental management

The DCS works with the other sectors of the ministry including the Agricultural Extension Services Directorate (AESD) which facilitates among other things technology dissemination, FBOs formation and development with other stakeholders. At the District level, the District Director of MoFA works with a team of staff including the Management of Information System (MIS) officer and a number of Agricultural Extension Agents (AEAs) distributed in the District's MoFA operational areas. Extension services at the local level from time to time receive support from donor-funded projects.

An Agricultural Engineering Department with a head office in Accra provides occasional technical inputs such as plastic imported maize storage cocoons (20 tonnes, 50 and above) and tractors (above 80 horse power). Whilst Agricultural Extension Services exist at the district level it proved difficult to get detailed statistical data on the subject but it was generally reported that farmers very rarely received agricultural extension advice as expected due to logistical challenges. Hence, some sort of support is usually received from external development organizations and projects such as TIPCEE.

Agricultural Research Organisations

The various directorates under MoFA work in collaboration with the Centre for Scientific and Industrial Research (CSIR) under which falls the CRI in Kumasi and the Savannah Agricultural Research Institute (SARI) in the North. They develop technologies for farmers to improve the maize industry. For instance, in maize seed multiplication and development, breeder seeds are produced by the CRI or SARI. Foundation seeds are then multiplied by the Grains and Legumes Development Board (GLDB) while, inspection and monitoring of certified seeds is carried out by the Seed Inspection Unit (SIU) under Plant Protection and Regulatory Service Directorate (PPRSD) of MoFA.

2.5.2 Private Institutions in the Maize Value Chain

Input Dealers and Service Provision

Numerous district-level inputs retail service providers can be found. These are mostly supplied by a number of large national importers of agricultural inputs. Competition is relatively strong (more than 8 such outlets in the relatively small suburbs of Sunyani) and the range of stock is sometimes limited (few stocked chemicals suitable for the fumigation of a small quantity of maize and not many found to be stocking maize seed – although it was not the maize planting period at the time of consultants visit).

Examples of such companies are Wienco, Dizengoff and Agricare. Agricare Limited for example is engaged in the manufacture, import and export trade in agricultural equipment, animal feeds, supplements and veterinary products. Agricare Limited is a member of the Association of Ghana Industries (AGI). Agricare operates mainly from Kumasi as one of the major wholesale buyers/millers in the maize supply chain.

2.5.3 Shelling Service Providers

Throughout the regions, shelling services by machine can be found at the community level where each community is likely to have a handful of service providers. A service provider is usually an individual owning one machine on wheels, that is taken from farm to farm and charged out on a per bag shelled, basis. These business services are often in the form of a young man who has a minimal level of education, few other employment opportunities and is in his first stages of business.

2.5.4 Transportation Service Providers

Transportation Service Providers can be widely found in various forms namely small trucks, tractors (above 100 horsepower) including hand-held (as shown in Figure 15.) and even cars where bags of maize are loaded onto seats.

2.5.5 Drying Service Providers

Drying service providers are not often found but can be found as part of a company's secondary activities; where its primary activity is higher-value food processing. For example, a drying service can be found at Yedent Foods in Sunyani.

2.5.6 Storage Services and Facilities

Since the 1970's government has installed fairly evenly across 27 locations of the country, large scale storage facilities. The total storage volume is reported to be 80,105 tonnes averaging out at 2966 tonnes per location. These are either in the form of silos or warehouses. Large and medium sized processing companies, and smaller middlemen are all found to have their own storage facilities which are most often in the form of warehouses with grain stored on the floor. Some of these facilities, particularly the smaller ones, are rudimentary, which may just in fact be the room of a house.

Assemblers at the village and town level have been found to often store the bags of maize on raised wooden frames (2 – 4 inches off the ground) and covered with tarpaulins, in the open ground. Farmers again may just be using the room of a house or be using a purpose built crib which is a building made from low cost materials of unsawn wood and corrugated metal roofing sheets.

2.5.7 District-Town/Village Assemblers Buying from Farmers at the Primary Level

At the district level, at least one bulking point can found (Sunyani has 2) per town. Approximately 30 – 60 microbuyers operate in Sunyani and approximately 60-150 micro-buyers in Nkoranza Town. During the high season amounts handled through these bulking points per month, have been found to be 1,300 tonnes and 5,200 tonnes for Nkoranza and Techiman respectively. The assemblers most often buy at the farm gate and sell to larger middlemen-traders who come from outside the district, to the local bulking area to buy. As an example assemblers in Nkoranza have formed an association with a membership of approximately 150 members. The land that this 'market' is operated on is reported to be owned by the local chief who allows its use at no or very little cost.

2.5.8 Middlemen / Intermediary Traders

These persons buy from the village / town assemblers and transport to the larger towns, cities or larger buyers. These buyers often have a 15 – 20 tonne truck with which they transport the maize. These traders are better capital-resourced either with formal bank loans or their own personal capital.

2.5.9 Private Sector: Medium and Large Scale Buyers

A number of large and medium sized companies buy and process maize. Some of these companies have significant investments in processing machinery and infrastructure (storage, milling, packaging, etc.). Table 4 below provides an overview of a selection of some of these companies.

Select Medium and Large Scale Buyers and Processors of Maize

Company	Current Annual traded quantity of maize	Method of Procurement Market Targeted	Market targeted
John Hussian	1200 – 2000 tonnes	Through middlemen	White maize for human consumption
Yahwe Salom	12,000 tonnes	Through middlemen	White maize for human consumption
Premium foods	20 – 50,000 tonnes	Through middlemen	Institutional buyers (army, schools, nWFP)
Ghana Agro Food Co.	10 – 15,000 tonnes	Through middlemen	Poultry feed
Aqua Farms	Approx. 30,000 tonnes	Importation mainly but has started to buy directly from farmers in Sunyani via TIPCEE Project	Poultry feed

2.5.10 Miller Service Providers

At the town and city level, numerous milling-only service providers can be found (they restrict their service to milling the grain for a fee without trading in maize). Households or small scale retailers are the main customers of this service. Service providers often have basic machinery and a basic business premises, with low overhead costs (mainly overheads of labour, electricity and maintenance). Milling charges are reported to be approximately 2.5% of the farm gate value of the maize.

2.5.11 Primary Post Harvest Processing Level

Many farmers hire labour to conduct operations such as harvesting, dehusking and bagging at these stages of the production cycle, of which the range of costs per acre, for these activities, ranged from GH₵12.7 to GH₵87.9. An average cost per acre is about GH₵40.76.

2.2 Pepper value chain

Pepper is a common agricultural product produced and consumed in Ghana. The crop is used in nearly all Ghanaian dishes. The annual demand for pepper is estimated at GH¢27 billion and accounts for about 9.6% of total food expenditure in Ghana (GSS, 2000), while pepper consumption is expected to rise with increasing population.

Pepper has become a major cash crop for many farmers and production has been increasing. Brong Ahafo is the largest pepper producing region the country followed by the Northern region. In the Northern Region, close to half the households (41.3%) are engaged in pepper production (OIC 2004).

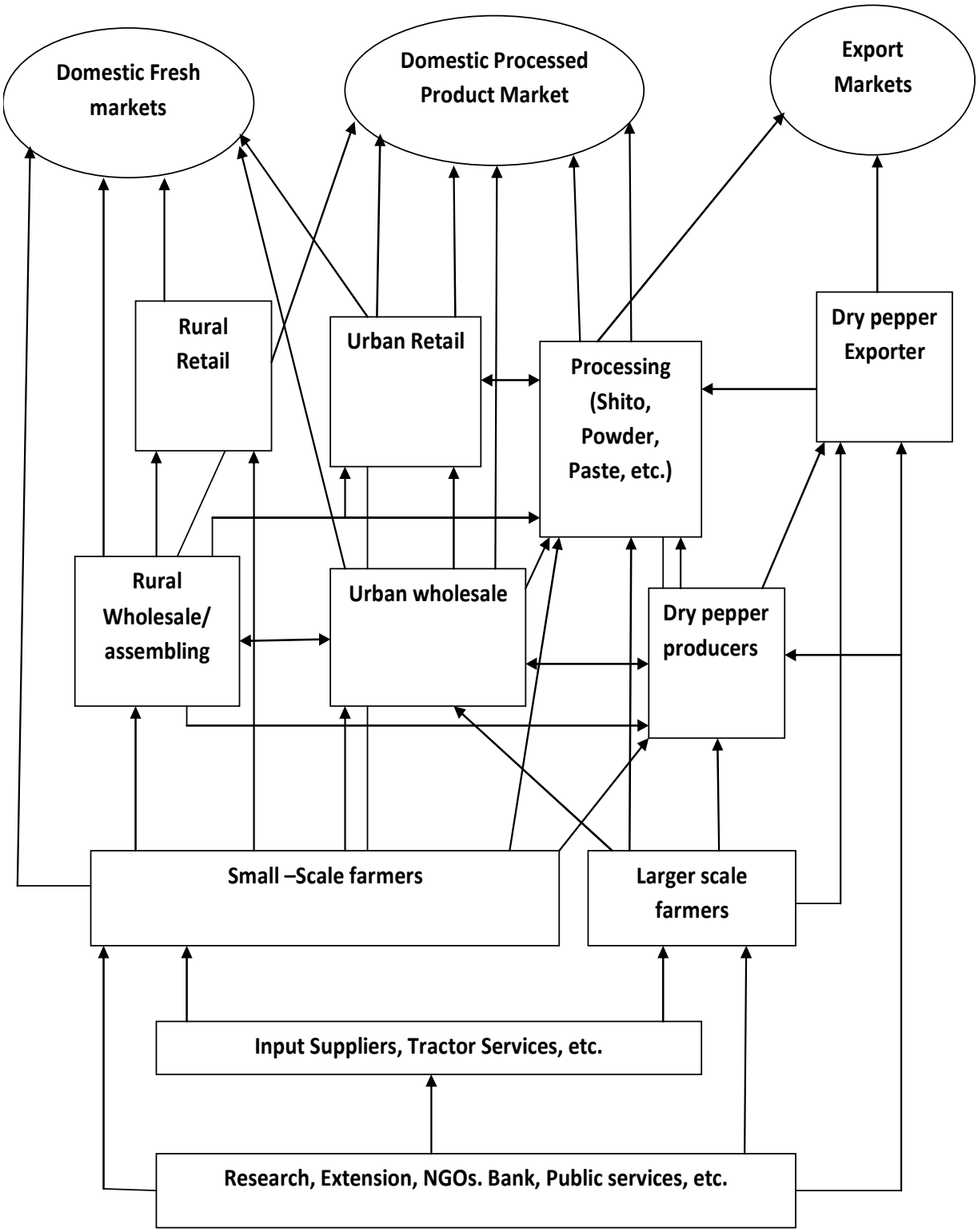
Pepper produced in Ghana is marketed both domestically and in export markets. Major export markets for Ghanaian pepper include United Kingdom, Togo, Germany, Netherlands, Austria, and United States (GEPC, 2006). Domestically, both fresh and dry pepper is sold within the production regions and beyond. They are also exported to other neighbouring countries like Burkina Faso, Niger and Mali.

Tthe pepper value chain

The pepper value chain in the peri-urban covers all the production processes as well as interactions between the processes of input supply, production, processing (transformation), trading, financial and business support services and consumption of the pepper.

The principal functions in the pepper chain, including input distribution and related preproduction services upstream, production of pepper, harvesting, post-harvest handling, processing, transporting/haulage, trading (assembling, wholesaling and retailing: both domestic and export) and consumption, downstream, in addition to business development and financial services rendered to the sector are described below.

Diagram of pepper value chain



3.3 Input supply

The function of input supply in the pepper chain covers all services required in pre-production activities, among others:

Seed supply

Few farmers buy pepper seed. Although they have limited knowledge in seed production and management, farmers largely select and use seed from their previous harvests. Some traders in the local markets however sell seed and seedlings.

Agrochemicals

Agro-inputs are primarily fertilizers, various types of pesticides and herbicides, and seeds/seedlings. Key sources of supply of smaller quantities of these inputs (e.g. less than 1 bag -50kg of fertilizer) are the village markets, which are organized periodically in a six-day cycle. The bulk of input supply however comes from urban centres. Key actors in the business of input supply include input peddlers who move from village to village to sell in smaller quantities, retailers with shops in the villages and urban centres, as well as wholesalers/distributors in the urban centres.

Farm equipment

Tractor services for field preparations.

3.3 Production

Farm sizes are generally small, ranging from 0.1 to 1.2ha. Production techniques are largely traditional, involving the use of traditional implements such as hoes for tilling the land and perforated gourds and buckets for watering. Key actors in pepper production are small farmers, both male and female, though males dominate in the function of production. Field preparation, planting, weeding and fertilization and pest and disease control are activities generally undertaken by male members of the farm household, while harvesting is largely carried out by women.

Production involves several activities discussed below.

Nursery preparation

This activity requires one semi-skilled labourer per acre.

Land preparation

Land preparation may be undertaken mostly by unskilled farm labourers where simple farm tools are being used. Where mechanized equipment is being used, a semi-skilled person is required. About 3 labourers may be required to prepare an acre of land using simple farm tools whereas only one labourer may be required in the use of modern equipment.

Cultural Practices

Cultural practices in pepper production include watering, weeding, fertilization, pest control, disease management and harvesting. About two labourers – one semi-skilled and the other unskilled – will be required to undertake this activity per acre of land.

3.4 Post-harvest operations

Post harvest operations on fresh pepper include sorting, bagging and drying. Even though pepper drying is largely restricted to women farmers, it is common to find some market women (traders) who buy the fresh pepper, dry and store.

3.5 Processing

The demand for processed and semi-processed products in Ghana has been rising as a result of growing urbanization and increasing demand for convenience foods as many more working people seek quicker and convenient ways of preparing dishes. The demand for processed pepper is no exception to this growing phenomenon, especially in urban centres.

The trend has seen some millers who have made pepper milling a full time occupation. Largely, dried pepper is sold in the traditional markets unprocessed, but some traders and processors mill the dried pepper and sell as powdered. Thus, dry pepper becomes intermediary product for further value addition downstream.

The powdered pepper is also a key ingredient for the production of 'Shito', a popular local pepper sauce which finds its way into the various restaurants in the country. This implies that the number of key actors involved in pepper processing can vary, depending on the product type and complexity as well as production technology. Actors identified in the processing of pepper in the study area are farmers (who dry pepper), market women (who also produce powdered pepper), and shito producers. Commercial processing of fresh pepper into paste is rare in the study area.

3.6 Marketing

Pepper produced in Ghana is traded in both domestic and external markets. Dry pepper is traded in all the major Ghanaian markets in Tamale, Techiman, Kumasi, Accra, Bolgatanga, Bawku and Navrongo, as well as in the West African sub-region.

3.7 Business Development Services

The Business Development Services (Business Support Services) consists of public and private service providers, e.g., public agricultural research and development institutions, rural banks, apex bodies of farmer based organizations, and local civil society organizations. They provide services such as research, extension, training, credit market information, etc, which may be tailored to the needs of the actors in the chain.

The Savanna Agricultural Research Institute is working with the University for Development Studies (UDS) to facilitate chain engagement: forging relationships among actors and helping to strengthen existing and new linkages. Other organizations supporting the pepper chain are Opportunities Industrialization Centres located in most of the regional capitals, the Ministry of Food and Agriculture (MoFA).Whereas OIC is engaged in community mobilization, facilitating the formation of Producer Organisations (POs), and providing micro-credit facilities, especially to women groups, the Extension Service of MoFA promotes the use of improved technologies by pepper farmers.

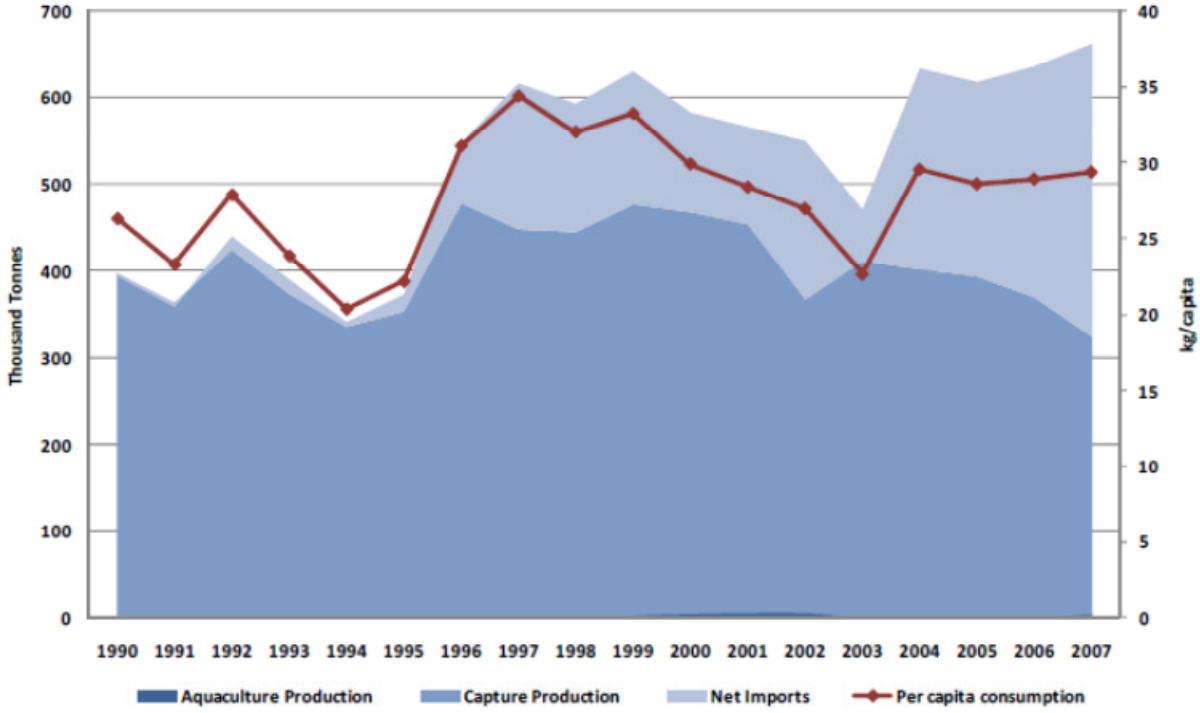
3.8 Financing

Some farmers obtain financial support from microcredit systems facilitated through NGOs such as OIC, Adventists Development and Relief Agency (ADRA), and Simli-Kpong – a subsidiary of the Ghanaian – Danish Community Development Program (GDCP).

2.3 Fish value chain

Fish is extremely important in the Ghanaian diet, accounting for 40-60% of animal protein supply (fig 3). Fish is widely consumed throughout the country – as a fresh product near the landing sites and as smoked and dried fish in more distant markets. FAO data indicate an overall food fish balance of almost 680,000 tonnes (or nearly 30kg per capita). A new study, however, suggests that freshwater fish landings from Lake Volta may be much higher than previously thought, indicating that average per capita fish consumption may exceed 40kg per annum (FAO and WorldFish Center, 2008). The marketing systems, although largely based on traditional products, are relatively well-developed and extend into neighbouring countries. The domestic market, however, remains the most important market for Ghanaian fish production.

Apparent consumption of food fish in Ghana, by source, 1990-2007



FAO data on apparent consumption are derived from: production (capture fisheries and aquaculture) plus imports less exports plus/minus any change in stock.

FAO statistics indicate that Ghana is a net importer of fish by value and volume (see Table 5 below).

Ghana food fish trade volumes and values, 1990-2007

	1990	Annual Growth Rate (1990-2000)	2000	Annual Growth Rate (2000-2007)	2007
Import Volume (Tonnes)	22,698	22.29%	169,753	11.47%	362,974
Import Value (000 $)	11,000	22.38%	83,640	10.74%	170,770
Import Unit Value ($/kg)	0.49	0.08%	0.49	-0.66%	0.47
Export Volume (Tonnes)	25,413	7.96%	54,681	-10.19%	25,772
Export Value (000 $)	21,591	13.77%	78,464	-3.53%	60,999
Export Unit Value ($/kg)	0.85	5.38%	1.43	7.41%	2.37

Source: http://www.fao.org/fisheries/countrysector/FI-CP_GH/en

Exports in 2007 were worth about $61 million whilst imports were valued at $171 million, whilst import volume exceeded export volume by a factor of 14. Although some of the informal regional trade may be under-reported, it is very clear that Ghana's dependence on imports has increased dramatically over the last 20 years. (In addition, the official data may give little clue to the movement of fish caught by the international fleet. Much of its catch is not landed in Ghana and there are also controversies concerning Illegal Unreported Unregulated (IUU) fishing).

4.1 Marketing Systems and Fish Products

Most of the catch along Ghana's coastlines enters the processed (smoked) fish marketing chain. However, some fresh fish is fried for sale locally while some is fermented. Fish is usually purchased at the point of catch by resident traders, or by "short-term migrant" traders residing there temporarily during periods of abundant catch and low prices (sometimes sub-contracting the smoking locally, or it is immediately transported back to the home base of visiting traders and sold to processors there).

These outcomes depend on relative prices, with traders juggling considerations of fresh and processed fish prices, as well as processing and transport costs, all of which will vary depending on market conditions.

Women play a dominant role in traditional fish processing and trade – be it in large- or small-scale operations. This position is long-standing as indicated by their traditional roles too (analogous to the Chief Fishermen), which, interestingly, include roles in coastal areas and inland markets (underlining the historical importance of fish trade in Ghana). At landing centres, the "konkohene" or Queen Mother (whose role dates to the early 20th century) sets or influences the prices at which all fish is sold from the boats on that day. Women traders may advance fishing trip costs to boat-operators and this will give them access to that boat's catch. There is some indication of erosion of these systems (e.g., in Sekondi, where prices are negotiated on an individual basis), particularly in places with improved landing facilities (allegedly in places where landing fees are payable) or where there are particularly successful and powerful fish mongers. More generally, there is some variation from place to place in precise roles and how the arrangements work in practice9, but the important role of women in fish marketing in Ghana is universal.

In Western Region, smoking is the most common form of processing. Women use so-called Chorkor kilns, where fish is slowly smoked on stacked racks, with relatively efficient use of fuel wood and producing a relatively evenly-smoked product. (The way in which the fish are prepared depends on the size and type of fish).

4.2 The economic importance of fisheries in Ghana

A noteworthy point, when describing the local fish economy in Ghana's coastal areas is the number of people that are drawn into related activity and the extent to which it seems to drive all other activity. Sixty-five percent of Ghana's population lives within 100 kms of the sea. Whilst clearly reflecting a number of factors (including agro-ecology) the importance of fisheries has also helped retain and attract populations to the coastal zone.

Economic multipliers are generally categorised as: backward (i.e., the supply of goods and services that are inputs to the production process – such as boat-building or fuel); forward (those linked to marketing, such as processing and transport services); and "consumption" (the economic effects of people simply spending their income on other goods and services). A visit to a landing site when boats are unloading reveals an astonishing array of economic activity, with ample examples of all three categories of multiplier, table 6 below.

Fish Value Chain: Examples of Multipliers

Economic Linkage	Activity
Backward	an "outboard motor lock□up /guardian" service • boat□building activity • lots of people mending nets (presumably boat□hands) • numerous fishers and deck□hands (large canoes may have a crew of 25) – all paid on a catch share basis • shops selling spare parts, engine oil, nets • water trading (fishing boats will carry and fill water containers, for a fee, collecting water from nearby villages where water is less scarce) (linkage category is debatable) • workshops offering outboard repair services • traders, walking from boat to boat, selling a wide variety of fishing related goods (e.g., raincoats) and other items
Forward	• Fish processing sites usually a hundred meters or so away, which in turn are purchasing fuel wood or paying porters to carry wood • fish traders buying from those boats (large amounts and small amounts) • hired transport (trucks, minibuses, taxis) • people renting freezer space or selling ice • porters – ferrying fish from the boats to the fish traders (taking a share as payment) • porters – ferrying the accumulated purchases of the fish traders to

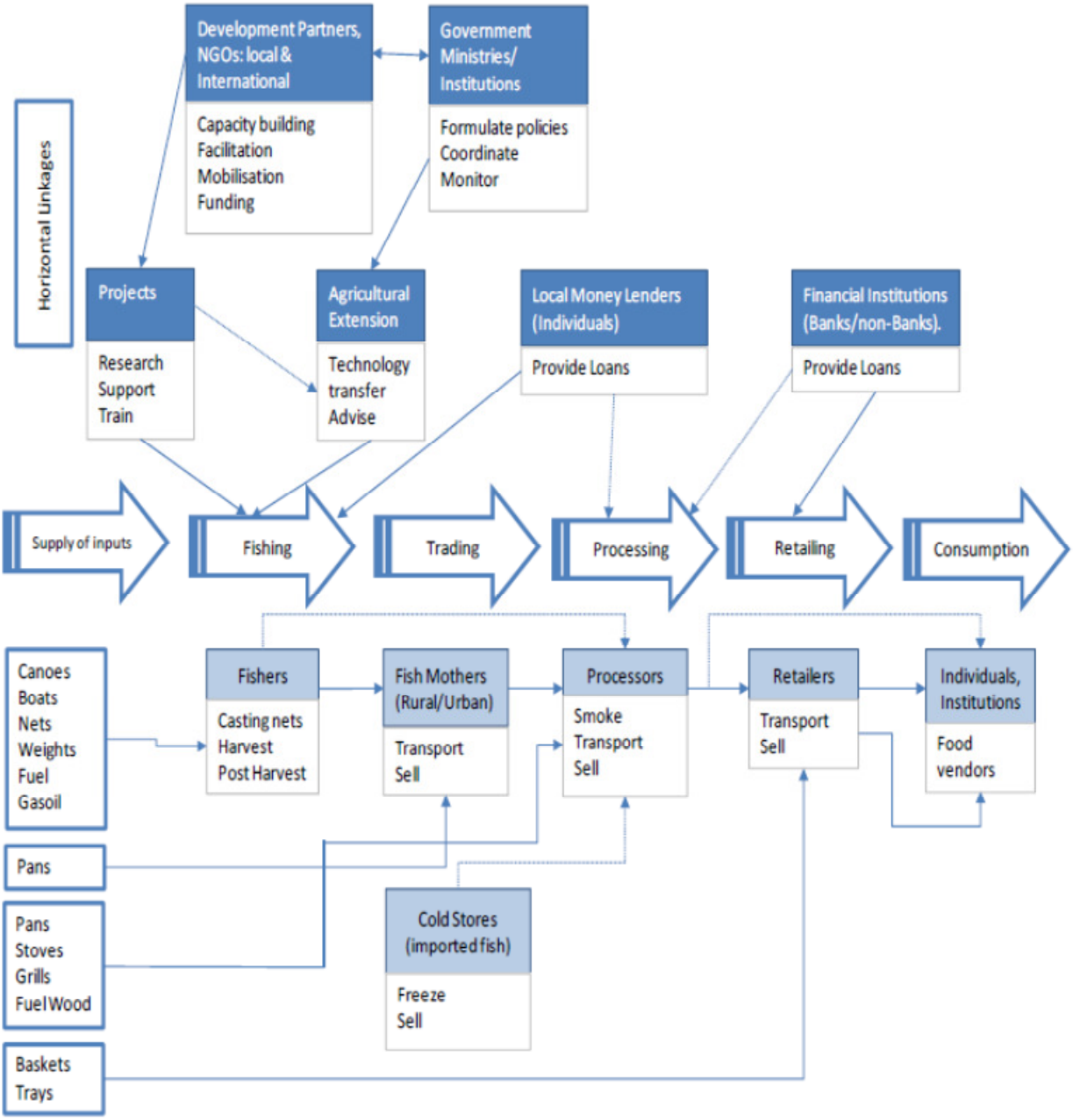
	waiting transport or to near□by fish processors • small informal guest□houses (or people renting out space in their homes) use of telephone services (mobile and landline) □ (also "consumption" linkage)
Consumption	• a wide variety of other consumer goods sold from stalls or by ambulant traders (clothes, telephone cards, linen, kitchenware, toiletries, maps, books, stationery, jewellery, handbags, medicines, matches, cigarettes, newspapers, ironmonger goods, cassettes/ CDs, radio/"hi□fi"s, mobile phones, batteries, plastic bags, etc) • buildings or tented areas where videos are viewed • cafes offering food and drink • drinks being sold by ambulant traders • other snacks and processed food being sold from stalls • people selling "ready to eat" fruit (e.g., pealed oranges) • women cooking and selling food (at the road□side)

The list in table above is only illustrative and certainly not exhaustive. Studies in rural Africa

suggest that local agricultural employment and income multipliers are in the range 1.3 -1.7 (i.e. new income in a rural area of say $1 (perhaps from trading crops) will generate a further $0.3- $0.7 through multiplier effects). Local multipliers are strongest where recipients spend high shares of their income locally. There has been relatively little work done on multipliers in fisheries, but an SFLP11 study in Ghana suggested that one fishing job created 7 additional livelihoods and FAO (2007) suggest that for every person employed directly in fishing, there may be an additional 4 associated "downstream" jobs.

The household security effect is even wider – since each of these incomes will help support an extended family. Although fishing is becoming more difficult, there is no doubt that it nonetheless remains a critical economic driver. These livelihood impacts are extremely important – particularly in the context of very limited alternatives for the coastal community. This merits emphasis moreover within the current discourse on "wealth-based fisheries management" which argues that marine fisheries in Ghana are only marginally profitable at best. Whatever the evidence for and against that position, the importance of fisheries as a (direct or indirect) source of livelihood for millions of people in Ghana should not be under-estimated.

Fish value Chain



4.3 Fishing and fishing input suppliers

At most landings throughout the country, marine fishing is dominated by small-scale fishermen (Finegold et al., 2010, indicate that roughly 5000 canoes operate in Western Region). The fish marketing system involves a chain of activities including: purchase of inputs (canoes, mechanized wooden boats, nets, corks, weights, hook and lines); casting and dragging of nets; and on-board preservation using ice blocks. Boat owners employ a number of fishers for fishing activities.

The size of the crew ranges between 2 and 30 depending on the size of the canoe. The

smaller paddle canoes employ about 2 to 4 crew members, while the medium and larger ones have crew members ranging from 20 to 30. These types of canoes are powered by outboard motors. Crew members are paid after every trip once operational costs are deducted from the proceeds, with larger shares going to the owner of the boat.

Ghana experiences upwellings each year. These are seasonal phenomena that bring cool, nutrient rich water to the surface, resulting in high productivity, and sustaining a biomass of organisms not seen in other areas of the ocean. The largest upwelling (major) occurs from June to September whilst the smaller one (minor) is between February and March. These upwellings bring a significant increase in fish catches (bumper seasons). The rest of the year is associated with little or no catches (lean season).

The use of lights (increasingly used by canoe fishers since 2003, but declared illegal in 2010) has to some extent taken the seasonality out of fishing – with lights attracting fish (even juveniles) and fishers able to maintain a reasonable catch year-round. However, if the new regulations are enforced, the marked seasonality will return to fishing.

Fishers typically fish on a daily basis and most observe a "day of rest" once a week (Tuesdays in most places), especially in small fishing communities. A typical fishing trip can last up to 20 hours with the exception of hook-and-line fishers and those utilising drift gill nets, who go on 3-4 day trips and carry ice to preserve catches. During the lean season some fishermen do not go fishing at all, because the small catches do not cover their costs.

During the major season, fishermen report that 10-30% of their catch has to be down-graded, as a result of poor on-board icing and handling. Such fish are used to make "stinky fish" (locally known as "momone"). Momone is, in essence, fermented fish and is prepared by airing it until it begins to rot. It is then soaked in brine and allowed to settle for a few days after which it is left in the sun to dry.

The chain begins with the supply of inputs to fishermen: canoes, nets, cork, weights, fuel, and outboard motors. Lower cost, frequently used items can be purchased at the large landings from small businesses but large items (such as new outboard engines) are purchased further away (e.g., in Takoradi). Locally available goods and services include motor repairs, fishing gear and fuel (either the subsidised "pre-mix" or other fuel if pre-mix is not available). Dug-out tree trunks are used to make canoes and although the use of the preferred wood (wawa) is officially illegal (to protect the dwindling numbers of this tree), it seems this trade still occurs.

4.4 Fish traders

The fish traders (also known as fish mothers or "konkofo") pre-finance fishing trips and purchase fish from fishermen for distribution to other actors in the fish value chain, most of whom are smoked fish processors. They also sell directly to fresh fish retailers, "momone" processors, and individual consumers.

Building of new canoes takes place quite openly in the fishing communities sometimes Wawa trees for this purpose can be bought from the north-eastern part of Western Region – and also from Cote d'Ivoire. Particularly in smaller landing sites, the Queen Mother ("konkohene" – the fish mothers' leader) negotiates a price with the first boat that arrives and this price is generally valid for the rest of the day.

In large landing sites like Sekondi harbour, this role has allegedly lost its importance and prices are negotiated on a boat-by-boat basis. The konkohene is appointed by the fish mothers. She remains in power indefinitely or until her elders (also fish mothers) advise her to step down. Exchanges between fish mothers and processors/consumers are typically carried out at the landing site where the fish is purchased (although, as noted above, fish mothers sometimes travel to the large landing sites to buy fish).

Apart from acting as intermediaries at the various fishing harbours, fish mothers can also play important roles in informal finance. They almost always pre-finance the fishing trips with fuel, gas oil, kerosene, and food, thus securing access to that boat's catch. Depending on the financial position of the fish mothers and fishermen's need for credit, one fish mother can support more than one fisherman. It is rare for fish mothers not to

pre-finance fishers. If this is the case, then it most probably means that the fish mother is the wife or close relative of the boat owner and already has access to an adequate supply of fish. Their support is not only restricted to fishers since, in some cases, they support processors by selling to them on credit. This will however depend on the specific relationship between the processor and the fish mother.

The fish mothers essentially act as a monopsonistic (one buyer) cartel: they control access to supply through pre-financing and (since relatively few people have the resources to offer such credit) they limit "membership" of the group by the same mechanism.

4.5 Fish processors

Processing of fish, which represents an important sector for women, seems to be concentrated at the small- and medium-scale levels. Fish is processed using several methods of which smoking is the dominant. Most of the processing takes place at the individual or household level and the most common species of fish processed is sardinella, known locally as "ɛban" (also known as "Amane" in some areas), though it is common to see other types of smoked fish. Processors mostly purchase fish from the fish traders, but there are cases where they purchase directly from fishermen. If there is insufficient supply of fish, processors travel to other landings to purchase fish.

Processing technology is mainly traditional using manual labour. Smokers use so-called

Chorkor kilns and utilise various inputs such as baskets, basins, grills, basket nets, fuelwwood, and brown paper.

4.6 Marketing of smoked fish

4.6.1 Selling fish in Ghanaian markets

Most processors do not wait for traders to come to them - they actively seek market opportunities by transporting smoked fish to various large markets within and outside their district or region of origin. In these markets, processors are excluded from selling directly to consumers. They sell fish in packs of hundred to retailers who in turn retail to consumers in the same markets or smaller neighbouring markets.

In some cases women who act as itinerant traders go to processors in their communities to buy the fish, which they sell to retailers in central markets. Retailers sell smoked fish to consumers (individuals and food vendors) at the same (central) markets or in smaller, surrounding markets whilst others transport it to villages for retailing. While the majority of these traders deal solely in smoked sardinella, a few sell other types of smoked fish as well.

Though they operate as individuals, most retailers are members of trader associations.

Members of these associations help each other in times of need and also share information on prices and supplies. They are typically headed by so-called "commodity queens". The queen's main functions include the establishment of informal market rules as well as the settling of disputes between retailers. One common rule, for example, makes it mandatory for every person selling fish in a particular market to give a specific quantity to the queen or pay the equivalent amount in cash. Failure to do so would warrant a fine or expulsion from the market. The commodity queens are appointed by an overall market queen whose role is inherited.

In the lean season, when fish is scarce, those retailers who are able to afford it resort to purchasing frozen fish from local cold stores and smoke it themselves.

4.6.2 Fish bound for regional markets

Whilst most fish sold is for domestic consumption, some of it ends up crossing international borders. Processors from Shama, Cape Coast (Duakoro) and Elmina (Bantuma) sell their produce in Denu, a market on the Ghana-Togo border. The fish here is sold to retailers coming from Togo, Nigeria, and Benin. It has a better quality appearance than the fish sold domestically. Processors smoke it using a mix of firewood and coconut shells before further smoking it at low temperatures with sugarcane bargasse (remnants of sugarcane after it has been crushed

to extract the juice). This gives it a shiny appearance. This higher quality is reflected in the price fetched by the processors which, on average, is 25% higher than smoked fish sold in other markets.

These processors are few in number and can be found in small villages in Central Region and in Shama (Western Region). The processors have made significantly higher investments than other processors. They have large smoking facilities and are able to smoke large amounts of fish (up to 100 pans a day during the bumper season). Not all of it is sold immediately – they are able to store large quantities which they sell at a later date (fish that has been well-smoked and stored has a shelf-life of five months or more).

4.7 Horizontal linkages in the fish value chain

There are a number of organisations and institutions (governmental and nongovernmental) that contribute to the conditions and context in which the fish value chain operates. These are not directly involved in the creation of the final output but their activities affect the performance of the value chain.

The new fisheries regulations are one such example. There is also the Ghana Ports and Harbours Authority (GHAPOHA) which serves to facilitate fishing activities at the larger fishing harbours (e.g., it has an ice plant at Sekondi harbour). Traditional institutions are very important, however. Most notable amongst fishing communities are traditional chief systems. Chief fishermen, together with their aides, govern fishers in their respective communities. They typically enforce traditional rules (such as no fishing on Tuesdays) and resolve disputes between fishers. The same also applies for fish retailers and fish mothers, who have a queen who controls access to markets, sets prices, and resolves disputes.

Banks and non-banking financial institutions also give various forms of support to actors at the different segments of the fish value chain. The Agricultural Development Bank supports fishermen with in-kind credit of outboard motors, usually at prices below the prevailing market rates. Non-banking financial institutions like the Sinapi Aba Trust (SAT) and Christian Relief Aid Network (CRAN), in Takoradi and Elmina respectively, assist some processors with credit using the group collateral system. SAT provides credit for processing activities and encourages clients to save money by opening a compulsory savings account for them. SAT also pre-finances children's school fees and sponsors those eager to learn a trade or skill.

2.4 Yam

Yam is a important crop in Ghana and is produced throughout most of the country. In fact, Ghana is the third largest producer of yams in the world, behind Nigeria and Cote d'Ivoire. Ghana produced approximately 4 million metric tons of yam in 2005, compared to approximately 34 million metric tons produced in Nigeria and 5 million metric tons produced in Cote d'Ivoire. Following Ghana is Benin, with a production of about 2.1 million metric tons, and Colombia, Brazil, and Japan with smaller quantities of production at around 200,000 metric tons in 2005.

Yam is an extremely vital crop, not only to the domestic market but also to the export market. Domestically, it is not only a main source of income, but it is a staple crop vital to food security. Internationally, customers desire the sweeter taste of the well known "Ghana yam". Nevertheless, the lack of planting materials is a major constraint in yam production. Seeds are needed to create a more efficient and affordable growing process that can yield better quality yams.

In Ghana, a variety of yams are grown, but the white yams, especially the Pona (sometimes Puna) variety, are preferred by both the domestic and export market. Pona is so desirable that it is often difficult to find enough Pona tubers, especially during June and August, when it is off season. Other popular varieties include Dente, Asana and Serwaa. The growing cycle for yams ranges from six to eight months depending on the variety, with planting occurring between February and April, and harvesting occurring in October.

Yams are grown by small scale farmers using traditional methods for seed generation. This involves "milking" or harvesting the yam tubers (also known as ware yams) early and using the seed yams that result from this pro-

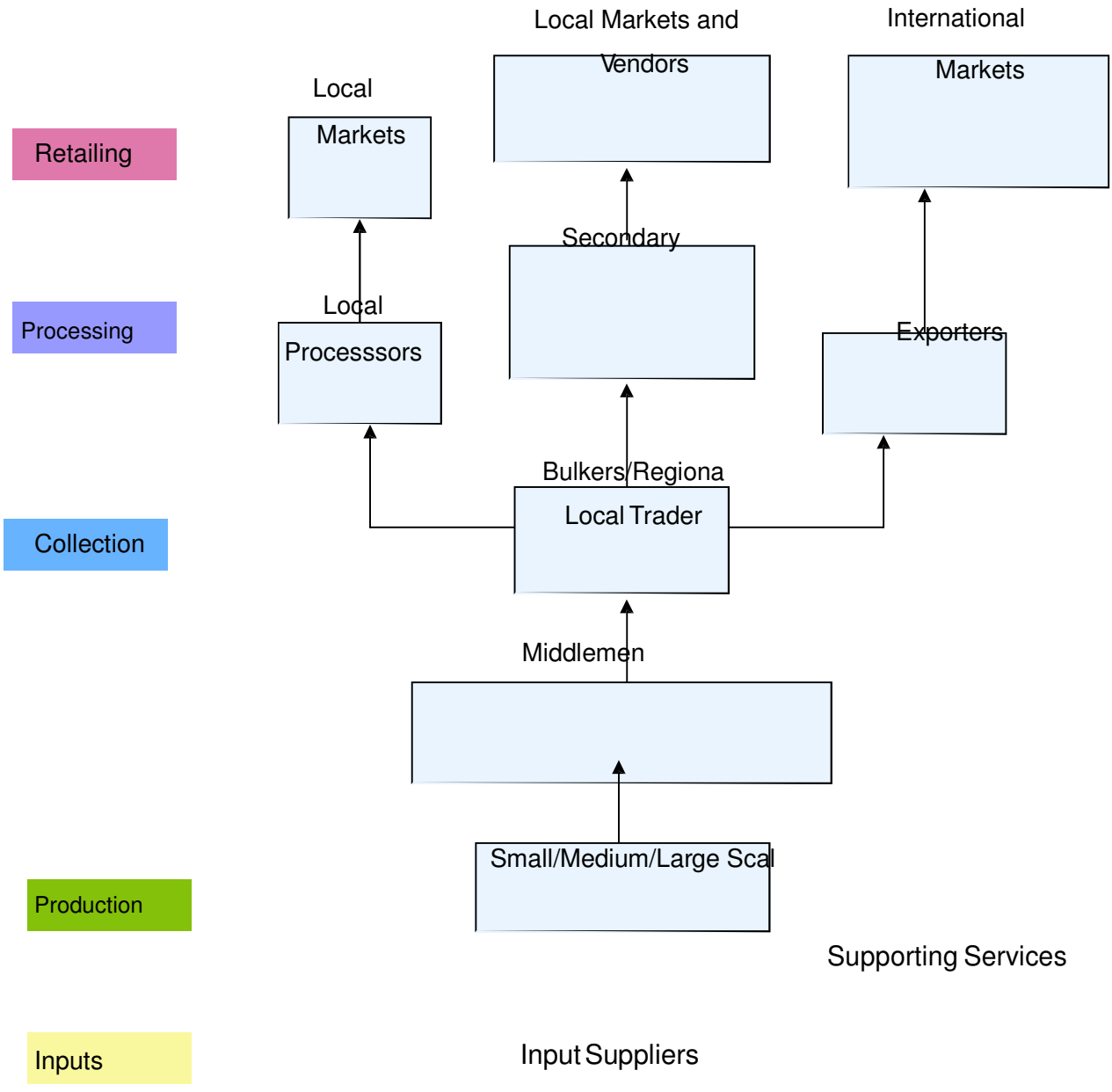
cess for planting. However, this results in a poorer quality, and sometimes diseased, tubers. Other methods for growing yams include using the yam head or other parts of the yam that can sprout to produce seeds. The challenge with these techniques is that they do not result in a large number of yams, and often times, the quality of seeds produced can be poor.

Yams can be planted using the traditional method of using mounds, or the newer method, using ridges.

ams grown in mounds

Yams grown in ridges

Yam value chain map



Inputs

The key inputs for the production of yam are seed yam, land, labor, equipment for preparing the land, staking materials, and agrochemicals. Currently, most yam producers obtain inputs from local markets, but are constrained by high costs of materials, particularly seed yam, and difficulty in accessing credit. Most farmers use traditional methods of generating planting materials, which results in lower quality yams. The minisett technique is used on a small scale and often farmers will keep the seeds that they have produced rather than sell to others, therefore creating a market opportunity for a commercial seed yam supplier.

Production

The majority of yam producers in Ghana are smallholder farmers. Steps of the production phase include clearing the land, preparing mounds or ridges, planting, weeding, staking and harvesting. Much of this is done by hired labor. The lack of affordable planting material has been the major bottleneck to increased production.

Collection and Transport

The majority of yam produced is sold on the local market. Traders and middle men transport yams from the farms to the market. For the export market, there is an opportunity to improve the direct linkages between producers and exporters. Crop spoilage and loss is a problem that can be addressed by improved storage facilities.

Processing

Processing of yam takes place on a small scale in Ghana. There is an opportunity to expand processing facilities and increase the production of fresh yam into other value-added products, such as yam flour, frozen or dry yam chips, or beverage products.

Retailing

Yam is heavily consumed by Ghanaians, who purchase fresh yams at local markets. For external markets, exporters purchase yams from farmers and transport, normally by ship, to end markets including the United States, the United Kingdom, and the Netherlands. Yam is typically brought to warehouses and purchased by wholesalers as well as individual consumers. The majority is sold in ethnic markets. The export market has become the target for increased production.

Financing

Rural banks can supply farmers with credit for the costs of inputs and production, but are often reluctant to do so because farmers have limited collateral. Major players in the export market have agreed to document their commitment to purchase greater quantities of yam from farmers if they can increase their production and meet quality standards. The Export Development and Investment Fund (EDIF) is also a source of funding for input suppliers and producers of export goods.

Research and Development

The Root and Tuber Improvement and Marketing Program (RTIMP), funded by IFAD (the International Fund for Agricultural Development) and the Crops Research Institute (CRI) are among the prominent groups conducting research on the production of yam and seed yam. These organizations support value chain activities by disseminating their technical know-how.

Extension Services

Extension services that facilitate value-chain activities include technical support from ADRA, MiDA, RTIMP, CRI, and EDIF can facilitate business opportunities.

2.5 Cowpea

Cowpeas (Vigna unguiculata), also known as black-eyed peas in the United States, are the most important indigenous grain legume in West and Central Africa. They are grown by small scale farmers throughout the region and because cowpeas are naturally drought tolerant they are extremely important in semi-arid areas. Cowpeas are important to small scale farmers because they are a cash crop, as well as providing high protein food for family consumption. The rapidly expanding urban populations of West Africa create an opportunity for cowpea producers and merchants. Farmers and merchants in traditional markets usually have a good sense for the preferences of their immediate customers, but a regional understanding of consumer preferences is needed to support expanded trade. In particular, researchers developing higher yield cowpea production systems and non-governmental organizations (NGOs) doing technology transfer lack information on these cowpea preferences.

In West Africa cowpea grain passes through a well established value chain with regional trade flowing mainly from the semi-arid production areas in the Sahel to the more urbanized coastal zones (Langyintuo et al., 2003). The international research and development community has recognized the importance of cowpea to the development of West and Central Africa. The Bean Cowpea Collaborative Research and Support (CRSP) program funded by the United States Agency for International Development (USAID) has conducted research on production, marketing and utilization of cowpea in West Africa for over 20 years. The cowpea marketing team of the Bean/Cowpea CRSP has good linkages with local and international organizations with cowpea market research program including International Institute of Tropical Agriculture (IITA) and its Cowpea Project for Africa (PRONAF). The importance of understanding markets and market chains has been recognized by national agricultural research systems and by non-governmental organizations throughout West Africa, including World Vision (www.wvi.org), the National Agricultural Research Institute of Niger (INRAN), the Rural Economics Institute (IER) of Mali; and the Institute for Agricultural and Environmental Studies (INERA) of Burkina Faso.

The Importance of Cowpeas

In West and Central Africa cowpeas are big business. In the 1990s about 2.6 million tons of cowpea were produced on 7.8 million hectares annually (Lanygintuo et al, 2003). Depending on the location, year, and time of year, the retail price of cowpea varies from about US$200/ton to over US$1000/ton. At a conservative value of US$500/ton, the retail value of cowpea in West and Central Africa is US$1.3 billion per year. Cowpea production in West and Central Africa represents almost 70% of world production of cowpea and about 80% of world cowpea production area. Official sources record a regional cowpea grain trade of almost 300,000 metric tons annually in the late 1990s. The unofficial trade is probably much larger. The largest cowpea exporting country in the region (and in the world) is Niger. Nigeria is the largest cowpea producer in the world with an annual production of almost 1.7 million metric tons in the 1990s. With about 25% of the population of Sub-Saharan Africa, Nigeria is also the largest importer of cowpea in the region.

The cowpea is also well-known for its ability to infuse soils with nitrogen, which again makes it a crop that could be enormously valuable to Africa, where many farmers struggle with nutrient-poor soils that are among the most challenging in the world.

Production

Cowpea production is concentrated in the drier areas of Ghana, specifically the Northern Regions of the country. The cowpea trade in general flows from the drier inland areas to the more humid and densely populated coastal areas.

Ghana produces a total of 219,257 metric tons of cowpea as per table #1 above and the main growing area is the Northern Region.

Although cowpea grain is two or three times as expensive as maize, rice or other cereals, it is relatively cheap compared to other protein sources (e.g. milk, meat, eggs). Because cowpea grain can be stored it is an important protein source for poor people who do not have access to refrigeration. Cowpea is often call the "poor man's meat." Cowpeas are used both for food preparation at home and for production of street foods. At home cowpeas are often added to sauces and stews. Cowpea fritters, called "kosai" in some inland areas and "akara" in many coastal areas, are one of the most common street foods. Informal observation suggests that in Ghana, as for the whole of West Africa, the income elasticity of cowpea consumption is positive and relatively high. When the incomes of poor people grow they often increase cowpea consumption.

The Cowpea Value Chain

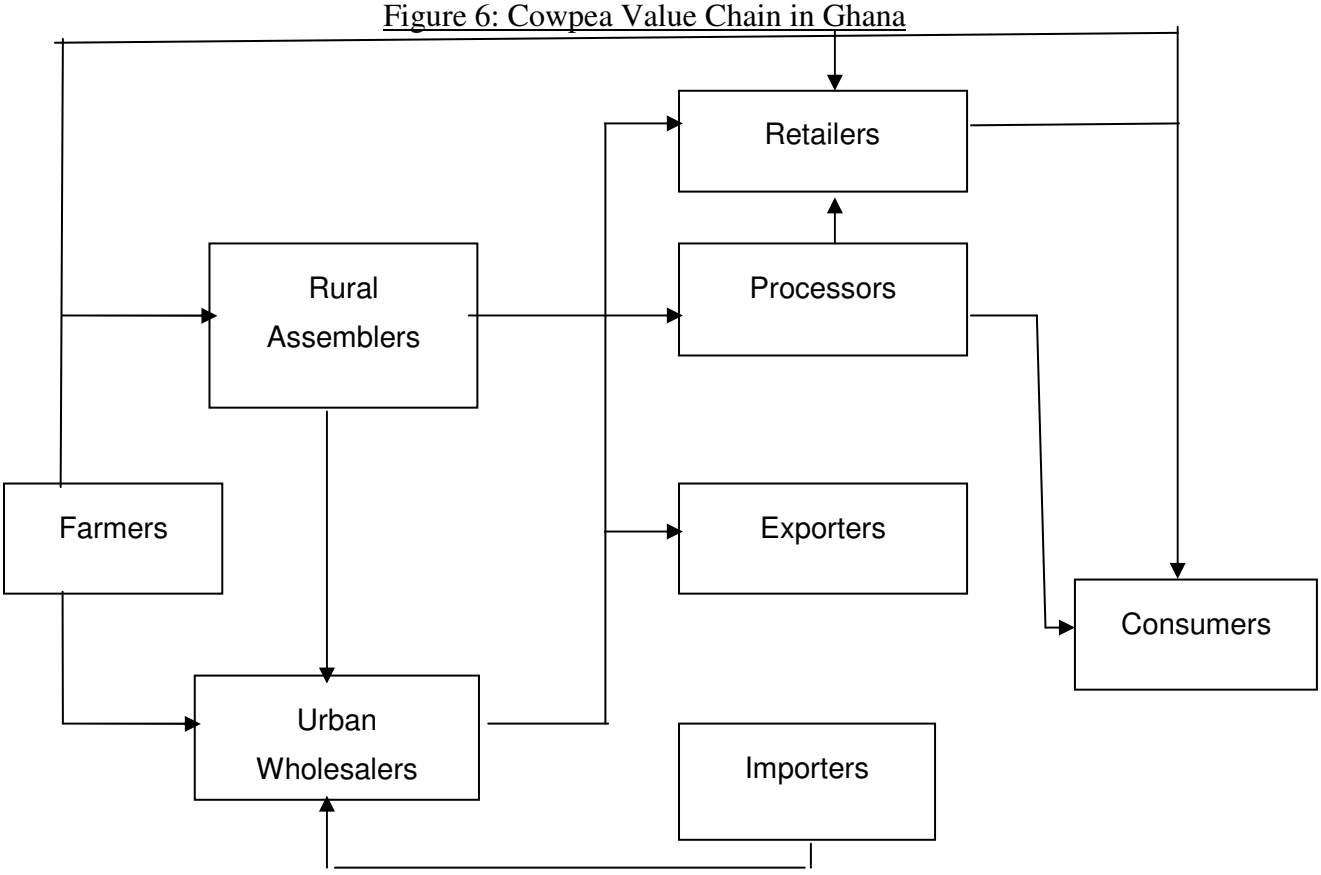
Cowpeas are consumed regularly in virtually every household in Ghana. Especially in the North, some cowpeas are purchased as green pods at harvest time and the leaves are also eaten as greens. However, the majority of cowpeas are sold as grain in bulk form. Vendors display large bowls of cowpea that consumers can inspect before making their purchase. There are a number of visual characteristics of cowpeas that have been shown, at least anecdotally, to be preferred by consumers. For example, the main varieties available on the open markets are white cowpeas seeds with black eye (Lambot, 2000), but in some areas red or black speckled cowpeas are preferred.

Cowpeas vary according to the size of the grain, colour of the skin, texture of the skin, color of the eye, and amount of damage resulting from insects. The size of the grain is commonly measured by breeders by weighing 100 randomly selected grains. The colour of the cowpeas (often referred to as skin colour or testa colour) varies and can be white, black, brown or red. Cowpea skin can be a uniform colour or speckled. The skin or outer coating of the cowpeas can be rough or smooth. The colour of the eye of the cowpeas can be black, grey or brown. It is important to note that while one advantage of cowpeas grain is that grains can be stored for use throughout the year, a major disadvantage is that cowpea grains are prone to insect damage. In particular, cowpea weevils (called bruchids) infest the cowpeas and eat holes in the grain. It is generally understood that consumers prefer cowpeas with less insect damage. Effective chemical and non-chemical storage methods are available, but producers and merchants do not always use them. (Murdock et al, 2003)

The cowpea value chain (see Figure 6 below) consists of traders and markets that ensure a movement of grain from rural markets to urban wholesale markets and finally to consumer markets. The cowpea value chain begins with the production of cowpeas by small scale farmers. Farmers typically sell their marketable surplus grains to rural assemblers, who in turn sell to urban wholesalers directly or through commission agents (Langyintuo, et. al., 2003). Commission agents sell grain on behalf of their clients (rural assemblers), and provide storage but do not take any price risk associated with the storage function.

Usually the commission fee paid to the commission agent by rural assemblers varies from country to country. The commission fee is often about 2% of the wholesale price depending on the country in question (Langyintuo, et. al., 2003).

Figure 6: Cowpea Value Chain in Ghana



In Ghana, as with other countries in the sub region, grain traders have organized themselves into commodity based associations to promote marketing of grain and to put in place the guidelines for grain pricing (Langyintuo, et. al., 2003). These associations provide a bridge between grain traders and government organizations. Larger grain size was statistically significant and positive at all markets

Langyintuo et. al. (2004) reported that in the markets in Northern Ghana consumers generally prefer large undamaged cowpeas grain. However, there was an exceptional case in Wa, Northern Ghana markets where consumers prefer small-seeded traditional cowpea grains presumably because of the taste. Here, grain eye color was noted to be an important grain quality characteristic that consumers are willing to pay a premium for. In Ghanaian markets (North Ghana), consumers prefer cowpeas with black eyes.

In Northern Ghana, cowpea consumers place value on large cowpeas grains and dislike damaged cowpeas grain (Langyintuo et. al., 2003, 2004). Further, in northern Ghana, consumers prefer cowpeas grain with black eyes. Langyintuo et. al. also reported that in northern Ghana, consumers pay a premium for white cowpeas.

As described above, market participants engage in moving, storing, grading and processing cowpeas in expectation that this will augment their value to consumers as they will be able to supply or serve the market segments with needed produce at a particular time of the year. In northern Ghana all cowpea production occurs between October and December while consumption occurs throughout the year. The variation of cowpea prices are typical of a commodity where production occurs at one point in time and the product is stored for use throughout the year. Typically, prices are lowest during harvest. Prices rise steadily thereafter to a peak in the June, July, August period.

In addition to consumer preferences there are also other factors which influence cowpeas consumption. The level of consumption of cowpea is determined by four major factors including: income level of consumers, taste of the product, market price of cowpea and of its close substitutes, and population density of towns. Kormawa et. al. reported that cowpeas prices are lower in December (harvesting season). In addition, consumers generally prefer brown colored cowpeas grain over white colored grains.

3. Overview information about the different segments on the cassava value chain

Overview information on the different segments of the cassava value chain

Value Chain Functions					
Input provision	Production	Trade	Processing	Export & Domestic Trade	Consumption
Provision of: - Cassava cuttings - Agro-chemicals - farm Implements and tools (cutlass, hoes, etc)	Production of: - Cassava tubers - Cassava cuttings - Cassava leaves	Sale of: - fresh cassava tubers - cuttings - leaves	Processing of fresh cassava tubers into: – Gari – Chips – Dough – Fufu – Starch – Flour – Peels	– Export of starch, Gari, & Chips, dough – Sale of the following in the domestic market – Dough – Fufu, flour – Peels – Starch – Gari, chips	– Industrial use of starch - textiles, pharmaceutical, plywood, etc) – Domestic use (fufu, dough, flour)
Value Chain Operators					
Input providers	Producers	Traders 1	Processors	Traders 2	Consumers
Agro-chemical dealers RTIMP Farmers	Cassava Farmers Farmer associations.	Market Queens (brokers) Retailers Whole-salers	Gari processing factories – Ejisu Kwamo, Adansi South, Fomena, Tepa, Josma (near Ashanti Mampong) etc. Cassava flour mills	Individual exporters Retailers Super-markets	households pharmaceu-tical and textile industries Educational institutions Hospitality industry

			Starch factory- Ashanti Mampong Chop Bar Keepers – for fufu		Prisons
Constraints along the value chain					
Input provision	Production	Trade	Processing	Trade 2	Consumption
- Inadequate knowledge on agrochemicals handling and usage - Low skill level in coppicing (cutting) resulting in wastage of planting material.	- Inadequate supply of quality planting materials - Inadequate knowledge in GAPs - Difficulty in accessing land - high incidence of pests & diseases (e.g. rodents) - high cost of weedicides - Bush burning - Low yields - Post harvest losses	- Short shelf life of cassava - Inadequate knowledge in handling and preservation techniques - inadequate knowledge in food safety and quality standards - inappropriate packaging	-Inefficient processing technologies -Inadequate capital to acquire sufficient cassava for all year round processing -Limited no. of cottage level processing units (cassava flour and dough) -Inadequate utilization of by-products (e.g. peels) - inadequate knowledge in food safety and quality standards		- some varieties are not suitable for fufu
Opportunities along the value chain					
Input provision	Production	Trade	Processing	Trade 2	Consumption
- high demand for all inputs (agrochemicals, cuttings etc) -training available by	- Suitable land available for cassava cultivation - Available training	- High demand for cassava	- High demand for processed products. - By- products used for animal feed.	- High demand in international market (starch and flours)	-Easy access to cassava products on domestic market

MOFA/ PPRSD for training input dealers - Promotion of planting materials of high yielding varieties on-going by RTIMP	programs to farmers on GAPs. - Availability of biological pest control technologies. .		- working capital available from EDIF, Banks and Venture Capital	- High potential for market access for gari in the West Africa sub region. - domestic market available	
Existing services					
Input provision	Production	Trade	Processing	Trade 2	Consumption
Extension services (MOFA) GAP Training and planting material provision -RTIMP, financial services (ADB, Rural Banks) Training on agrochemical use and handling – PPRSD, IFDC/GAIDA Dizengoff, Wienco, Sefa & Jane Training on business development - NGOs e.g. Self Help International Research – development of cassava varieties – CRI, FRI &	Extension services (MOFA) Financing (banks) labour (farm hands)	Provision of credit (financial institutions – ProCredit, Sinapi Aba Trust, rural banks) Transport – GPRTU, PROTOA Market information. –GEPC, MOFA	Skill training – RTIMP, MOFA (WIAD), Rural Enterprise Project (REP) Business Capacity building by Business Advisory Centres/NBSSI, NGO - SHI Quality standard certification and analysis – GSB, FRI & FDB Fabrication & provision of equipment e.g. GRATIS Foundation, Suame Magazine Processing technologies (MOFA, RTIMP, FRI Promotional services (packaging and labelling)	export market access (Flour & Starch –GEPC) export and local market information (GSB & GEPC, Trade Net, RTIMP) Certifica-tion – SGS, GSB & GEPC Export financing – EDIF, Venture Capital & Banks	Promotion- Advertisements (Media) by FM Stations, Food Fairs by MOFA – RTIMP, WIAD & KNUST

KNUST					
Service gaps					
Input provision	Production	Trade	Processing	Trade 2	Consumption
Training of agro-chemical dealers on appropriate chemicals, use and handling by MOFA-PPRSD Weak enforcement of pesticide law by EPA and MOFA -PPRSD	Limited coverage of farmer training on appropriate use of agro-chemicals by MOFA-PPRSD Inadequate training of farmers on GAPs by MOFA Facilitation and strengthe-ning of farmer associa-tions Low access to mechanized services Affordable labour	Training in tuber Handling practices – MOFA/RTIMP WIAD	Regular inspection for Food safety & hygienic practices (environmental health division of MMDAs & FDB Facilitation and strengthening of pro-cessing groups – MOFA-RTIMP & NGOs - SHI	Improved access to funds by EDIF and Banks	
Sources of information: RTIMP, WIAD- MOFA, FRI, CRI, KNUST, SARI, UG					

4. TVET levels description

Level Descriptors

The level descriptors indicate the broad learning outcomes at each level within the NTVETQF Framework. They are designed to help programmes designers and the writers of unit specifications for qualifications to determine not only the range of knowledge and skills required but also the learning outcomes that are appropriate for the level.

Level Descriptors			
Level	Qualifications	Enables learners to:(Knowledge)	Enables learners to carry out processes that: (Skills & Attitude)
1	Proficiency 1		1. Require basic skills of trade and craft and the ability to perform routine and predictable tasks. 2. Are repetitive and familiar. 3. Require close supervision. 4. Require practical and oral tests for qualification.
2	Proficiency 2	Demonstrate basic numeracy, literary and IT skills: For example, carry out limited range of simple tasks of data processing.	1. Confirm competence in the handling of hand tools and machinery components. 2. Require performance of varied activities that are routine, predictable and non-complex in nature. 3. Require limited supervision. 4. Require practical and oral tests for qualification.
3	Certificate 1	1. Demonstrate a broad knowledge base incorporating some technical concepts. 2. Demonstrate knowledge of the theoretical basis of practical skills. 3. Demonstrate basic numeracy, literacy and IT skills.	1. Require a wide range of technical skills. 2. Are applied in a variety of familiar and complex contexts with minimum supervision. 3. Require collaboration with others in a team.
4	Certificate 2	1. Demonstrate broad knowledge base with substantial depth in area(s) of study. 2. Demonstrate a command of analytical interpretation of a range of data. 3. Demonstrate numeracy, literacy and IT skills commensurate with this level.	1. Require broad knowledge of skill competency in different tasks in varied contexts. 2. Require a wide range of technical and supervisory skills. Are employed in different contexts.

		4. Present results of their study accurately and reliably.	
5	Diploma	1. Demonstrate specialised in-depth knowledge in their area(s) of study. 2. Analyse and interpret a range of data and be able to determine appropriate methods and procedures to deal with a wide range of problems. 3. Communicate methods, procedures and outcomes accurately and reliably	1. Require the ability to adapt and apply knowledge and skills to specific contexts in a broad range of work activities. 2. Demand specialised technical and/or supervisory skills. 3. Require minimum supervision.
6	Higher National Diploma (HND)	1. Demonstrate considerable theoretical knowledge and solid practical skills in their area(s) of study. 2. Integrate, contextualize and apply knowledge to a range of complex technical or professional activities. 3. Have a command of planning, analytical, supervisory and management functions under minimum direction. 4. Display qualities and transferable skills for employment.	1. Require a wide range of highly specialized technical and / or management and / or conceptual or creative skills. 2. Require qualities and transferable skills necessary for formal and self-employment. 3. Involve some level of organizational ability, resource management and personal responsibility.
7	Bachelor's (Professional/ Technology)	1. Demonstrate high level conceptual knowledge in a broad range of complex and changing contexts. 2. Demonstrate basic research skills. 3. Undertake tasks involving high level organisational ability, resource management and personal responsibility. 4. Demonstrate a significant degree of strategic thinking and judgment. 5. Have a high level of supervisory and management capabilities.	1. Apply methods, techniques and modes of practices that they learned and reviewed, to consolidate, extend and apply their knowledge and understanding to initiate and carry out projects. 2. Promote further training, development of existing skills and acquisition of new competencies that will enable them to assume responsibility within organisations in self-employment. 3. Require qualities and transfer of skills necessary for formal and self employment. 4. Communicate information in a variety of formats appropriate to both specialists and non-specialist audiences.
8	Master's	1. Have a systematic understand-	1. Involve the resolution of complex

	(Professional/ Technology) - Technically-oriented researched Masters	ing of knowledge and a critical awareness of current problems and/or new insights in their academic discipline, field of study, or area of professional practice. 2. Possess comprehensive understanding of relevant techniques in research or advanced scholarship. 3. Demonstrate originality in the application of knowledge, together with a practical understanding of established techniques of research. 4. Critically evaluate current research, methodologies and advanced scholarships in the discipline, and where appropriate, to propose new hypothesis.	issues and making sound judgment in the absence of complex data, and communicating these conclusions to both specialists and non- specialist audiences. 2. Require self-direction and originality in tackling and solving problems, and acting independently in planning and implementing tasks at a professional or equivalent level. 3. Continue to advance their knowledge and understanding, and to develop new skills to a high level. 4. Promote qualities and transferable skills necessary for employment, initiative and personal responsibility and decision making in complex and unpredictable situations, and the exhibition of independent learning ability required for continuing professional development.
9	Doctorate Degree (Professional/ Technology)	1. Creation of new knowledge through research of the quality that extends the frontier of knowledge in the discipline 2. A substantial acquisition of knowledge which is at the forefront of technology or area of professional practice 3. Ability to conceptualise, design and implement a project to generate new knowledge, or applications at the frontier of technology or professional practice. 4. Comprehensive and detailed knowledge and application of research methodology.	1. Make informed judgment on complex issues in the area of technology or professional practice often in the absence of complete data and be able to communicate ideas and conclusions clearly to specialist and non-specialists in the discipline 2. Exhibit qualities and transferable skills necessary for employment requiring the exercise of personal responsibility and initiative in complex and unpredictable situation

Source: http://www.cotvet.org/level-descriptors.php#ld

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6. Planning of the mission

Appointments schedule from Thursday, December 8th to Saturday, December 17th, 2011

Day	Organisation	Official
1.	Thursday, December 8, 2011	
	Mel Consulting Ltd.	Ms. Aba AMISSAH QUAINOO, Executive Director
	Agence Française de Développement	M. Bruno LECLERC, director M. Florent CLAIR, xx
2.	Friday, December 9, 2011	
	USAID	M. John MULLENAX, animation of donor agricultural plate-form
	GRIB	M. Paa Kwesi FOLSON, xx
	ADVANCE PROJECT	M. Tom CARR, director
	Saturday	
	Sunday (departure to Kumasi (afternoon)	
3.	Monday, December 12, 2011	
	Council for Scientific and Industrial Research (CSIR), Crop Research Institute (CRI)	Dr. RALPH BAM, Director Mrs Evelyne Ader-Kwarteng, research in crops, in charge of post-harvest and processing Dr Berchie, food scientist, in charge of training
	Small cassava processing group: Yebesi (gari) Service provider (miller): ABOU Karim	
	Kwadaso Agricultural College	M. KONTOH, Principal

	Polytechnics Kumasi	Ms. Xx, Head of Hospitality, catering & institutional management Dpt. Ms. Patricia OWUSU-DARKO, Director of International Affairs and Collaborations
4.	Tuesday, December 13, 2011	
	Gratis Mampong	M. Marc KAFOY, manager
	2 enterprises: - Jossmah Ltd. (gari, HQCF) - Kweremfeso gari processors association (gari)	M. Emmanuel Gibson Senye Amoeh, manager Ms. Janette Jyahasi Jessa, owner
	2 former trainees from Gratis (now machine fabricators) - Charles EAPINKE - Benjamin ABIBU (evening: Back to Accra)	
5.	Wednesday, December 14, 2011	
	Ashaiman zone Service provider (mill) Broker Gratis (Great Accra) Roots & Tubers Improvement & Marketing project (RTIMP/Ifad)	Ben CONUNT, executive from GRIB, rice farmer and secretary of the rice group and former secretary of the Ahaima farmers association Daniel HESSE, Mill manager Ms. AGUAPONG, broker Coordinator Dr Christian M. Jekum, coordinator
6.	Thursday, December 15, 2011	

	National Vocational Training Institute (NVTI)	M. Stepeh BISMARK, Director
	C-AVA Project (in Food Research Institute)	Nanam DZAEDZOVE
7.	Friday, December 16, 2011	
	Debrief, AFD	Florent CLAIR
	MOFA/ Women in agriculture Directorate (Wiad)	Ms. Eunice ADAMS, Directrice, with: Victoria ANIATU, Alice DAWSON, Joseph SAMPONG, Peta ABSAGYE
	Enterprise: Praise Export (various processing of which cassava gari)	M. Marc SEPENOO, marketing officer / food products
8	Saturday, December 17th	
	Enterprise: Milenovise gari Village	M. Gibrim, manager
	Sunday (departure)	

7. List of tables and figures

8. List of illustrations