

# EEEGL

ENTERPRISE ENVIRONMENT AND EQUITY IN THE VIRUNGA LANDSCAPE OF THE GREAT LAKES

## VALUE CHAIN ANALYSIS OF THE MUSHROOM ENTERPRISE

Habib Tibrichu and Marie Rose Buykusenge



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## Program Contacts

### EEEGL Regional Coordination Office

Regional Programme Coordinator  
EEEGL Programme  
CARE INTERNATIONAL  
Kachiru, Kigali B.P. 550  
Kigali, Rwanda  
Tel: + 250 58 31 47/ 48/ 49

### IGCP

International Gorilla Conservation Programme (IGCP)  
|AWF, FFI & WWF)  
Off UMUGANDA BOULEVARD  
Opp. the Office of the General Prosecutor  
P.O. Box 931, Kigali, RWANDA  
Tel: +250 580465 | (fax) +250 580466

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**ACRONYMS**

EEEGL	Enterprise, Environment and Equity in the Virunga Landscape of the Great Lakes
IGCP	International Gorilla Conservation Programme
ORTPN	Office Rwanda du Tourisme et des Parcs Nationaux
PA	Protected Area
TOR	Terms of Reference
NPA	Non Profit Association
RPSF	Rwanda Private Sector Foundation
BNR	National Bank of Rwanda
BRD	Rwanda Development Bank
SCC	Savings and Credit Cooperative
CRS	Catholic Relief Service
ADAR	Assistance to the Development of Agribusiness in Rwanda
FAO	Food and Agriculture Organization
RWF	Rwanda Franc
MFI	Micro Finance Institution
ISAR	Rwanda Institute of Agricultural Science
KG	Kilogram
MINAGRI	Ministry of Agriculture
MINALOC	Ministry of Local Government
OC	Community Organization
NGO	Non – Governmental Organization
GNDP	Gross National Domestic Product
SME	Small and Medium Enterprise
SOPYRWA	Societe de Pyrethre Au Rwanda
ISAR	Institut des Sciences Agronomiques du Rwanda
RBS	Rwanda Bureau of Standards
NISR	National Institute of Statistics of Rwanda
STTA	Short term Technical Assistance
HIV	Human Immunodeficiency Virus
AIDS	Acquired Immunodeficiency Syndrome
ISAE	Institute of Agriculture and Animal Production

## **INTRODUCTION AND BACKGROUND**

### **Introduction**

This is a mushroom value chain analysis report prepared for Enterprise, Environment and Equity in the Virunga Landscape of the Great Lakes (EEEGL) Project. The study took place during the month of October\November 2008 prepared as part of project implementation program. The report begins with the brief description of the study objective, scope, and methodology used to undertake the study. It analyzed in detail the market, the value chain functions, the actors and their responsibilities, growth opportunities and the driving forces. This is followed by the analysis of major constraints, opportunities, business services and a detailed action plan in which possible interventions and indicators are presented.

### **Background**

The Enterprise, Environment, and Equity in the Virunga Landscape of the Great Lakes (EEEGL) program has the mandate to address the inter-related problems of poverty, conflict, and environmental degradation within the Virunga landscape. The program has been designed as a joint venture project of CARE and the International Gorilla Conservation Program (IGCP) who provides lead in conservation in this region, while CARE is known for its community approaches as well as support to small enterprise development by engaging the private sector.

The overall goal of the EEEGL is “increased livelihood opportunities based on sustainable use of natural resources, and improved governance of these resources. They have made a substantial contribution to poverty reduction and environmental conservation in the Virunga landscape of the trans-boundary region whose benefit has been enjoyed by the marginalized and vulnerable groups in the population”. The programme target areas straddle the regions of Democratic Republic of Congo (DRC), Rwanda and Uganda bordering the Virunga parks complex.

In Rwanda, the programme undertakes to expand the access to financial services for the local population, especially poor and marginalized farmers, through Village Saving and Loan Associations (VSLA). At the same time, the programme plans to expand opportunities for micro-enterprise development available to the beneficiary population. Mushroom has been identified as potential enterprise that can help the local community earn income, access sustainable food, and increase employment opportunities. This study was therefore commissioned to detail out growth opportunities, constraints and interventions that can help the project jump start facilitation initiative in the four districts of Musanze, Burera, Nyabihu, and Rubavu.

### **Objective of the study**

The study has been carried out by independent Consultants in order to help EEEGL CARE project develop a practical approach to the mushroom value chain development in the districts bordering the Virunga protected area. The value chain analysis is expected to cover input supply to production, processing, wholesale and finally, retail market with focus on increasing market access for the poor people. In addition, the value chain approach is expected help identify interventions that can strengthen the competitiveness of mushroom value addition and to develop competitiveness strategies that are beneficial both to the environment and to local business development.

### **Scope of Study**

The Consulting team carried out field study on mushroom value chain in the districts of Musanze, Nyabihu, Burera and Rubavu covering 13 sectors namely Musanze, Nyange, Shingiro, Gataraga, Kinigi, Cyanika, Rugarama, Gahunga, Jenda, Mukamira, Kabatwa, Bigogwe, and Bugeshi. Further fieldwork was carried out in

Kigali city on market survey and seed multiplication. The study analyzed the entire value chain from input supply, production, processing, and organization to the final market.

### **Methodology and Approach**

The consulting team for this assignment was composed of Habib Tibrichu (BDS/Agribusiness Development Specialist/Team Leader), and Byukusenge Marie Rose (Associated Local Consultant). The team was supported by Giuseppe Daconto, EEEGL Regional Programme Coordinator, Jackson Mutebi, EEEGL Project Manager, and Muvunyi Jean Damascene, EEEGL NRM Officer. The team worked in Kigali City from 16<sup>th</sup> October 2008 through 17<sup>th</sup> October 2008. Then they traveled to Northern Province on 19<sup>th</sup> October 2008 through to 24<sup>th</sup> October 2008 and interviewed major stakeholders in Musanze, Burera, Nyabihu and Rubavu districts. The team returned to Kigali city and carried out interviews and roundtable meetings with several businesses, and institutions until 12<sup>th</sup> November 2008. A detailed schedule with names and contacts of the staff is provided in Annex 4. A preliminary report of the team's observations and recommendations was presented to CARE staff in Kigali on 11<sup>th</sup> November 2008 and stakeholder workshop was held on 14<sup>th</sup> November 2008. The recommendations and observations of the two presentations have been incorporated into this report. Methodology used included literature review (See Annex 5- references consulted); focus roundtable meetings, face to face interview of informants, physical observations and inspections, and workshop. Tools/Instruments used to collect and analyze the information included a checklist of key issues. See work plan and tool in Annex 2. The informed provided in this report has been summarized from primary and secondary data collected and analyzed.

The approach to the study included value chain mapping, assessment of market potential, identification of constraints and opportunities in the value chain, identification of business services that can address constraints and opportunities, market assessment of the identified business services, and identification of interventions to develop business services in the value chain.

### **Study Limitation**

- Lack of accurate data on the number of farmers, production statistics in all the four districts including data from other region where mushrooms are grown such as Gitarama, Butera, and Kigali city.
- Some of the respondents could not provide a deeper understanding of their situation owing to language barrier and the fear to disclose information.

## MUSHROOM VALUE CHAIN

### OVERVIEW

#### Economy

The Rwandan economy is depends largely on rain-fed agricultural production of small, semi-subsistence, and increasingly fragmented farming. According to official records, Agribusiness accounts for 36.2% (2007) of Rwanda's GDP while exports make 40.2%. Mountain gorillas and other upscale eco-tourism avenues are increasingly important sources of tourism revenue for the government. Rwanda depends significantly on imports (over \$400 million per year). Exports have increased, up to \$145 million in 2007. Private investment remains below planned levels despite an open trade policy, a favorable investment climate, cheap and abundant labor, tax incentives to businesses, stable internal security, and crime rates that are comparatively low. Agriculture accounts for 36.2% of GDP in 2007<sup>1</sup>. The main Products include coffee, tea, pyrethrum (insecticide made from chrysanthemums), bananas, beans, sorghum, potatoes, and livestock. Exports accounts for \$145 million, which include tea, coffee, coltan, cassiterite, hides, iron ore, and tin. Major export markets are in China, Belgium, and Germany. On the other hand, imports in 2007—amounted \$488 million F.O.B of foodstuffs inclusive of mushroom, machinery and equipment, steel, petroleum products, cement, and construction material. Major suppliers of imported products include Kenya, Germany, Belgium, France, Uganda, and Israel. Following this background, CARE international in Rwanda and International Gorilla Conservation Programme (IGCP) intend to pilot agribusiness development project on mushroom production based on value chain development approach in four districts (Musanze, Burera, Nyabihu, and Rubavu ditricts) in Rwanda. This project is aimed at supporting import substitution strategy and national local agricultural development strategy.

#### Mushroom Sub sector

The mushroom sub sector is a high-potential subsector because it is well suited to smallholders in the rural household economy and because Rwanda's Virunga region provides a natural climatic condition for mushroom production. The mushroom sub sector in Rwanda is still in its infant stage. Mushroom growing is popular in Rubavu district in the Western province, Nyagatare district, and Eastern province and Musanza district in the Northern Province, Butare, and Kigali city in Rwanda.

The national mushroom production is currently estimated at 17 tons per annum. The Rwanda Agriculture Development Authority (RADA) started an initiative aimed at producing quality mushroom seeds using Chinese technology. The modern mushroom growing project (JUNCAO) was borrowed from China where farmers can produce several kilograms of mushrooms within less than 10 days. The project is currently producing 4,000 tubes per week. Through this initiative RADA plans to increase the production of tubes to about 7000 per week to meet the increasing demand. Therefore, Rwanda needs to improve its mushroom production, processing, and marketing to meet this target.

The promotion of mushroom sub sector provides advantages on promoting commercial agricultural and environmental conservation. Farmers can actively engage into production of mushroom as income generating agribusiness activity, and use the waste substrate for production of vegetables. At the same time through this initiative, IGCP in partnership with CARE - EEEGL project will be working towards its long-term goal of protecting the encroachment of wild mushroom in the protected areas by the local population.

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<sup>1</sup> Ministry of Finance and Economic Planning, Annual Report 2007

## VISION

### Growth Opportunities

- The market demand for mushroom in the domestic market is high and the annual production is low. Virunga region's potential market opportunities being tourist zone with over 10 hotels and in Kigali city means over 50 hotels provide ready market for fresh mushrooms.
- Mushroom seed production has been increased by RADA and it is projected to increase from 4,000 to 7,000 tubes per week. COPEPEC (Musanze) and Jyambere Munyarwanda (Kigali) provide additional opportunity for steady supply of mushroom seeds\ tubes.
- Over 300 mushroom growers have established associations in the four districts of Burera, Nyabihu, Rubavu, and Musanze. Some of the farmers have been trained in mushroom production techniques and in addition, there are number of individual farmer's already growing mushroom in the Northern Province.
- Mushroom production creates opportunity for establishment of value addition facility to improve quality and prolong shelf life from 3 days to three months.

### Program

In order to exploit the growth potentials in the mushroom value chain, assistance is needed to address the continuing shortage of mushroom seeds/tubes in the four districts – Musanze, Nyabihu, Burera and Rubavu. Seed multiplication remains critical factor in stimulating mushroom commercial production due to lack of access to raw materials which are mostly agricultural residues used as substrates for mushroom cultivation and technology. The access to these materials is seasonal because farmers mobilize them after harvesting crops such as sorghum, beans, and maize. The EEEGL team will facilitate linkages between farmers and the seed suppliers in Musanze and Kigali city, thereby increasing the demand and supply for mushroom seeds and hence stimulating production. Increased efficiencies in the mushroom seed multiplication will create a ripple effect into other value chains such as wheat and maize especially for the waste. In addition, simple mushroom production and management package including quality assurance techniques will be part of the technical assistance provided under BDS market development. The BDS package may include rural mushroom technology demonstration sites, training of Mushroom Community Based Advisors (MCA), facilitating market linkages, training of local farmers, market research, and study tour etc.

The program must ensure that stringent food safety regulations and standards are put in place to address hygiene and quality issues by working closely with the Rwanda Bureau of Standard (RBS). Mushroom farmers will need to adopt food and safety quality system, as well as environmentally friendly manure management practices. The RADA and the Rwanda Bureau of Standard may help the project to meet this mandate.

A comprehensive package for cooperatives and association development shall be developed to address one of the major challenges in the value chain. Using a participatory, farmer-led, commercially focused approach, EEEGL will facilitate and strengthen producer groups or associations to enable producers to cooperate, boost production, and gain access to cheaper and better input supplies, services, information, and markets. These groups can serve as a platform to improve awareness, surveillance, and prevention of pests and diseases including natural resource conservation.

EEEGL activities may include enhanced seed multiplication to tertiary level to ease growing of mushrooms by farmers, strengthening of service providers, creation of commercial farmers, strengthening of viable and organized cooperatives, enhancing capacity of associations for vulnerable people, and facilitating market

linkages for fresh quality mushrooms and other alternative products such as dried mushrooms, organic waste manure etc. In addition, the project can facilitate cooperatives to develop relationship with the research institution such ISAR to carry out research on new varieties. Strengthening the relationship between the value chain actors with the farmers union -IMBARAGA will help the project to leverage resources, develop new mushroom varieties, and disseminate mushroom production technology to large number of farmers. Facilitating access to financial services as a consolidated package delivered by selected commercial banks, microfinance institutions, and including Village Savings and Loan Associations (VSLA).

## MARKET DEVELOPMENT

### International Markets

The global outlook of the mushroom industry indicates that China is the largest world mushroom producer with over 1.4 million Mt followed by USA<sup>2</sup>. While Poland is the largest exporter of mushroom in the World and the USA is the biggest market for fresh and dried mushrooms globally. In Africa, few countries are engaged in export of Mushroom on the World market these include South Africa, Tunisia, Zambia, Algeria, Niger, Uganda, and Kenya.

Rwanda is not currently exporting any mushroom on the World market because of low domestic production and high demand in the domestic market. The available statistics on exports indicates exports volume and value on coffee, tea, minerals, leather, pyrethrum, and bark quinquind as main export products as shown below.

**Table 1:** Rwanda's Export distribution by Product, Value (10<sup>3</sup> USD) and Volume for first Quarter 2008 and 2007

Product Type	1 <sup>st</sup> Qtr 08 (Val. US\$)	1 <sup>st</sup> Qtr 07 (Val. US\$)	Var. (%)	1 <sup>st</sup> Qtr 08 (Vol.)	1 <sup>st</sup> Qtr 07 (Vol.)	Var. (%)
Coffee	3,872.4	2,472.4	57%	1,633.1	1,141	43%
Tea	8,208.0	7,370.0	11%	3,763.8	4,145	-9%
Minerals	20,837.1	14,871.6	40%	1,780.5	2,056.3	-13%
Leather	902.7	864.6	4%	511.0	454.0	13%
Pyrethrum	163.7	600.0	-73%	1.5	10.0	-85%
Bark quinquina	21.2	7.9	-	38.3	15.5	-
Other products	6,090.1	1,402.7	334%	10,847.4	3,412.4	218%
Re-exports	4,754.3	3,571.8	33%	4,106.8	4,156.1	-1%
<b>Total</b>	<b>44,849.5</b>	<b>31,160.9</b>	<b>44%</b>	<b>22,682.4</b>	<b>15,390.3</b>	<b>47%</b>

Source: Ministry Finance & Economic Planning –National Institute of Statistics of Rwanda –Jan-March 2008

Export value and volume has increased from 44,849.5 to 31,160.9 in the first quarter of 2008-2007 and 15,390.3 – 22,682.4 as shown in table 1 above. It should be noted that exports quarterly change had an increase in value of 44%. The same table indicates that the other products rose by of 334%, and coffee 57%, minerals 40% then re-exports by 33%. The significance of the above statistics is to demonstrate that imports are on the increase including import of mushrooms and yet among the export commodities, mushroom is not one of the strategic commodities. Hence, with the potential of Rwanda's climatic condition in Virunga region, this opportunity can be exploited to increase mushroom production as import substitution strategy. The potential to grow for export especially for organic specialty market can be exploited to increase range of the export products. Therefore, the pilot mushroom intervention in the four districts may set foundation for mushroom development in Rwanda.

However, Imports to Rwanda are subdivided into 4 categories, namely consumption goods, equipment goods, provisioning goods, energy and lubricants products. Total imports value in Rwanda ranged from Rwf 53 billion, Rwf 35 billion and 42 Rwf billion from January to March 2008. It should be noted that mushroom is one of the imported products. For example, in the local market an imported mushroom from China is sold at 1,200 Rwf. The canned mushroom is packed in 227 grams under the brand name of Alpha. The

<sup>2</sup> Sources: USDA, Animal and Plant Health Inspection Service, Fresh Fruit and Vegetable Import Manual, 2007

consultant did not get accurate data on the imported mushroom. Table 2 below shows the distribution of Rwanda's import for the period first quarter of 2007 and 2008.

**Table 2:** Rwanda's Import distribution by Product, Value (10<sup>3</sup> USD) and Volume for first Quarter 2008 and 2007

Imported Products	1 <sup>st</sup> Qtr 08 (Vol. T)	1 <sup>st</sup> Qtr 08 (Val. US\$)	1 <sup>st</sup> Qtr 07 (Vol. T)	1 <sup>st</sup> Qtr 07 (Val. US\$)	Qtr Change (Vol.)	Qtr Change (Val.)
Consumption goods	68,164.31	62,850.93	72,199.95	44,024.77	-6%	43%
Equipment goods	8,170.17	60,143.57	6,591.40	39,388.78	24%	53%
Procurement goods	89,567.37	68,282.79	57,335.28	33,599.58	56%	103%
Energy & Lubricants	71,868.77	48,845.17	41,920.96	23,845.19	71%	105%
<b>Total</b>	<b>237,770.62</b>	<b>240,122.46</b>	<b>178,047.59</b>	<b>140,858.32</b>	<b>34%</b>	<b>70%</b>

Source: Ministry Finance & Economic Planning –National Institute of Statistics of Rwanda –Jan-March 2008

## Regional Markets

The regional market for Rwanda covers DR Congo and the East African Community, which covers: Burundi, Kenya, Tanzania and Uganda with a combined population of 120 million people, a land area of 1.85 million square kilometers and a combined gross domestic product of \$41 billion. The region has high market potential for mushrooms especially Kenya, Tanzania and Uganda due to the developments in the tourism industry and urbanization.

Uganda and Burundi provides Rwandan mushroom market with essential input supplies such as laboratory chemicals, packaging materials, and technical training especially from Kawanda Agricultural Research Institute in Uganda. Rwanda has now established a project for spawn multiplication and provision of technical training. Rwanda cannot export mushroom because of low productivity but instead canned mushrooms are imported from China and other countries into Rwanda.

Uganda's current production for export is of dried oyster mushrooms. The mushrooms are produced by small out grower production groups in Kabale in adapted rooms or traditional buildings around their homes. The Uganda mushrooms Growers Association has 250 farmers who are engaged in exporting mushrooms to European Union markets. One tube or substrate is estimated to yield about 1.5 to 2.5 kilograms of fresh mushrooms, assuming four harvests over a five week period. One kilogram of fresh mushrooms yields about 0.1 kilograms of dried product in Uganda. Mushroom growing involves growing mushroom spawn on a substrate, harvesting the mushrooms, and drying mushroom using solar dryers. In Kabale district, the Mushroom Training and Resource Centre - (MTRC) is actively engaged in spawn production, training, processing and distribution of mushroom products in the domestic markets. MTRC works with over 150 farmers in South-western region and has a potential supply over 1,500 farmers with spawn. The company supplies supermarkets and hotels in the region and in Kampala with fresh and dried mushrooms. 1 kg of dried mushrooms cost about Ushs 60,000 (21,428 Rwf) and while 1 kg of fresh mushrooms cost about Ushs 5,000 (1,785 Rwf)

In Kenya, Mushrooms in grown by small scale farmers in central Kenya. Profit from mushroom sales are low because of lack of significant market due to perception of the potential customers that mushroom is for the rich. The price for mushroom is ranges from Kshs. 300 (Rfrw 2,460) – Kshs. 600 (Rfrw 4,920). Kenya grows mainly Shitake mushrooms known for their medicinal values and Oyster mushrooms.

Mushroom cultivation was first introduced to Tanzania in 1993 by the Ministry of Agriculture and Cooperatives under the sponsorship of the International Fund for Agricultural Development. The focus was

on cultivation of oyster mushrooms (*Pleurotus* spp.) and the first strains to be cultivated were obtained from Belgium. The recently assessment of mushroom project<sup>3</sup> in Tanzania reported about 4000 smallholder mushroom farmers in 10 regions estimated to produce a total of 960 tons of fresh oyster mushrooms annually. The value of the mushrooms produced was estimated at TSh 3,840 million (Euro 2.8 million). The market for mushroom is local, and the retail price is about TSh 1500 - 4000 (Euro 0.9-2.4) per kg of fresh mushrooms with no middlemen involvement. Fresh mushrooms are sold mainly locally to individuals in the communities for food and medicine. The regular customers are the sick people particularly, those suffering from diabetes and HIV/AIDS. To enable the low-income people to afford mushrooms, growers package mushroom in portions of 100 and 250g for selling.

The oyster mushroom was so far the most commonly cultivated. The currently cultivated species include *Pleurotus flabellatus*, a local mushroom, *Pleurotus sajor- caju* imported from India; *Pleurotus* sp. HK 37 obtained from South Africa; *Pleurotus* sp. WC 814 and *Pleurotus* sp. WC 537 both obtained from Uganda; and *Pleurotus florida* obtained from Mauritius. Sorghum is the most commonly used spawn carrier, and banana leaves, rice straw, bean trash and cotton waste are common substrates.

### **Domestic Markets**

Domestic production of mushroom in Rwanda is currently estimated at 17 tons per annum. The demand for mushroom is high especially by hotels, supermarkets, restaurants, people living with HIV/AIDS, and households. Mini market survey carried in Kigali city by randomly interviewing 10 selected hotels and restaurants out of over 50 hotels in the city reported mushroom demand of over 260 kg per week that translates to an average of one (1) tone per month. Imported canned mushroom from China is sold at 1,200 Rwf packed in 227 grams under the brand name of Alpha and which implies that 1.1 kg of canned imported mushroom cost about Rwf 6,000 while the locally produced mushroom cost about Rwf 2,000 -3,000 per kg in Kigali city. According to the respondents interviewed during the mini market survey, fresh mushrooms are supplied in Kigali city by smallholder growers around the city, and other farmers from Gitarama, and Butare. The mushroom price is attractive to the farmers and it is one of the driving forces of the value chain.

### **Local Provincial Markets**

The local market for fresh mushrooms in Musanze, Nyabihu, Rubavu, and Burera is high and increasing. The most promising markets for mushrooms are Musanze and Burera because of the increasing economic activities and large peri-urban population. Mini- market survey carried out in Musanze reported demand for fresh mushrooms of 65kg per week (260 kg per month) by only 4 hotels out of about 10 hotels operating in the town. Mushroom producers interviewed reported increasing demand for mushrooms especially by households. The farmers sell fresh mushrooms at their gardens to mainly local individuals in the communities for food and medicine. Many interviewed growers reported that regular customers were the sick people particularly, those suffering from HIV/AIDS. Some individual growers supply fresh mushrooms directly to the hotels such as Muhambura, La Palme Hotel, Virunga Hotel, Fatima Hotel and EER Hotel. The average price of fresh mushroom is about Rwf 1,500 per kg. There are no middlemen in this value chain market, and production is not consistent. High production is experienced in the month of February- April and July- October when farmers are harvesting and when the rains season is on.

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<sup>3</sup> Mushroom Cultivation in Tanzania, Amelia Kajumulo Kivaisi, Department of Molecular Biotechnology (former Microbiology Unit), University of Dar es Salaam, 2007

### **Critical Success Factor's in the final markets**

The mushroom production has not reached to the level to promote exports owing to the high demand in the domestic market which still supplied by imported canned mushrooms. Therefore, facilitation of mushroom production shall help to reduce the domestic demand as an import substitution strategy. However, the good climate and the overwhelming commitment of the local farmers in the four districts, northern province can produce organic mushroom for export. There are critical factors (price, quality, promotion, distribution and value addition) that must be considered to develop the mushroom market in Rwanda.

#### *Maintaining the attractive mushroom price:*

The price for mushroom fluctuates depending on the supply of fresh mushroom in the local market. Over supply of mushroom in the market, results into reduction of the market prices while under supply or off season production keeps the prices up. The price for fresh mushroom is determined by the type and quality of mushrooms supplied in the market. Value addition, grading, and increasing the variety of the mushrooms shall help to maintain the price attractive to the actors.

#### *Maintaining high quality standard and food safety practices:*

The quality of spawn (seed) determines the quality of mushrooms, and in addition to the substrate (media) used, and prevailing environment of the garden. Quality can also be maintained through good packaging, grading, hygiene practices, and product differentiation. Mushrooms should be stored as close to 34° Fahrenheit as possible for optimum shelf life. Each degree above that can lead to a shorter shelf life. Under ideal storage conditions, mushrooms may have a shelf life of up to 15 days for whole fresh and nine days for sliced. Hence, moving mushrooms to cold storage immediately at every point of distribution maintains and improves quality. Trading better-looking mushrooms can increase unit sales by 18%, reduce shrink and improve the image of the business.

#### *Promoting and increasing awareness on the availability of quality mushrooms:*

Through intensive market promotion such as radio advertisement, newspaper adverts, and increased awareness through posters can disseminate information to over millions of potential consumers. This can increase the market demand and stimulate more production. The promotion can focus on the nutritive values and proven medicine benefits including hygiene and the organic nature of the mushrooms.

#### *Maintaining consistent supply and efficient distribution system:*

The hotels and restaurants in Musanze and Kigali city need for consistent quality and timely delivery of fresh mushrooms. Maintaining consistency in production requires proper planning, accurate market forecasting and also possibly market commitment through contracts with buyers. A lot of efforts and resources have to be devoted to achieve this critical factor. However, the distribution costs (i.e. transport, storage, and packaging costs) can be transferred to the customers through bargaining for better prices. Lack of consistency in supply and delivery shall result into market failure. The distribution system needs to be supported by efficient means of transport.

#### *Value addition:*

Investing in value addition technology such as electrical drier and other technologies for the extract of mushroom nutrients shall help to increase the shelf life from 3 days to 3 months. During the over supply period excess mushrooms can be processed and sold as value added products so that the farmers can not make losses. However, intensive marketing campaign is needed to increase consumer awareness and expand the market the mushroom products such as fresh and dried mushrooms.

## VALUE CHAIN ANALYSIS

### Value chain functions, Major Actors and Activities

The main function of the mushroom value chain in the four districts are input supplying, growing, organization and management, collection and packing, transporting, rural trading, processing, and urban trading and recycling of the waste. These functions are performed by different actors in the value chain, which includes, the input suppliers, growers through cooperatives and associations, individual farmers, transporters, hotels, restaurants, and households. These functions and actors activities are described more fully below.

#### Input Supply:

This function involves spawn production, which is the process of creating "seeds" or "roots" for the growth of mushrooms. It is sometimes referred to as spawn making. Spawn is the mature biological inoculum (mycelium) used in the permeation of substrate for the generation of mushrooms. Spawn making is a highly complicated process in which a pure strain of a selected fungus is chosen to generate a specific variety of mushroom. Spawn making requires a great deal of understanding of environments and technique and thus represents science as well as art.

Spawn is produced in the project targeted area by COPEPEC in Musanze, and other producers of Spawn in Rwanda include JUNCOA project managed by RADA and Jyambere Munyarwanda both located in Kabuye in Kigali city. JUNCOA project has capacity to produce 7,000 tubes per week. These input suppliers make Spawn from their laboratory facilities to propagate mycelia. The process of making Spawn starts by sterilizing a mixture of cereal grain plus water and chalk; rye, wheat, millet, and other small grains are used. Once the sterilized grain has bits of mycelia added to it, it is incubated to promote its full colonization. Mushroom farmers purchase Spawn either from COPEPEC, JUNCOA project or Jyambere Munyarwanda.

JUNCOA project has developed its technology more advanced than the above two suppliers with support of Chinese experts. JUNCOA technology was invented in 1980 by professor Lin Zhan Xi. The technology was developed to limit the cutting down of trees for production of mushrooms. The project produces tubes of colonized substrate by mixing grass with bran from maize, rice or wheat. 39 kg of processed elephant grass is mixed with 10 kg of bran and 1kg of lime and 100 grams of urea and 65 liter of water using the automated machines. The substrate is packed into tubes using a packing machine each weighing 1 kg. These tubes are sterilized for 24 hours and after sterilization, Spawn is added into each packed tube, which is sold to the farmers as mushroom tubes. Each mushroom tube cost Rwf 300 and 1 kg of spawn cost about Rwf 500, which is capable of preparing 100 tubes. However, many farmers in Ruhengeri buy Spawn from COPEPEC; and they invest more money in purchasing equipment to produce tubes or bags, which is highly scientific process. COPEPEC lacks equipment needed to produce these mushroom tubes, which are ready for farmers to start casing. During the field visit, we discovered that many farmers lack adequate skills in preparing the substrate, which has affected productivity. See the cost of purchasing Spawn and Tubes in table 3 below including the gross margins for each of the input supplier.

**Table 3: Price of Spawn and Tubes**

Service Provider	Unit (Kg)	Cost per Kg (Rwf)	Gross Margin
JUNCOA RADA Project	1 kilogram	500	N/A
JUNCOA RADA Project	1 piece of Spawned tube	300	N/A
COPEPEC	1 kilogram (packed in 250g)	1,600	70%
Jyambere Munyarwanda	1 kilogram (packed in 250g)	600	15%

Source: Field Survey Data 2008

Spawn making represents a critical component of development of the mushroom value chain in the four districts of Musanze, Nyabihu, Burera, and Rubavu without which the value chain shall remain unsustainable. The willingness to buy spawn and tubes is high but the supply is inadequate. According to COPEPEC, the farmers buy an average of 10kg (40 bottles) of spawn per season amounting to about 16,000 Rwf.

Farmers first undergo 3-5 days training in mushroom production at fee and thereafter purchase the spawn to start production. However, farmers interviewed revealed difficulties in confidently implementing the skills acquired because the preparation of substrate tubes is too scientific and require a lot of technical guidance. For instance, Jyambere Munyarwanda charges a flat rate of 150,000 Rwf for 3 days training on mushroom tube preparation for association with 20 people and several associations have managed to pay for the services. For individual farmers, the cooperative charges 20,000 Rwf for 1 days training on general mushroom production practices and some individual farmers come for 3 days training on mushroom tube preparation, who pay 50,000 Rwf and Jyambere Munyarwanda maintains an average of about 20% gross margins on the training fees. Many participants are also sponsored by ISAE, ARD, World Vision, ORTPN, ADRAS, and sometimes the participants are University students and lecturers. COPEPEC training program has been constrained by low ability of farmers to pay upfront fees but most of the training services are co-funded by the NGOs and other development projects.

The provision of extension services is yet a big challenge to the input suppliers because through extension services, the effectiveness of training can be monitored, marketing for more spawn can be created by recruiting new farmers, and supplying more spawn to farmers. This activity needs to be designed in order to sustain the business of input suppliers in partnership with the cooperatives and associations. Probably provision of embedded services could be one the options that can be exploited and designed.

### **Growing:**

This function involves thorough mixing of spawn into the compost using a manual spawning system. Once the spawn has been mixed throughout the compost, the compost temperature and the relative humidity in the growing room are managed by the farmer to optimize mycelial growth. In this function the spawn grows out in all directions from a spawn grain. The time needed for spawn to fully colonize the compost depends on the amount of spawn added and its distribution, the compost moisture and temperature, and the nature or quality of the compost. A complete spawn run usually requires at least 10 to 21 days. The major actors in this function of the value chain include Cooperatives, Mushroom Producer Associations and Individual Mushroom farmers. Terambere Munyarwandakazi, Ibyiringiro, Dukundibihumyo, COJEKIPPIA, and Association Tuzamurane are among of the active mushroom groups. In all the 13 Sectors bordering the protected area, COPEPEC plans to train members of about 13 mushroom associations.

Compost production involves two phases as performed by the farmers. Phase1 (outside) is where the raw materials (sorghum, beans waste) are mixed, the chemical and biological process proceed for at least 1-12 days. In the second Phase (peak heating) is conducted inside the garden using a drum and heated using firewood. The compost is filled into bags in special controlled temperature room and pasteurized for 2-3 hours at 60°C then conditioned for 6-7 days at decreasing temperatures to free the compost of ammonia. This function is highly technical and many farmers in the project areas have failed to undertake mushroom growing because of the related investment cost of two phases. According to the interviews held with Cooperative Presidents, and the individual farmers, compost production is time consuming, it is not hygienic practices, yet it is too technical for an ordinary farmer to successfully implement. Once the farmer does not control the excessive temperatures, the compost then gets damaged and hence resulting into production loss. A layer of specially prepared soil or peat moss is spread over the compost to protect it from drying out and allow for formation of the fruiting bodies. Most mushroom farmers harvest for 25 to 35 days, but harvest can

continue for as long as 90 or farmer during this process has water management, and critical parameters throughout

Harvesting of mushroom is the farmer. Harvesting usually sign of cup (old unopened 7-10 day cycle and this may last Mushrooms are picked at the fully expended) stage requirements. Many farmers the challenge of managing time is important as mushrooms their size within 24 hours. The (mushrooms) are harvested by motion according to the stems are trimmed and the straight into containers of the mushroom gardens for sale but farmers harvest, pack the and immediately the transported and delivered to Muhambura, La Palme, and

Some of the major constraints been identified included lack of composting as a potential Jenda, Shingiro, and Busogo Sectors. However, in Meizeira the maize processing company and SOTIRU the processor of wheat have a lot of the bran with no market. Many of these growers would access adequate supply of wheat straw or maize bran from the processors.

<i>Typical Rural Mushroom Investment Cost:</i>	
<i>Tubes/bags (200 bags):</i>	<i>226,100 Rwf</i>
<i>Labor cost:</i>	<i>30,000 Rwf</i>
<i>Water Jar:</i>	<i>3,000 Rwf</i>
<i>Plastic Cover (4-5 meters):</i>	<i>2,500 Rwf</i>
<i>Weighing scale:</i>	<i>15,000 Rwf</i>
<i>Basket:</i>	<i>2,000 Rwf</i>
<i>Production House:</i>	<i>110,000 Rwf</i>
<b>TOTAL:</b>	<b>388,600 RWF</b>

150 days. The mushroom to control temperature, ventilation, which are the growing period.

carried out every week by commences at the first mushrooms), often on a for 1½-2 months. cup or flat (cups that have depending on market interviewed are faced with during harvesting, which grow quickly, doubling fruiting bodies hand with a twisting farmers interviewed. The mushrooms are weighed customers at the however, few individual mushrooms into baskets, mushrooms are the hotels especially Virunga Hotels.

in this functions that has raw material for problem for farmers in

**Table 4: Gross Margins**

Items	Farmer Group 1	Farmer Group 2	Commercial Farmer
<b>Production Capacity</b>	<b>200 bags @ 5kg</b>	<b>1,000 Tubes @ 1kg</b>	<b>2,000 Tubes @ 1kg</b>
Output	168 kg	400 kg	800 kg
Selling price	1,500 Rwf	1,500 Rwf	1,500 Rwf
<b>Sales Revenue</b>	<b>252,000 Rwf</b>	<b>600,000 Rwf</b>	<b>1,200,000 Rwf</b>
<b>Less Cost of sales</b>			
Spawn-100 kg /Tubes	160,000 Rwf	300,000 Rwf	600,000 Rwf
Substrate materials	50,000 Rwf	0	0
Fuel wood/water	1,500 Rwf	0	0
Direct Labor for 2 days	4,000 Rwf	0	0
Plastic bags (200)	10,000 Rwf	0	0
Transport	600 Rwf	3,000 Rwf	3000 Rwf
<b>Total Cost of Sales</b>	<b>226,100 Rwf</b>	<b>303,000 Rwf</b>	<b>603,000 Rwf</b>
<b>Gross Profit</b>	<b>25,900 Rwf</b>	<b>297,000</b>	<b>597,000</b>

Less: Operational costs			
Wages	5,000 Rwf	10,000 Rwf	20,000 Rwf
Water	1,000 Rwf	2,000 Rwf	5,000 Rwf
<b>Total</b>	<b>6,000 Rwf</b>	<b>12,000 Rwf</b>	<b>25,000 Rwf</b>
<b>Net profit</b>	<b>19,900 Rwf</b>	<b>285,000 Rwf</b>	<b>572,000 Rwf</b>

Source: Data collected from Different Farmers

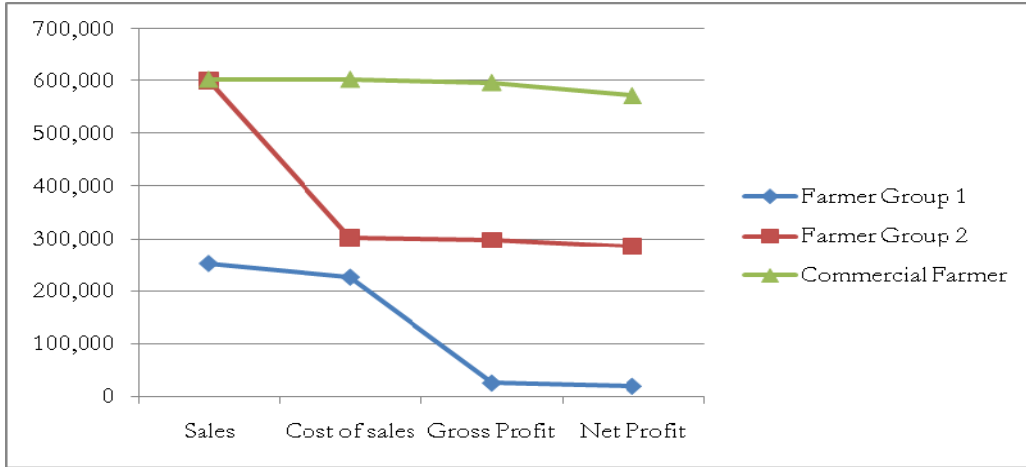
**Note:** Farmer group 1 is the typical example of existing farmer groups comprised of about 15 -20 members. The profit margins are so small and sometimes they end up making losses. The average output per kg of spawn is about 1.5 kg of mushroom due to inadequate agronomic practices. In best cases, 1 kg of spawn can be used to prepare 100 tubes of each 1 kg and each tube can produce about 400g -500g of mushrooms.

Farmer group 2 uses spawned substrate tubes produced by RADA. Each tube produces about 400g. The advantage of the group is based on the economies of scale. Instead of using 200 bags (1,000 kg) of locally prepared substrate blocks, it procured well prepared blocks from RADA, which reduces the cost of sales, and time wasted on preparation of tubes. However, the last category is of a commercial farmer that has invested in already professionally prepared spawned substrate tubes, using economies of scale, the entrepreneurs increased its production stock to 2,000 tubes and hence generating a sustainable income of 572,000 Rwf every 90 days. If the tubes are available for purchase throughout the year, this entrepreneur can plant 4 times in a year and earn 4 times the above net profit (2.2 million Rwf per annum).

Therefore it should be noted that yields of mushrooms are influenced by compost depth and quality, length of cropping and grade of mushrooms picked, spawn productivity, moisture and climatic conditions and disease factors. The yield is usually quoted in kg of mushrooms per square meter of compost. A good average yield would be about 16kg per m<sup>2</sup> (15 cm deep compost) over a picking time of 6 weeks. The majority of mushrooms will be picked over the first 3 flushes (about 4 weeks). Using this strategy, the farmers can increase their mushroom productivity by significant volume and hence increase the sales revenue. The summary of the business performance for the three categories of mushroom farmers is in table 5 below.

**Table 5: Summary of Mushroom Business performance**

Category	Sales	Cost of sales	Gross Profit	Net Profit
Farmer Group 1	252,000	226,100	25,900	19,900
Farmer Group 2	600,000	303,000	297,000	285,000
Commercial Farmer	603,000	603,000	597,000	572,000



## Organization and Management

This is a key value chain function; it refers to the organization, and management of the value chain, which covers mobilization of actors, coordination of major cross cutting activities, governance of the chain, and setting up basic practices and quality standards.

### *Organization of the Growers*

Over 20 Cooperatives and associations do exist in the mushroom value chain in the four districts with over 300 farmers. Many of these cooperatives/associations are not actively involved in commercial mushroom production and marketing. Cooperatives and associations are autonomous associations of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically controlled enterprise. When mushroom was introduced in the region, many associations were created to start up mushroom growing income generating activity. However, interviews carried out with some of the selected members of groups revealed the following strategic issues. According to the respondents, the groups were useful during the early stages of training and demonstrations but as the activity of the mushroom farming intensified especially the production of substrates and maintaining the gardens, the lazy farmers pulled out of the groups. The mushroom development initiatives have to be planned carefully where group interventions are concerned according to the respondents. Otherwise, the groups are useful in facilitating technology adoption by enhancing learning thereafter each farmer has to struggle and invest his or her own resources to develop his or her own mushroom garden and thereafter the farmers can come together for the purpose of bulking and marketing.

Some of these mushroom cooperatives are legally recognized as a legal form of a private enterprise, owned exclusively by its members who take the risk to establish it, to benefit from it and to bear its losses. One of the major strengths of these cooperatives is that they stimulate production and ensure that there is fair distribution of wealth among its members and hence contributing to the improvement of the community life conditions and welfare. COPEPEC for example, constitutes a form of enterprise capable to succeed even at the base level and among the poor population by producing spawn and distributing them on commercial basis. Whereas, the mushroom associations are not legally recognized enterprises and are mainly voluntarily in nature, and therefore, members tends to come together to access resources no limited commercial orientation.

The strategy is to strengthen selected cooperatives and associations, in order to support the development of performing & profitable cooperatives/associations. The capacity building initiative will require special training programs in rural development and in cooperatives management with comprehensive package on quality assurance, governance, financial management, and rural farmer –to – farmer extension services, mushroom technology, value addition, and high mushroom market opportunity.

The SWOT analysis carried out on the mushroom cooperatives revealed the following weaknesses: These cooperatives often operate like the simple collection or distribution points of the products and look rather like a subsidiary of a public enterprise than an independent enterprise rather than a vertical functional integration. The cooperatives operate in isolation not linked to specific mushroom markets. The capital of these cooperative are too small (average 30,000 Rwf), it does not grant the facilities of accessing to the external financing and hence, undertaking commercial scale mushroom production is constrained. The cooperative spirit is distorted by high expectation of the members, in view to benefit from the credits, grants, training and therefore, the initiative to be regrouped is not necessarily related to a need felt by the cooperators. Evidence identified in the field visits revealed that some members of cooperatives or associations opted to work as individual mushroom farmers because through cooperatives collective efforts cannot be sustained. Other weaknesses include limited mushroom market network, limited economies of scale in mushroom production, and spawn production, inability to hire competent skilled labor to manage operations on full time basis, and inability of members to raise adequate share to sustain the cooperative activities.

This weakness in the cooperatives or associations has made some of the farmers to move out of the organizations and work as individual farmers. Especially the lack of well coordinated collective effort and responsibility has caused many farmers to work on their own. The farmers use the association or cooperative approach to access group training, inputs, and other development support but work individual basis.

#### *Governance of the Value Chain*

The mushroom value chain currently lacks governance system that would have set quality standards and coordinate the implementation of value chain development strategic initiatives. The mushroom value chain can be governed when parameters requiring product, process, and logistic qualification are set which have consequences up or down the value chain encompassing bundles of activities, actors, roles, and functions. This is not necessarily the same thing as the co-ordination of activities by various actors within mushroom value chain. Therefore, there is need to establish governance system for the Mushroom value chain in the project area to coordinate at different places in the linkages in order to ensure these constraints and opportunities are managed in particular ways. Value chain coordination involves managing parameters as they are exhibited in bundles of activities undertaken by various actors performing specific roles in the chain. It also requires monitoring of the outcomes, linking the discrete activities between different actors, establishing and managing the relationships between the various actors comprising the links, and organizing the logistics to maintain networks of a national, regional or global nature. It is this role of coordination and the complementary role of identifying dynamic rent opportunities and apportion that is needed. This governance role can be performed by Union or a special value chain working technical group comprised of representatives of different value chain actors.

#### **Rural Trading**

Mushrooms are mainly traded by the associations or cooperatives at their respective gardens to the households comprised mainly of people living with HIV/AIDS. The customers come on weekly basis at the gardens to buy ½ kg or 1 kg of mushroom. 95% of the mushroom produced in the four districts is traded in the rural markets. The farmers are equipped with containers and weighing scales at their gardens. The customers buy each kilo of mushroom at 1,000 Rwf -1,200 Rwf. Also the local retail shops are another potential buyer of fresh mushrooms.

Some of the individual farmers sell your mushrooms or mushroom products directly to an end user such as hotels and restaurants; they receive a better price of 1,500 Rwf -2,000 Rwf per kilo. However, this market is stable throughout the year but the chef demand for assurances of both quality and regular supply before switching from established sources such as imported canned mushrooms. Direct marketing of mushrooms at local farmers' markets, to restaurants, or in supermarkets is possible in many locations in the four districts or even the neighboring districts. The main constraints farmers faced in maintaining this market are the customers demand for excellent service, top quality, and consistent supply. Facilitating the farmers to establish a relationship with the buyer and reliably delivering a quality product are essential element of promoting mushrooms in the region. Mushrooms are highly perishable, and growers confront daily market prices that are highly variable. Generally, fresh market prices are significantly higher than processing prices.

#### **Recycling of the waste:**

One of the value added products of the mushroom value chain that has potential for income generation and job creation is the utilization of spent mushroom spawn. Many farmers use spent mushroom spawn as a soil amendment for growing vegetables and sometimes, other farmers use it to feed animals. However, the commercial value of the spent mushroom spawn has not been fully exploited by the farmers. Spent mushroom spawn is an excellent growing medium for not only house plants, but it can be used on gardens and by farmers to improve soil texture and fertility. This product, if packaged and sold as soil amendment for use by landscapers and as potting soil in garden shops, it has the potential to get higher prices than

mushrooms per kilo. The spent substrate from mushrooms is an economical useful input to the organic manure which is so expensive in the four districts. For example 4.5 tones of organic manure cost about 70,000 Rwf.

### Processing:

The mushroom value chain has limited processing function at the moment. There is no special packaging of the fresh mushroom products for the local market, other value additions such as processing of mushroom. These may include dried and canned mushrooms, fast food products, meals ready to eat, pharmaceuticals, and the use of alternative substrate materials for spawn production (See Annex 4 for guidance of different types of substrates). The field findings indicated no single evidence of appropriate mushroom storage facility. Freshly-harvested mushrooms must be kept refrigerated at 350 F to 450 F. For example quality deterioration is slowed by removing heat from harvested mushrooms, and by assuring that a proper storage temperature is maintained. The harvested mushrooms should be placed in a vacuum cooler or an ice-bank cooler to quickly remove internal heat, after which they are transported in refrigerated container or trucks to maintain a low temperature.

However, mushrooms sold to the hotels and restaurants in urban areas undergo further processing into mushroom food dishes. For example 1 kg of fresh mushrooms purchased at 1,500 frw can prepared 5 plates of mushroom dishes cost each 5,000 frw with gross margin of at least 30% -25% of the total selling price. The main customers in the final market include mainly tourist, urban working class, and customers with special diet preferences. The market for mushroom dishes is high and the demand is stable throughout the year but the supply of mushrooms is unreliable and inconsistent.

### The value chain Map

The value chain map is a visual presentation of the way that the product flows through the different stages of the chain from production to the markets. The mushroom value chain map is divided between the different functions as described above, which are carried out by the major actors in order to get the product from the farm to the end markets. The participants in the value chain are divided into channels based on their forward and backward linkages and their use of technologies that differentiate them from one another within the same value addition. The summary of the value chain functions and actors is in table 3 below.

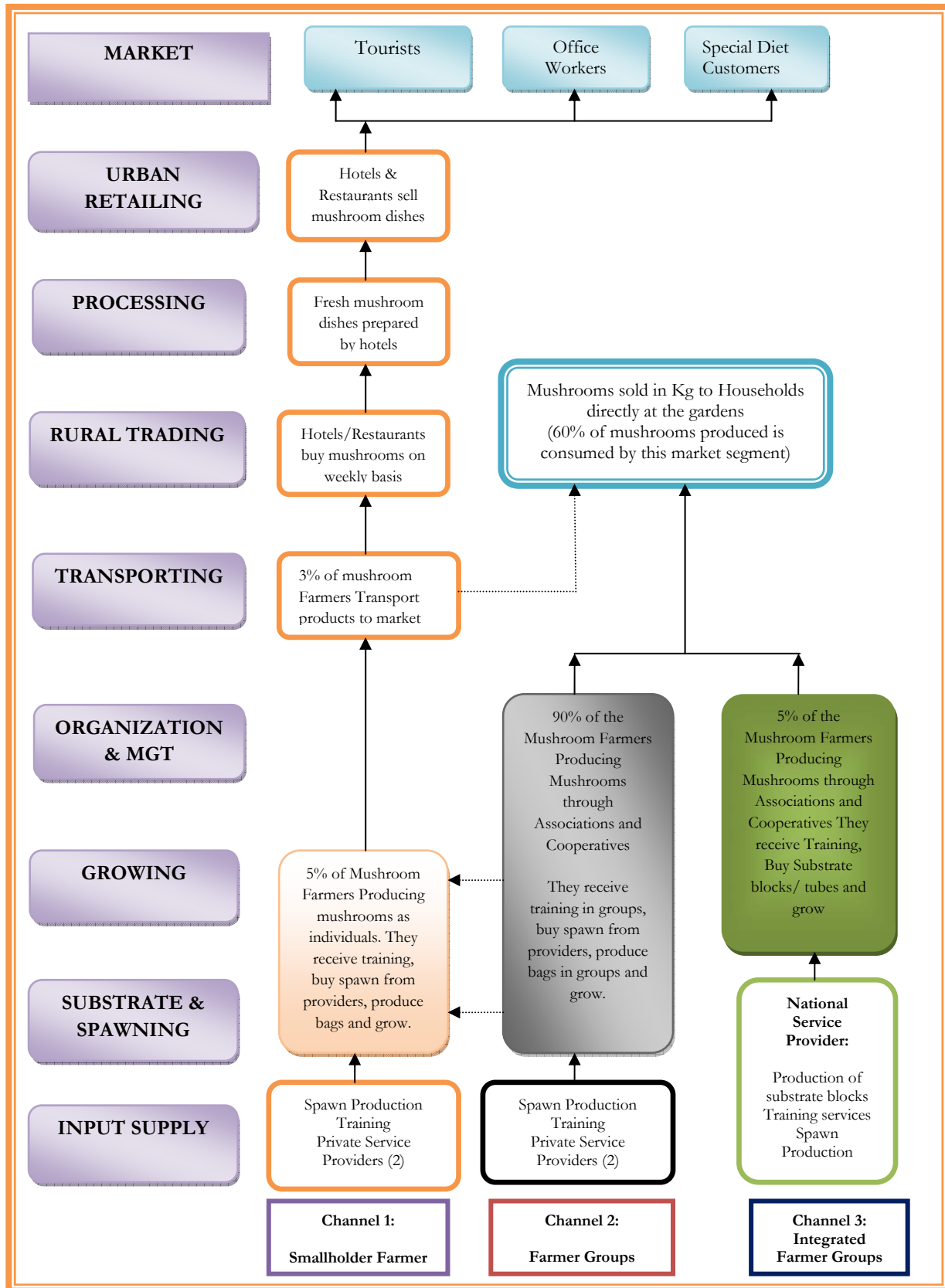
**Table 3: Value chain function activities and major actors**

No.	FUNCTION	ACTIVITIES	ACTORS
1.	Input Supply	Seed multiplication Production of Tubes Pasteurizing tubes Inoculating tubes Training on Technology Extension services	RADA-JUNCAO Project COPEPEC Jyambere Munyarwanda Private service providers (Trainers)

2.	<b>Growing</b>	Seed multiplication Making Tubes Pasteurizing tubes Inoculating tubes with waste material coated with Spawn (seed) Incubating tubes Watering and cleaning Fruiting Harvesting	Cooperatives Associations Individual Farmers
3.	<b>Organization and Management</b>	Mobilizing farmers into viable groups of production and marketing. Coordinate information dissemination and input supply. Governance of value chain and monitoring the chain activities	Cooperatives and Associations
4.	<b>Collection and Packing</b>	Bulking packing in baskets	Association/Cooperatives Individual Farmers
5.	<b>Transporting</b>	Fresh mushroom transported to customers premises – Hotels and restaurants	Individual Farmers
6.	<b>Rural Trading</b>	Selling at the production centre – Household consumers Selling to Hotels and Supermarkets	Associations, Cooperatives, Individual Farmers
7.	<b>Recycling of Waste</b>	Using the waste to grow vegetables and feeding animals	Associations Individual Farmers
8.	<b>Processing</b>	Preparing mushroom into different dishes	Hotels, Restaurants and Household
9.	<b>Urban Trading</b>	Selling of finished mushroom products	Hotels and Restaurants

Source: Field survey 2008

Value Chain Map for Mushrooms



## Supply Channels – Horizontal and Vertical Linkages

### Channel 1

Small holder farmers start Mushroom farming as part of farmer group; they receive training on mushroom production through the groups, and learn techniques for preparing substrate blocks or bags but later move out of the group arrangement. These individual farmers purchase spawn from suppliers and prepare substrate bags of 200 – 500 woven bags in average per season. However, these individual farmers invest money in construction of mushroom house, purchase of a drum, baskets, weighing scale, fuel wood, water, and strings. The main substrate materials include sorghum straw, beans and maize stovers. These smallholder farmers have established fresh mushroom supply contacts with hotels, restaurants and selected households. This channel is reliable but with insufficient quantity of mushrooms to supply to large customers. Secondly, the high investment costs require a committed farmer with adequate resources to manage operations of the farming. The cost of preparing substrate blocks or bags is high and requires highly technical skills; hence many farmers drop out of the business after the first cycle of mushroom production. This channel is reliable, commercial in nature and can grow but only if the production stage of substrate blocks preparation is done by service provider with technical expertise on commercial basis, which can reduce the production time and cost by significant amount.

### Channel 2

This is channel for smallholder farmers working in associations, groups or cooperatives representing 90%. This channel has high potential to produce high volume of mushrooms. Just like the smallholder individual farmers, the groups receive training on mushroom production, and preparation of substrate blocks or bags. These groups purchase 10 packets (2.5 Kg) spawn from suppliers, each 250 grams of spawn can be used to prepare 4 bags or tubes, and it is estimated to produce about 25kg of mushroom over 90 days. The group or cooperative prep substrate bags made of woven bags, garden management and harvesting is done through collective effort. The actors in this channel sell their mushrooms directly to the households who walk to their gardens. This channel is unreliable in terms of production because production is done seasonally when the harvested material waste for sorghum and beans are available and secondly, the farmers are actively engaged in other more viable enterprises such as Irish potatoes. In addition to these challenges, the group approach to mushroom production does not produce expected results because it difficult to put together a committed groups of farmers. The most successful mushroom cooperatives or groups available are managed by women. This channel can be improved through linking them to better reliable markets, encourage the farmers to grow mushrooms as commercial crop, provide capacity building, and facilitate them to access already prepared substrate bags, which can reduce the production time and costs by significant amount.

### Channel 3

This is channel for integrated mushroom farmers representing estimated only about 5% of the farmers in the four districts. The farmers work in groups or cooperatives to produce mushrooms. Unlike farmers in channel 1 and 2, these cooperatives purchase already prepared substrates from JUNCOA project in Kigali city and start growing mushrooms but after receiving training. These cooperatives purchase between 1,000 – 4,000 tubes per season. The actors in this channel sell their mushrooms directly to the households who walk to their gardens. This channel is more reliable channel in terms of efficiency in production but however, due to lack of information, ignorance on the economic benefits of purchasing already prepare substrate tubes or blocks, this channel has remained under developed in the target project area. It has high potential to grow if more awareness is provided and the service of tube preparation is brought near to the potential farmers.

## **Driving Forces**

### *Increasing Market Demand*

The ever increasing market demand for mushrooms by Hotels, Restaurants and Households offering competitive prices provides a driving force to the value actors to grow more mushrooms. For example the average demand per hotel in Musanze is about 5-10 Kg per week and in Kigali City is about 20 -100 kg per week. The increasing demand for fresh mushrooms by households especially people living with HIV/AIDS. Rwanda largely depends on imported canned mushrooms.

### *Consistent Input supply*

The increasing demand for quality mushroom spawn by local farmers in the four districts offers a big driving force to stimulate mushroom production. The main critical factors needed to stimulate production and commercialization is the increasing access to consistent supply spawn and tubes. The prepared colonized substrates blocks or tubes can have multiplier effects of increasing mushroom production by significant quantities over a short period of time and reduce fuel wood usage by large number of the mushroom farmers. The government started an initiative to produce mushroom seeds and tubes through JUNCOA project managed by RADA and COPEPEC initiative to produce mushroom spawn in Musanze district. These initiatives offer high potential for improving the supply of spawn production and preparation of mushroom tubes.

### *Availability of Producer Organizations*

Over 40 mushroom cooperatives and associations do exist in the four districts. These associations and cooperatives offer the driving force of reaching large number of farmers to introduce modern mushroom technology. However, these cooperatives and associations are still weak and once they are strengthened to manage mushroom production and marketing at commercial scale, productivity can be boosted to market the market demand.

### *Opportunity for value addition*

The technology needed for value addition for Mushrooms is available in the East African region. Inadequate value addition in the mushroom value chain has caused low productivity in the four districts. The lack of information on value addition, and access to technology has reduced the potential for farmers to increase the shelf life of fresh mushrooms from 3 days to over 3 months. Increasing value addition opportunities in the chain can offer a big driving force to improve marketing and boost production of the mushrooms in the target four districts.

## **Supporting Markets**

### *Access to Finance*

Starting commercial mushroom farming requires some capital especially for construction of the house, equipment, materials, and Spawn procurement. Access to finance for the rural farmers in the four districts has been a big challenge. Many financial institutions view mushroom farming as a high risk business and yet the poor people leaving along the protected areas have no guarantee to present to the local micro finance institutions. Increasing access to finance especially for start up investment and procurement of Spawned substrate blocks will increase the opportunity to reach large number of poor people or vulnerable target group. Banque Populaire du Rwanda is one of the most promising rural banks that has been supporting the rural farmers and therefore developing appropriate finance product to target mushroom farmers to increase

finance access to stimulate growth. The introduction of Village Savings and Loan Association can increase access to vulnerable people who can't access finance services from Banque Populaire du Rwanda.

#### *Gender Mainstreaming*

Targeting special interest groups such as women associations, Batwa group, Youth group, and people with disability and living with HIV/AIDS is critical. The field findings revealed that these groups provide high market opportunity for the mushrooms in the target districts. Mushroom cultivation offers a wide range of activities that can be suited for the above target groups with various needs, interest and capabilities. Strengthening the capacity of the associations and organizing these groups to access main markets for the mushroom, shall require special project considerations and grant support. However, the main emphasis of the interventions shall focus on commercialization of mushroom farming as a business and most importantly is the project support to link these target groups to viable mushroom markets. For example Terambere Munyarwandakazi a women mushroom association closed operations due to lack of access to Spawn, substrate materials, and lack of market. An association of women living with HIV/AIDS in Katwa Sector called Association Tuzamurane is faced with the challenge of accessing quality Spawn, and substrate materials.

#### *Policy and advocacy*

The Cooperative policy provides opportunity to increase commercialization of agriculture through establishment of viability cooperative society. In this value chain, the existing cooperatives, and associations are weak in terms inadequate capital (share), skilled personnel, structure and commitment of the members. Strategic policy and advocacy program is currently lacking in the value chain to encourage farmers to establish viable mushroom cooperative societies based on business principles. COPEPEC has taken lead in encouraging farmers to establish associations and cooperatives so as to facilitate access to inputs for mushroom. More strategic and district wide approach is needed and building up strategic partnership with the local government especially the department of cooperatives shall be essential in promoting organized value chain. Supporting associations to transform into cooperatives shall also be critical but however, some vulnerable groups shall definitely operate well through their existing associations or farmers groups due to inability to meet the government guidelines on cooperative formation.

## MAJOR CONSTRAINTS AND OPPORTUNITIES

Category	Major Constraints	Opportunities
Input Supply	<ul style="list-style-type: none"> <li>Lack of equipment for production of mushroom tubes in Musanze district as main input supply centre. For example: Lack of Laboratory tools, Motor driven mill, and Machinery for mixing substrates</li> </ul>	Building capacity of Regional Spawn Producer to guarantee consistent supply of necessary inputs to farmers
	<ul style="list-style-type: none"> <li>Inadequate working capital to purchase large amount of substrate materials by only service provider in the province such as maize, wheat straw, packaging materials, chemicals for preparing Spawn.</li> </ul>	Facilitate Preparation of bankable business plan for input suppliers and commercial farmers
	<ul style="list-style-type: none"> <li>Inadequate modern technology skills among the staff especially in quality assurance- HACCP, laboratory practices, and modern spawn production techniques e.g. COPEPEC, &amp; Jyambere Munyarwanda</li> </ul>	Development of training program to enhance capacity of service providers at all level of value chain
	<ul style="list-style-type: none"> <li>Inadequate space for production of Spawned Substrate tubes/blocks.</li> </ul>	Enhance capacity of the private sector service providers to invest in the expansion of the infrastructure
	<ul style="list-style-type: none"> <li>High cost of marketing Spawn and its high distribution costs to the outreach rural markets.</li> </ul>	Increase rural farmer access to Spawn and Spawned Substrate Tubes
	<ul style="list-style-type: none"> <li>Over production of Spawn by service providers resulting into losses due to low market demand during some seasons e.g. During off harvesting seasons for sorghum and beans farmers don't have access to waste materials and lack information about alternative substrate materials.</li> </ul>	Promote systematic production planning based on market demand and increase sensitization on the alternative substrate materials e.g. elephant grass, sawdust, wheat straw, maize brain etc
	<b>Major Constraints</b>	<b>Opportunities</b>
Technical and Product Development	<ul style="list-style-type: none"> <li>Lack of access to quality spawn (seed) ready for planting e.g. spawned substrate tube or bag/ block by farmers to enhance mushroom production</li> </ul>	Build capacity of providers in the province to produce quality spawn and spawned substrate tubes/ bags
	<ul style="list-style-type: none"> <li>Lack of sufficient substrate material for production of mushroom tubes/ bags by farmers. 95% of the farmers go through the process of preparing spawned substrate bags using fuel wood for pasteurization and sterilization</li> </ul>	Develop capacity of the service providers to increase farmers access to spawned substrate tubes/blocks
	<ul style="list-style-type: none"> <li>Lack of skills/ knowledge in modern mushroom production technology by the farmers.</li> </ul>	Establishment of demonstration centers for technology transfer
	<ul style="list-style-type: none"> <li>Lack of extension services to smallholder mushroom growers</li> </ul>	Establishment of private linked extension services
	<ul style="list-style-type: none"> <li>High cost of inputs (Spawn, Substrate materials, storage space) for small scale growers.</li> </ul>	Development of credit facility for spawn access and other necessary inputs

	<ul style="list-style-type: none"> <li>Farmers experience low mushroom output from 1 Kg of Spawn, the farmer harvest about 3-4 kg of mushroom within two weeks).</li> </ul>	Improve agronomic practices through practical training
	<ul style="list-style-type: none"> <li>Farmers and input suppliers lack of quality control system and some of the best hygiene practices, which has affected productivity.</li> </ul>	Establish value chain quality standards
	<ul style="list-style-type: none"> <li>High initial cost of starting mushroom farming. Start up requirement includes: Storage space, incubator room, Spawn purchase, training, packaging materials, Shelves, plastic materials and substrate material).</li> </ul>	Develop financing facility for farmers and input suppliers
	<ul style="list-style-type: none"> <li>Poor post harvest handling practices – lack of grading system, primary processing skills, storage facility like refrigerator etc</li> </ul>	Develop training program
	<ul style="list-style-type: none"> <li>Lack of efforts to cooperate and network with other enterprises such as poultry, forest and horticulture, which could yield new partnerships and uses for agricultural waste products.</li> </ul>	Develop and implement farmer linkage program with enterprises that produce substrates
	<ul style="list-style-type: none"> <li>Lack of access to affordable technology for processing mushroom e.g. electric drier, modern vacuum packing machinery, and refrigerated van.</li> </ul>	Linkage of major actors to the supplier of appropriate technology
<b>Market Access</b>	<ul style="list-style-type: none"> <li>Lack of farmers linkage to potential buyers of mushrooms e.g. hotels and Restaurants in Musanze, Burera and Kigali city.</li> </ul>	Promote Contract Farming Linkages
	<ul style="list-style-type: none"> <li>Lack of market during the over supply of mushrooms resulting into wastage and loss.</li> </ul>	Encourage access to technology for value addition. E.g. electric mushroom drier.
	<ul style="list-style-type: none"> <li>Lack of market organization &amp; techniques to improve access of smaller farmers to the viable mushroom markets.</li> </ul>	Strengthen the capacity of cooperative to coordinate mushroom bulk marketing
	<ul style="list-style-type: none"> <li>Lack of information of market demand for mushroom products.</li> </ul>	Develop sustainable market research and information dissemination system
	<ul style="list-style-type: none"> <li>Lack of mushroom value added products</li> </ul>	Build capacity of private enterprises to prepare value added products and facilitate marketing of the products
<b>Organization and Management</b>	<ul style="list-style-type: none"> <li>Weak cooperatives/ associations and have inadequate resources to hire competent qualified personnel to manage the activities.</li> </ul>	Develop and implement comprehensive capacity building package for cooperatives and associations
	<ul style="list-style-type: none"> <li>Lack of value chain governance system. There is no technical value chain working group to coordinate the activities in the different functions.</li> </ul>	Establish Value chain Technical Working Group – Representing all stakeholders
	<ul style="list-style-type: none"> <li>Lack of financial management system and inadequate capacity of the members to increase share capital – resulting into overdependence on grants</li> </ul>	Develop financial sustainability plan for associations and cooperatives

<b>Alternative Financing Mechanism</b>	<ul style="list-style-type: none"> <li>Lack of access to affordable credit facility to small scale mushroom producers especially associations and individual farmers.</li> </ul>	Develop and implement VSLA model
	<ul style="list-style-type: none"> <li>Inability of farmers to provide adequate collateral required by commercial banks to access commercial loans</li> </ul>	Sensitize bank staff on investment returns of mushroom projects. Promote dialogue between the value chain actors and the financial institutions
<b>Infrastructure</b>	<ul style="list-style-type: none"> <li>Lack of access to storage facility for fresh mushroom.</li> </ul>	Increase access to cold storage facility to all the major players
	<ul style="list-style-type: none"> <li>Lack of effective linkage between the mushroom farmers and ISAR. An agricultural commodity like mushroom requires a research component dedicated to strain improvement and development, preservation and quality control, alternative substrate development for mushrooms, and research is needed to investigate ways of improving the shelf life and packaging of mushrooms</li> </ul>	Develop linkages between the cooperatives and ISAR
<b>Enabling Environment</b>	<ul style="list-style-type: none"> <li>The mushroom associations lack capacity to comply with Cooperative Policy.</li> </ul>	Work with District Cooperative Officers to sensitize farmers on cooperative policy and law
	<ul style="list-style-type: none"> <li>Lack of compliance with the national quality standards and quality management system to facilitate good hygiene and food safety practices by the farmers and other players in the value chain.</li> </ul>	Work with Rwanda Bureau of Standard to develop mushroom quality standards and Facilitate cooperatives/ associations to enforce compliance.

## IDENTIFICATION AND SELECTION OF BUSINESS SERVICES

Category	Major Constraints	Business Services	Service Providers
Input Supply	Lack of equipment for production of mushroom tubes in Musanze district as main input supply centre. For example: Lack of Laboratory tools, Motor driven mill, and Machinery for mixing substrates	Provision of affordable equipment for mushroom input supply production to COPEPEC and other service providers	-Equipment supplier
	Inadequate working capital to purchase large amount of substrate materials by only service provider in the province such as maize, wheat straw, packaging materials, chemicals for preparing Spawn.	Facilitate Preparation of bankable business plan for COPEPEC, and commercial farmers. Facilitate access to affordable credit for COPEPEC and other providers or enterprises.	-Micro credit lending institutions -Commercial Banks e.g. -ECOBank, -Banque Populaire du Rwanda
	Lack of knowledge and skills in modern mushroom technology especially in quality assurance- HACCP, and Spawn production laboratory practices e.g. COPEPEC, & Jyambere Munyarwand	Development and provision of training to enhance capacity of service providers at all level of value chain	-RADA – JUNCOA project
	Inadequate space for production of Spawned Substrate tubes/blocks.	Promote the private sector service providers to invest in the expansion of the infrastructure	-Cooperative Society -RSSP, -IGCP
	High cost of marketing Spawn and its high distribution costs to the outreach rural markets.	Develop and promote affordable spawn/tube marketing and distribution system.	-COPEPEC, -JUNCOA RADA Project and -Jyambere Munyarwand
	Over production of Spawn by service providers resulting into losses due to low market demand during some seasons e.g. During off harvesting seasons for sorghum and beans farmers don't have access to waste materials and lack information about alternative substrate materials.	-Develop systematic production planning based on market demand. -Access new markets for spawn in the neighboring districts. -Increase farmers access to alternative substrate materials e.g. elephant grass, sawdust, wheat straw, maize brain etc	-COPEPEC, -JUNCOA RADA Project and -Jyambere Munyarwand
	<b>Major Constraints</b>	<b>Business Services</b>	<b>Service Providers</b>
Technical	Lack of access to quality spawn (seed) ready for planting e.g. spawned substrate tube or bag/block by farmers to enhance mushroom production	Build capacity of providers in the province to provide access to affordable quality spawn and spawned substrate tubes/ bags	-Cooperatives -Associations -COPEPEC, -JUNCOA RADA Project and -Jyambere Munyarwand
	Lack of sufficient substrate material for production of mushroom tubes/ bags by farmers. 95% of the farmers go through the process of preparing spawned substrate bags	Develop capacity of the service providers to increase farmers access to spawned substrate	-Cooperatives -Associations -COPEPEC, -JUNCOA RADA

<b>and Product Development</b>	using fuel wood for pasteurization and sterilization	tubes/blocks Access to alternative substrate materials e.g. elephant grass, sawdust, wheat straw, maize bran etc	Project and -Jyambere Munyarwand
	Lack of skills/ knowledge in modern mushroom production technology by the farmers.	-Establishment of demonstration centers for technology transfer and training of smallholder farmers. -Access to study tours and visits for smallholder farmers in the neighboring countries like Uganda, Tanzania and Kenya	-Jyambere Munyarwand -COPEPEC -Other Service Providers -IMBARAGA -Cooperatives
	High cost of inputs (Spawn, Substrate materials, storage space) for small scale growers.	Provision of and access to affordable quality Spawns and Spawned Substrate Tubes/bags to smallholder farmers	-Jyambere Munyarwand -COPEPEC -Other Service Providers -JUNCOA RADA project
	Farmers experience low mushroom output from 1 Kg of Spawn, the farmer harvest about 3-4 kg of mushroom within two weeks).	Provision of training and demonstration on improved mushroom agronomic practices to smallholder farmers	-Jyambere Munyarwand -COPEPEC -Other Service Providers -JUNCOA RADA project
	Farmers and input suppliers lack quality control system, which has affected productivity.	Develop and promote establishment of value chain quality standards	-Rwanda Bureau of Standard -Cooperatives -Associations -RADA
	High initial cost of starting mushroom farming for vulnerable people. Start up requirement includes: Storage space, incubator room, Spawn purchase, training, packaging materials, Shelves, plastic materials and substrate material).	Provision of financing scheme for vulnerable farmers to start mushroom farming	-VSLA -Project facilitation support – CARE, & IGCP
	Poor post harvest handling practices – lack of grading system, primary processing skills, storage facility like refrigerator etc	Provision of training and extension services to smallholders farmers	-IMBARAGA -RADA –JUNCOA project -COPEPEC
	Lack of Extension services to smallholder mushroom growers	Provision of and access to affordable private led extension services	-Cooperatives -COPEPEC -IMBARAGA
	Lack of efforts to cooperate and network with other enterprises such as poultry, forest and horticulture, which could yield new partnerships and uses for agricultural waste products.	Access to alternative substrate materials through promotion of farmer linkages to other enterprises that produce substrate materials.	-Cooperative -IMBARAGA -SOTIRU -Maizerie de Mukamira
	Lack of access to affordable technology for processing mushroom e.g. electric drier, modern vacuum packing machinery, and refrigerated van.	-Access to tools and equipment for value addition through cost sharing or leasing options.	-Mushroom processing equipment supplier. -Financial Institutions -RPSF

		-Access to information on new technologies for value addition.	
	<b>Constraints</b>	<b>Business Services</b>	<b>Service Providers</b>
<b>Market Access</b>	Lack of farmers' linkages to potential buyers of mushrooms e.g. hotels and Restaurants in Musanze, Burera and Kigali city.	-Provision of and access to market research services to identify potential market opportunities. -Access to Contract Farming Linkages with buyers in Northern province and Kigali city	-Private service providers -Cooperative -Hotels and Restaurants
	Lack of market during the over supply of mushrooms resulting into wastage and loss.	-Access to technology for value addition. E.g. electric mushroom drier. -Access to alternative mushroom markets	-Cooperatives -Supermarkets -Mushroom processors
	Lack of market organization & techniques to improve access of smaller farmers to the viable mushroom markets.	Access to management and marketing capacity support for cooperatives and associations to coordinate bulk mushroom marketing	-Cooperative Department – Local Government -Service providers -IMBARAGA
	Lack of information of market demand for mushroom products.	Provision of and access to sustainable market research and information system for cooperatives and associations	-RPSF -Cooperatives -Service Providers
	Lack of mushroom value added products	Build capacity of private enterprises to prepare value added products and facilitate marketing of the products. Access to training on value addition for cooperatives, associations and commercial farmers.	-Service providers -RADA -ISAR
	<b>Constraints</b>	<b>Business Services</b>	<b>Service Providers</b>
<b>Organization and Management</b>	Weak cooperatives/ associations and have inadequate resources to hire competent qualified personnel to manage the activities.	Provision of and access to comprehensive capacity building package for cooperatives and associations	-Service Providers -Cooperative Department – Local Government -RSSP
	Lack of value chain governance system. There is no technical value chain working group to coordinate the activities in the different functions.	Establish Value chain Technical Net Working Group – Representing all stakeholders	-CARE EEGL -IMBARAGA -IGCP
	Lack of financial management system and inadequate capacity of the members to increase share capital – resulting into overdependence on grants	Provision of and access to financial sustainability plan for associations and cooperatives	-Service providers

	<b>Constraints</b>	<b>Business Services</b>	<b>Service Providers</b>
<b>Alternative Financing Mechanism</b>	Lack of access to affordable credit facility to small scale mushroom producers especially associations and individual farmers.	Access to smallholder growers of affordable credit through VSLA model and other available financial schemes	-Cooperative Savings and Credit Society -Micro Finance Institutions -Bank Populaire du Rwanda. -VSLA
	Inability of farmers to provide adequate collateral required by commercial banks to access commercial loans	Sensitize bank staff on investment returns of mushroom projects. Promote dialogue between the value chain actors and the financial institutions	-Service Providers
	<b>Constraints</b>	<b>Business Services</b>	<b>Service Providers</b>
<b>Infrastructure</b>	Lack of access to storage facility for fresh mushroom.	Access to cold storage facility to all the major players in the value chain	-Cold storage equipment supplier -Cooperatives
	Lack of effective linkage between the mushroom farmers and ISAR. An agricultural commodity like mushroom requires a research component dedicated to strain improvement and development, preservation and quality control, alternative substrate development for mushrooms, and research is needed to investigate ways of improving the shelf life and packaging of mushrooms	Access to research information and services from ISAR through strategic partnership with mushroom cooperatives, associations and commercial farmers	-ISAR
	<b>Constraints</b>	<b>Business Services</b>	<b>Service Providers</b>
<b>Enabling Environment</b>	The mushroom associations lack capacity to comply with Cooperative Policy.	Access to technical advisory services from District Cooperative Officers as strategic approach to sensitize farmers on cooperative policy and law.	-Local Government-Cooperative Department
	Lack of compliance with the national quality standards and quality management system to facilitate good hygiene and food safety practices by the farmers and other players in the value chain.	Work with Rwanda Bureau of Standard to develop mushroom quality standards and facilitate cooperatives/ associations to enforce compliance.	-Cooperatives -RBS -IMBARAGA -RADA

## POSSIBLE INTERVENTIONS

### Key Results Area 1: Market Linkages for Mushroom Value Added Products Increased and Expanded

1.	<b>KRA 1.1. Identify market opportunities for mushrooms in Northern, northwest provinces and Kigali city and dissemination market information to all the major value chain actors.</b>	Facilitate Short term technical assistance to carry out detailed market survey in the targeted province and Kigali city including other potential markets to identify potential markets for mushrooms (fresh, dried, etc).	Jan 2009	EEEGL/Service provider	-Number of Mushrooms potential markets identified. -Volume and value of potential market demand identified.
		Facilitate market information dissemination to all the stakeholders to stimulate production of mushrooms through media programs, seminars and workshops.	Feb 2009	EEEGL/Cooperatives and Associations	-Market information disseminated. -% of farmers accessing markets as a result of availability of market information.
		Facilitate growers and buyers business dialogue forum to stimulate business linkages. Buyers can communicate their demands and specification for products.	March 2009	EEEGL/Cooperatives Associations/Buyers	-No of business linkages created. -Value and volume of business transactions
		Facilitate 2-3 potential cooperatives, commercial mushroom growers or private entrepreneur to develop marketing plans to develop a forward market linkage with buyers – hotels, supermarkets, and restaurants. Facilitate establishment of backward linkage for most promising enterprises (1-2 businesses) to guarantee markets for bulked mushrooms from farmers including vulnerable people to sustain mushroom markets.	May 2009	EEEGL/Cooperatives/Associations/Entrepreneurs/Service providers	-No of viable local mushrooms buyers created. -Volume and value of mushrooms purchased from Farmers. -No of Farmers integrated into better markets for mushrooms
2.	<b>KRA 1.2. Organize selected producer organizations to coordinate and streamline rural marketing of</b>	Facilitate technical assistance to producer organizations to develop mushroom bulking system for cooperatives, associations, and vulnerable groups.	May 2009	EEEGL/Service Provider	No of producer organizations with bulking system.

	<b>mushrooms</b>	Facilitate rural marketing network training to all the viable and active producer organizations to handle efficiently and effective rural marketing.	July 2009	EEEGL/Service Providers/Producer Organizations	No of people trained in marketing
		Facilitate Vulnerable groups through special grant scheme to integrate marketing of their mushrooms into the main markets by working with lead cooperatives and commercial farmers.	April 2009	EEEGL/Vulnerable Groups	-No of vulnerable integrated into markets -No of vulnerable with access to mushroom market
		Facilitate producer organizations to establish marketing units/sub committees to coordinate bulking disseminate market information and handle entire marketing functions.	April 2009	EEEGL/Producer Organizations	-No of producer organizations marketing mushrooms on the market

### Key Results Area 2: The Capacity of Private Commercial Mushroom Input Suppliers Strengthened

1.	<b>KRA 2.1. Build the capacity of mushroom input suppliers and rural Extension Community Based Providers to deliver affordable services to mushroom Smallholder Growers</b>	Facilitate Input suppliers e.g. COPEPEC and other potential suppliers to prepare a bankable business plan for expansion of services	Jan-Feb 2009	EEEGL Sub contracted Service Providers	2-3 Business plans for selected service providers developed
		Facilitate Input Suppliers to access credit and mobilize their own resources to procure tools and equipment needed to expand Spawn production and preparation of Spawned Substrate Blocks or tubes or Bags	March-April 2009	EEEGL Technical Staff/Service Provider	-At least 1 sustainable input supplier created to supply spawn and spawned substrate tubes in northern region -Value of credit/funding accessed by input suppliers
		Facilitate technical assistance to support input suppliers to develop appropriate systems on how to market services to smallholder mushroom out growers, how to carry out market survey/research, financial management practices, NRM, HACCP system, and strategies on how to develop embedded services.	Jan-March 2009	RADA/Service provider	No of technical assistance provided to input suppliers. No of input suppliers with appropriate management systems
		Facilitate linkage between the input suppliers based in the northern province and RADA's JUNCOA	Jan-March 2009	EEEGL Staff	No of Input suppliers linked to RADA

		project in Kigali City. Where RADA can provide direct technical assistance on technology transfer on Spawned Substrate tube production, quality standards, and access to quality Spawn.			
		Facilitate training program for management of Input Supply enterprises on entrepreneurship development, marketing, financial and quality management practices including mushroom agronomy practices.	April 2009	Service providers	No of management staff trained on best management practices.
		Facilitate Training of Trainers for Input Suppliers Marketing and Extension Agents operating in four districts as a strategy to increase marketing of input supply, provision of fee based advisory services, and monitoring of the Spawn performance.	May 2009	Service Providers/RADA, and COPEPEC	No of rural extension Community based Advisors Trained.
		Facilitate linkage between Input Suppliers and the potential mushroom farmers located in the protected areas in Virunga region in Rwanda through conferences, study tours and roundtable meetings	May 2009	EEEEGL Staff	-No of mushrooms farmers linked to the input suppliers. -Volume of inputs supplied to the farmers
		Facilitate one input supplier to prepare spawned substrate tubes and also acts as a marketing agent for RADA's JUNCOA project in the northern province.	June 2009	RADA/Service Provider	- At least one input suppliers capacity developed to supply spawned substrate tubes to farmers. -No of tubes produced -No of tubes purchased by farmers

**Key Results Area 3: The Capacity of Mushroom Cooperatives, Associations, Commercial Farmers and Vulnerable Groups Strengthened and Mushroom Productivity Increased.**

1.	<b>KRA 3.1. Build the capacity of mushroom cooperatives, associations, commercial farmers and vulnerable groups to deliver services to mushroom Smallholder Growers</b>	Facilitate a business diagnostic study on selected mushroom cooperatives, associations, commercial farmers and vulnerable groups so as to identify development and growth opportunities.	June 2009	EEEG/Service Providers	No of business diagnostics carry out No of viable cooperatives, associations, commercial farmers and vulnerable groups identified.
		Facilitate design, development and implementation of comprehensive management training programs based on training needs assessment to cooperatives, associations, commercial farmers, and vulnerable groups to fill management gaps.	July 2009	EEEG/Service Providers, District Cooperative Officers	No of participants trained by type of organization.
		Facilitate technical assistance to design and develop management system for the cooperatives, associations, selected commercial farmers, and vulnerable groups.	August 2009	EEEG/Service Providers	No of cooperatives, associations, commercial farmers, and vulnerable groups with sound management system.
		Facilitate producer organizations to negotiate and procure inputs on bulk to reduce the cost of inputs (spawn, tubes, tools, and refrigerators) to individual farmers.	Feb 2009	EEEG/Service Providers	No of producer organizations with bulk input procurement system.
		Facilitate vulnerable groups to jump start commercial mushroom production project using a group approach.	March 2009	EEEG/IGCP	No of vulnerable groups engaged in commercial mushroom production.
2.	<b>KRA 3.2. Capacity of Smallholder Mushroom Growers Enhanced</b>	Facilitate linkages between mushroom growers and supplier of spawn, spawned substrate tubes through well organized business dialogue and roundtable meetings	March 2009	EEEG/RADA	-No of farmers linked to input suppliers -Volume and value of inputs purchased by the farmers
		Facilitate design and implementation of training and extension services to	June 2009	EEEG/Service Providers	-No of farmers trained. -% of farmers practiced

		<p>Mushroom farmers in the targeted four districts.</p> <ul style="list-style-type: none"> <li>-Develop standardized mushroom growing training materials that can use to training farmers.</li> <li>-Develop database on all smallholder farmers in the districts.</li> <li>-Facilitate meetings between the farmers within producer organizations and as well with the potential buyers.</li> <li>-Facilitate development and dissemination mushroom agronomic practices, NRM and quality assurance.</li> <li>-Facilitate farmer to farmers visit as a learning on field strategy</li> </ul>			<p>skills acquired.</p> <ul style="list-style-type: none"> <li>-No of trainings conducted.</li> <li>-Average fees per training per person.</li> <li>-No of farmers in the four districts.</li> </ul>
		<p>Facilitate study tours and exposure trips for smallholder farmers to increase their knowledge and skills in mushroom growing and Natural Resource Management</p>	September 2009	EEEGL/Cooperatives/Associations	<p>No of Farmers Trained. % of farmers practiced skills acquired from tour.</p>

**Key Results Area 4: Coordination and Governance of Mushroom Value Chain Improved**

1.	<b>KRA 4.1. Establish Value chain Governance System</b>	Facilitate the value chain major actor's conference to discuss the findings of the value chain and identify stakeholders for the Value Chain Technical Working Group (TWG).	Feb 2009	EEEEGL/IGCP	Technical working group in place
		Facilitate STTA to develop the scope of work for the technical working group, procedures, and guidelines to operate as a viable governor of the mushroom value chain.	March 2009	EEEEGL/TWG Service provider	TWG Operational guidelines in Place
		Facilitate training for all the selected members of the technical working group on governance, monitoring – markets, actors roles/responsibilities etc, strategic planning, and natural resource management.	April 2009	EEEEGL/Service providers	TWG members trained

**Key Results Area 5: Increased Financial Access to Smallholder Mushroom Growers**

1.	<b>KRA 5.1. Develop financing mechanism for supporting mushroom farmers in the target project area</b>	Facilitate establishment of CARE's VSLA model to the selected farmer groups, associations and cooperatives as alternative financing options	April 2009	EEEEGL/VSLA service providers	No of VSLA created and strengthened.
		Facilitate the development and implementation of equipment leasing financing for mushroom growers by working with suitable financial institutions	April 2009	EEEEGL/Financial Institutions	No and value of equipment leased No of farmers supported
		Facilitate business dialogue between the financial institutions and mushroom growers to improve relationships	June 2009	EEEEGL/Financial Institutions	No of farmers linked to financial institutions
2.	<b>KRA 5.2. Build confidence among staff of selected financial institutions on the viability of mushroom farming as a business</b>	Facilitate one day training for staff of financial institutions on mushroom farming including exposure visit to typical successful commercial mushroom farm business.	April 2009	EEEEGL/TWG Service provider	No of bank staff trained on mushroom farming as a business.
		Facilitate organization and implementation of mushroom awareness campaign in partnership with selected financial institutions to increase local consumption.	Feb 2010	EEEEGL/Financial Institutions	At least one campaign carried out per annum

**Key Results Area 6: Improved Enabling Environment for Mushroom Agribusiness**

1.	<b>KRA 6.1. Integrate Natural Resource Management guidelines and policies in all value chain interventions to encourage sustainable use of these resources</b>	Facilitate sensitization of growers on the values of NRM in mushroom value chain and encourage farmers and producer organizations to comply policy requirements of NRM.	March 2009	IGCP/EEEGL Local Governments	No of farmers sensitized
		Facilitate access to alternative energy sources to reduce use of fuel wood in mushroom farming to growers and promote environmental friendly energy sources.	March 2009	IGCP/EEEGL Local Government	At least 2-3 alternative energy sources identified and in use.
2.	<b>KRA 6.2. Strengthen Policy and Advocacy program of producer organizations</b>	Facilitate capacity building for cooperatives, associations, commercial farmers, and farmers that are not organized in cooperatives on HAACP, Cooperative Policy, and contract enforcement.	July 2009	EEEGL/ District Cooperative Officer/ Service Provider	% of farmers and producer organizations complying with major policy requirements
3.	<b>KRA 6.3. Integrate Research and Development on new mushroom varieties in the value chain by working with ISAR, input suppliers and lead farmers.</b>	Facilitate research on the current varieties of mushroom spawn by working closely with RADA and ISAR and identify other new varieties with high market demands	Nov 2009	EEEGL, TWG, ISAR, RADA	No of new mushroom varieties developed.



## EXPECTED RESULTS –PERFORMANCE MEASUREMENT

### Key Results Area 1: Market Linkages for Mushroom Value Added Products Increased and Expanded

-Number of Mushroom potential markets identified. -Volume and value of potential market demand identified.	Market survey Report
-Market information disseminated. -% of farmers accessing markets as a result of availability of market information.	Periodic Field survey
-No of business linkages created. -Value and volume of business transactions accomplished	Periodic Field survey Quarterly Progress Reports
-No of viable local mushrooms buyers created. -Volume and value of mushrooms purchased from Farmers. -No of Farmers integrated into better markets for mushrooms	Quarterly Progress Reports M&E Reports
No of producer organizations with bulking system.	Quarterly Progress Reports M&E Reports
No of people trained in marketing	Training Reports
-No of vulnerable integrated into markets -No of vulnerable with access to mushroom market	Quarterly Progress Reports M&E Reports
-No of producer organizations marketing mushrooms on the market	Quarterly Progress Reports M&E Reports

### Key Results Area 2: The Capacity of Private Commercial Mushroom Input Suppliers Strengthened

2-3 Business plans for selected service providers developed	Business Plan Reports
-At least 1 sustainable input supplier created to supply spawn and spawned substrate tubes in northern region -Value of credit/funding accessed by input suppliers	Quarterly Progress Reports Periodic Field Visit Reports M&E Progress Reports
No of technical assistance provided to input suppliers. No of input suppliers with appropriate management systems	Quarterly Progress Reports M&E Progress Reports
No of Input suppliers linked to RADA	Quarterly Progress Reports M&E Progress Reports
No of management staff trained on best management practices.	Training Reports Quarterly Progress Reports M&E Progress Reports
No of rural extension Community based Advisors Trained.	Training Reports Quarterly Progress Reports M&E Progress Reports
-No of mushrooms farmers linked to the input suppliers. -Volume of inputs supplied to the farmers	Quarterly Progress Reports M&E Progress Reports
- At least one input suppliers capacity developed to supply spawned substrate tubes to farmers. -No of tubes produced -No of tubes purchased by farmers	Quarterly Progress Reports M&E Progress Reports Periodic Field Visit Reports

### Key Results Area 3: The Capacity of Mushroom Cooperatives, Associations, Commercial Farmers and Vulnerable Groups Strengthened and Mushroom Productivity Increased.

-No of business diagnostics carry out -No of viable cooperatives, associations, commercial farmers and vulnerable groups identified.	Service provider reports Quarterly Progress Reports
-No of participants trained by type of organization.	Training Reports
-No of cooperatives, associations, commercial farmers, and vulnerable groups with sound management system.	Quarterly Progress Reports M&E Progress Reports
No of producer organizations with bulk input procurement system.	Quarterly Progress Reports M&E Progress Reports
No of vulnerable groups engaged in commercial mushroom production.	Quarterly Progress Reports M&E Progress Reports
-No of farmers linked to input suppliers -Volume and value of inputs purchased by the farmers	Quarterly Progress Reports M&E Progress Reports Field Visit Reports
-No of farmers trained. -% of farmers practiced skills acquired. -No of trainings conducted. -Average fees per training per person. -No of farmers in the four districts.	Quarterly Progress Reports M&E Progress Reports Training Reports Periodic Field Visit Reports
No of Farmers Trained. % of farmers practiced skills acquired from tour.	Training Reports Quarterly Progress Reports Periodic Field Visit Reports

### Key Results Area 4: Coordination and Governance of Mushroom Value Chain Improved

Technical working group in place	Minutes of Stakeholder Meeting
TWG Operational guidelines in Place	Consultancy Report
TWG members trained	Training Report

### Key Results Area 5: Increased Financial Access to Smallholder Mushroom Growers

No of VSLA created and strengthened.	Quarterly Progress Reports
No and value of equipment leased No of farmers supported	Quarterly Progress Reports Periodic Finance Progress Reports
No of farmers linked to financial institutions	Quarterly Progress Reports Periodic Finance Progress Reports
No of bank staff trained on mushroom farming as a business.	Training Reports
At least one campaign carried out per annum	Quarterly Progress Reports

**Key Results Area 6: Improved Enabling Environment for Mushroom Agribusiness**

<i>No of farmers sensitized</i>	Training Report Quarterly Progress Reports
<i>At least 2-3 alternative energy sources identified and in use.</i>	Quarterly Progress Reports
<i>% of farmers and producer organizations complying with major policy requirements</i>	Quarterly Progress Reports Periodic Field Visit Reports
<i>No of new mushroom varieties developed</i>	Research and development Report

## EXIT STRATEGY

EEEGL/IGCP shall implement these interventions based on the following exit strategies. These exit strategies are linked to the achievement of the intervention's market development objectives- for example of sustainable service providers or the development of viable mushroom products tailored to the lower end of the market. The project interventions must emphasize commercialization of services and products to ensure sustainability of the interventions.

The project interventions should focus on targeted farmers that are poorly integrated into mushroom-markets to reach viable markets by removing the underlying constraints or market failures identified above. This exit strategy can help to develop and expand mushroom markets. The project should emphasize commercialization of mushroom farming and access to inputs.

The use of subsidies like grants, technical assistance, training etc to build provider capacity (input suppliers, trainers and other service providers) should not be used to subsidize the cost of service delivery. It should be used to develop products, and expand service network to reach large number of farmers. For example supporting COPEPEC to produce spawned substrate tubes for farmers in the province, can help to reduce cost of starting mushroom farming, in addition it can help to address lack of substrate materials, and extension services. The principle of selective use of subsidies is critical in maintaining stable markets for inputs and other essential services.

The project should reduce the use of subsidies over time as the market for services and products grow. EEEGL should ensure that there is a clear end to any financial support with local partners, and that support should be contingent upon measurable and achievable objectives.

EEEGL/IGCP should build capacity of local partners within the value chain through transparent selection criteria. The financial support to local partners should be open to more than one entity, and should be based on reaching agreed performance objectives. The exit strategy should then be clearly defined with partner's right from the beginning of the formal relationship.

It is important to note that, EEEGL project one of the core objectives is integrating the poor into mainstream markets. Poor farm producers of mushrooms can be integrated into the mainstream markets by increasing sustainable access to productivity-enhancing products and services. These products and services include: micro- equipment, mushroom inputs (spawn, tubes, packaging), and access to market and mushroom agronomy information. These interventions should be integrated into the producer groups for vulnerable people and other poor farmers in associations.

Building capacity of input suppliers to deliver services to the target beneficiaries market is critical in order to create multiplier effects that can benefit hundreds of farmers based on commercial principles e.g. fee for services and products. This strategy towards a more commercially oriented market strategy maintains and even expands the multiplier effect of services and products to improve the overall efficiency of the value chain market to deliver more services to more farmers over a sustained period of time.

Sustainability of interventions should be emphasized right from the beginning of relationship with the project. Sustainability is possible only through participation and empowerment of stakeholders (target beneficiaries private sector service providers, cooperatives, associations, and commercial farmers). Capacity building is needed for all stakeholders; institutional development should start from the planning stage and be continuous.

Project priority interventions should be demand-driven and flexible. EEEGL should encourage target groups to fully get involved in implementation. There should be cost sharing by the beneficiaries to increase their sense of ownership.

To promote mushroom farming as a business to vulnerable people, the project should emphasize the delivery of services at lower costs through group approach, Package services in small pieces instead of a 5 day mushroom production training offer only 2 days demonstration practice. Offer introductory services to vulnerable people with immediate value-added for fee based services at a lower cost, once target beneficiaries benefits from these services, they may have improved their income to purchase future services from providers such as Spawn, and tubes.

The project should facilitate development of embedded services, where suppliers charge for training and extension fees on inputs supplied to mushroom farmers. The service provider like COPEPEC supplies raw material, advisory services, market information, product specifications, or other services for those farmers who purchase their mushroom inputs. The mushroom buyers can also be encouraged and strengthened to supply services, such as quality control and packaging or promotion, whose costs are paid by the mark-up. Embedded services have high potential to reach the poor because they are not upfront fee based. Services provided by buyers are more likely to reach the poor, as are services embedded in essential inputs that the poor already purchase. To reach the poor, the services have to be delivered through markets these farmers can access easily in the province.

## CONCLUSION AND RECOMMENDATIONS

### Conclusion

In conclusion, Mushroom is a viable rural income generating activity in the four target districts and has high potential to generate revenue. Mushrooms can be cultivated on a small and larger scale to allow personal consumption or commercial enterprise. This can serve as supplemental or major source of income, depending on the size of the farming activity and the number of mushroom houses. People with physical disabilities are capable of accomplishing all required tasks necessary in mushroom cultivation, although sometimes some modifications in techniques, handling, tools and equipment may be required. Furthermore, mushrooms grow under the shade thus reducing physical exertion associated with open cultivation such as Irish potatoes, wheat, and rice. The value chain has currently a lot of inefficiencies that can be addressed by implementing the above interventions. Collaboration with other development programs in the four districts such as CARITAS, and other faith based organizations, IGCP, Local Governments, and Cooperatives can result into substantial development of the mushroom value chain.

### Recommendations

The development of mushroom markets in the initial stages of the value chain development stimulates growth and enhances strategic production planning. The six Key Results Areas outlines clearly identified the driving forces and leverage points to stimulate growth and development of the mushroom value chain. The project management team can use the interventions outlined and develop clearer budget lines for the interventions and distribute responsibilities and roles for each of the major project implementers and other stakeholders. There is need to work closely with the Local Governments and some of already existing institutions, cooperatives and associations in order to realize quick and meaningful development.

Farmer's mobilization and encouraging individual commercial growers to join the value chain in order to sustain markets and mobilize sufficient volume of mushrooms needed to meet market demand. Governance of the value chain is essential and critical now because it helps the facilitator transfer ownership right from the beginning and also to oversee and address general value chain strategic issues without interfering with the value chain functional activities.

Consistent input, quality assurance and organization of the actors play major roles in the industry and the proposed interventions in these three aspects should be addressed right from the beginning because they directly impacts on productivity, which is one of the major stimulus to market development.

Specifically, EEEGL shall develop a strategic partnership with RADA JUNCOA project to initially supply spawn or tubes to the farmers in the target project area as short term strategy. As a long term strategy, EEEGL can use services of RADA JUNCOA project technical staff to build the capacity of COPEPEC as a regional spawn and tube suppliers to the farmers. COPEPEC's current capacity is inadequate to meet the market demands in the target project area and in addition, the cost of spawn supplied by COPEPEC is far much higher than what RADA can offer. RADA staff at the JUNCOA project also view this proposal of building capacity of a regional supplier as a sustainable intervention, and which RADA can adequately support. EEEGL project needs to take the initial step to formalize this relationship.

Jyambere Munyarwand Company based in Kigali city has developed practical training manuals, and production guidelines. This company also is a producer of spawn and tubes. It works closely with RADA JUNCOA project in terms of technical collaboration. EEEGL project can evaluate the training services provided by this company to farmers in other provinces so as to ascertain the quality of service delivery. This company can provide practical training and technical assistance to the target groups. Mushroom Training and

Resource Centre (MTRC) based in Uganda in Kabale district is a model mushroom enterprise. MTRC buys fresh mushrooms from farmers, process and distribute both fresh and dried to supermarkets and hotels. It is working with 106 farmers in the three districts of Kabale, Kisoro, and Kanungu. This company can provide opportunity for the farmers in Rwanda to learn modern mushroom production technology especially on value addition. The company also provides training and technical assistance.

EEEGL shall have to identify a potential private company or cooperative to coordinate bulking of mushrooms, and marketing to the different market channels. This can be done through sourcing of potential local partner through competitive bidding process using media and other alternative available options in accordance with the project or CARE International requirements. The successful local partner shall invest its own funds in development suitable infrastructure to coordinate and market mushroom from the project target area to pre identified market segments. EEEGL project on its part shall provide technical assistance and some grants to facilitate the process of establishing this gateway company. In addition, EEEGL shall link the gateway company to different production centers. Priority must be given to the local businesses or entrepreneurs during the gateway company identification process. Currently, there are no potential cooperatives or companies the Consultant can recommend but through competitive bidding, strict due-diligence, and selection process a suitable local partner can be identified.

The sustainability of the market can be determined by consistency in supply of quality mushrooms, expanding the range of mushroom varieties as demanded by the customers, developing modern technology to add value to the fresh mushrooms, and adopting quality standards that guarantees quality, food safety and hygiene. Periodic market surveys to find out the ever changing consumers requirements and demands can help the gateway company to address the challenges associated with market failures.

## **ANNEXES**

Annex 1: Terms of Reference

Annex 2: Work Plan and Tools

Annex 3: Profile of Consultants

Annex 4: Mushroom Cultivation Media and Mushroom Types

Annex 5: Proceeding of Stakeholders Roundtable Meeting

Annex 6: List of People Consulted

Annex 7: List of References Consulted

## Annex 1: Terms of Reference



EEEEGL

With sub-grant support from UNDP/GEF/PAB project

# TOR for Mushroom Value Chain Analysis

## Background on the activity

The Enterprise, Environment, and Equity in the Virunga Landscape of the Great Lakes (EEEEGL) program address the inter-related problems of poverty, conflict, and environmental degradation within the Virunga landscape. The program has been designed as a joint venture project of CARE and the International Gorilla Conservation Program that is a leader in conservation in this region, while CARE is known for its community approaches as well as support to small enterprise development by engaging the private sector.

The overall goal of the EEEGL is “Increased livelihood opportunities based on sustainable use of natural resources, and improved governance of these resources, have made a substantial contribution to poverty reduction and environmental conservation in the Virunga landscape of the transboundary region, in particular benefiting the more marginalized and vulnerable groups in the population”. The programme target areas straddling the regions of DRC, Rwanda and Uganda bordering the complex of the Virunga parks.

In Rwanda, in the economic sector, the programme undertakes to expand the access to financial services for the local population, especially poor and marginalised farmers, through Village Saving and Loan Associations. At the same time, the programme wishes to expand opportunities for micro-enterprise development available to the beneficiary population. The following table illustrates the main element of the work-plan with regard to enterprise development in its foundation phase.

<i>Major Theme/Result</i>	<i>Major Activities</i>	<i>Approach</i>
<p><i>Enterprise</i></p> <p><b>1. Ecotourism and other enterprise activities that support sustainable NRM and are conflict sensitive have been developed and promoted, and market access at local, national and regional levels improved.</b></p>	<p>1.1 Conduct an assessment of local, national, and trans-boundary enterprise opportunities to shortlist 2-3 most promising options per country that will support sustainable NRM.</p>	<p>In its support for community-based enterprise beyond ecotourism, the program will use an approach that emphasizes the creation of market linkages between poor micro-entrepreneurs in the informal sector, and the formal private sector. Key principles of this approach include:</p> <ul style="list-style-type: none"> <li>⇒ Start with the market and work backwards;</li> <li>⇒ Formally engage the private sector, e.g. through forward contracts with buyers/suppliers;</li> <li>⇒ Support establishment of “gateway agencies” that aggregate supply and/or demand; and</li> <li>⇒ Formalize ownership of production and marketing organizations – making the poor genuine shareholders in the larger business.</li> </ul> <p>Applying this approach to agricultural and other natural resource-based products within the target area, the program will aim to identify two to three of the most promising enterprise opportunities in each country. In the context of this program, the key criteria are potential to generate benefits to local communities, including marginalized and vulnerable groups, and potential to support sustainable NRM either by adding value to resources that can be legally and sustainably harvested from protected areas, or by providing alternatives to the use of natural resources that are currently being exploited. This process will start with a broad scoping exercise reviewing all significant opportunities based on fieldwork and secondary sources which produce a shortlist of two to three of the most promising options. At this stage we cannot predict which enterprises will be selected, but the list in each country is likely to include some of the following: agricultural commodities (e.g., beans, potatoes, coffee), charcoal and fish (DRC only), honey, and medicinal herbs (where there is a rapidly growing market for remedies that alleviate the symptoms of AIDS). In terms of markets, the program will address local, national, regional, and global markets. Opportunities exist at all levels, but in terms of this</p>

		program, the regional level clearly has particular potential.
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In order to realize this result, a preliminary market opportunity mapping has been carried out and results showed twelve value chain opportunities. Among these our preliminary analysis indicates that eight have a significant growth opportunity: Honey products, Mushrooms, Apple, Irish potatoes, Agricultural seeds, Wheat products, Arts & crafts, Wool sheep. The study also showed that many stakeholders are involved in this value chain. Those key informants are private or public institutions, cooperatives, research institutions, NGO (local or international), financial institutions, commercial institutions (Hotels, Factory, Supermarket, etc). In other hand, it is demonstrated that few of those opportunities are well documented and analyzed.

CARE has received a grant from the project UNDP/GEF/PAB to undertake certain activities supplementary to and coordinated with EEEGL tasks. These sub-granted tasks include the support to the development of mushroom production in the target area as a livelihood and income generation activity. To fulfill this specific grant, CARE is undertaking to contract a local cooperative with experience and presence in mushroom production and able to support local farmers. At the same time, CARE wants to understand the mushroom value-chain and to identify opportunities and requirements to improve access to market by local producers.

## Rationale

Value chain analysis is an established approach to support economic development opportunities which can benefit rural poor, by identifying strengths and weaknesses to foster market access and linkages. Value chain analysis (VCA) can assist in assessing the growth potential of a selected chain, identifying market development opportunities and formulating supportive vision and objectives, as well as actions required to pursue them. A VCA can also help assess the pro poor potential of a given value chain, in terms of employment opportunities, entry barriers, gender and geographical factors, linkages with other growth sectors.

## Objectives

The objective of this consultancy is to deliver a VCA of the mushroom chain with specific regard to:

- production in the Districts of Musanze, Burera, Nyabihu and Rubavu (and specifically sectors of these districts bordering the PNV)
- access to local, national and foreign markets (regional and beyond).

The study is expected to identify and provide EEEGL with clear and detailed entry points (e.g., BDS, extension support, etc.) to support enterprise development in the mushroom chain.

The consultancy is expected to be delivered in a participatory way that is by eliciting inputs to discussions and analysis from stakeholders.

Specific objectives shall be:

1. To describe the value chain: operators and stakeholders involved, their functions, and business linkages / nature of their transactions.
2. To identify the geographical area of the chain (and broad identification of geographical areas of competing chains from other regions of Rwanda, if applicable)
3. To identify product markets (including quality standards, demand, etc) and their trends

4. To quantify to the maximum extent possible the value chain: number of operators, people employed, volumes/price/turnover of transactions at the various stages, shares of various market channels, product market shares, and their trends.
5. To identify SWOT of the chain in terms of product specifications, BDS requirements, policy framework, financial services, access to inputs and extension services, etc.
6. To identify and prioritize key points of leverage and opportunities for stimulating the growth of the chain, especially with respect to access to BDS and finance, product development, access to markets and influencing policy and the operating environment, as relevant.
7. To deliver a preliminary identification of potential BDS providers relevant to identified needs.
8. To propose a detailed action plan and timeframe for the respective interventions and matrix indicators for impact monitoring.

## **Methodology**

The consultant shall propose a methodology involving both quantitative and qualitative means and participatory steps (examples: review of available literature, key informant interviews with lead farmers, local businesses and traders, researchers, or important service providers; focus group discussions with farmer groups or industry associations; field visits/ observations; surveys). The VCA study should adequately reflect a pro poor orientation that is giving emphasis to chain factors which may favor the employment, participation and economic empowerment of the poorest segments of the population in the target area.

The results of the study are to be discussed at a stakeholder meeting to be facilitated by the consultant.

The methodology has to be participatory and must involve CARE staff; micro, small and medium enterprises (MSMEs) operating in the same market; cooperatives or associations. The participation of communities and local authorities in the project area must also be sought.

## **Outputs**

A preliminary report shall be submitted to CARE prior to the final stakeholder workshop (5 days earlier) and revised based on feedback from CARE.

The draft final report will be presented CARE for review and comments.

A final report will be submitted to reflect all feedback received from CARE within 10 days from receiving the final comments. The consultant can invoice CARE for final payment after the submission of the final report.

## **Timetable**

The time shall be agreed with the consultant during the contract negotiation.

## **Requirements**

Qualified individuals or institutions with proven capacity and experience in Enterprise Development; agribusiness, rural development, and particularly with experience in community-based interventions and specific experience in value chain analysis and BDS development;

Ability to demonstrate that the proposed methodology and tools are building on successfully conducted consultancies. The assessment capacity has to include participatory, qualitative and quantitative methods;

Proficiency in English or French (two languages are advantages);

Interested candidates are requested to submit their application, not later **xxxx 2008** in a sealed envelope at the CARE office at Kacyiru, Kigali, for the attention of: CARE International, Human Resources Department. The application should contain the following documents:

A detailed Curriculum Vitae of the individual(s) who Is (are) proposing to carry out the work (if a team is envisaged, ensure the role of each team member is clearly indicated);

A capacity statement demonstrating why the consultant(s) is/are capable of doing the job based on academic qualifications and past professional experience;

A technical offer, with a clear timeframe and a description of the proposed methodology for each specific objective of the TOR, detailing how the deliverables will be achieved;

A financial offer detailing the various costs associated with the delivery of the above services.

Transport in country and workshops will be organized by CARE and does not need to be included in the offer.

## Annex 2: Work Plan and Tools

No	ACTIVITY	DETAILS	Location	PERSONNEL	DAY
1.	Travel EBB-Kigali			Habib Tibrichu	Wednesday
2.	Team Building Meeting		Kigali	Habib/Marie Rose	Thursday
3.	Meeting CARE staff		Kigali	Habib/Marie Rose	Thursday
4.	Stakeholder Meetings -National		Kigali	Habib/Marie Rose	Friday
	<i>Ministry of Agriculture</i>	RADA	Kigali	Habib/Marie Rose	Friday
	<i>Rwanda Bureau of Statistics</i>		Kigali	Habib/Marie Rose	Friday
	<i>National Bank</i>	BNR	Kigali	Habib/Marie Rose	Friday
	<i>Ministry of Trade/Commerce</i>		Kigali	Habib/Marie Rose	Friday
	<i>Rwanda Environmental Management Authority</i>	REMA	Kigali	Habib/Marie Rose	Friday
	<i>Office Rwandais/Tourisme, Protection des Parcs Nationaux</i>	ORTPN -Musanze	Kigali	Habib/Marie Rose	Friday
	<i>Existing CARE Projects</i>		Kigali	Habib/Marie Rose	Friday
	<i>Institute of Agricultural Research in Rwanda</i>	ISAR	Kigali	Habib/Marie Rose	Friday
5.	Literature Review		Kigali	Habib/Marie Rose	Thursday/Saturday
6.	Field Visit: Travel to Musanze			Habib/Marie Rose	Sunday
a	<i>Musanze District</i>		Musanze	Habib/Marie Rose	Monday -Tuesday
b	<i>Burera District</i>		Burera	Habib/Marie Rose	Wednesday
c	<i>Rubavu District</i>		Rubavu	Habib/Marie Rose	Thursday
d	<i>Nyabihu</i>		Nyabihu	Habib/Marie Rose	Friday
e	<i>Musanze</i>		Musanze	Habib/Marie Rose	Friday
f	<i>Travel to Kigali</i>		Kigali	Habib/Marie Rose	Friday
7.	Review of field findings	Impala Hotel	Kigali	Habib/Marie Rose	Saturday
8.	Sunday	Sunday	Sunday	Sunday	Sunday
9.	Appointment scheduling	Enterprises	Kigali	Marie Rose	Monday
10.	Literature review/Coordinate Transport with Jackson		Kigali	Habib	Monday
11.	Enterprise Interviews		Kigali	Habib/Marie Rose	Tuesday
12.	Enterprise Interviews		Kigali	Habib/Marie Rose	Wednesday
13.	Enterprise Interviews		Kigali	Habib/Marie Rose	Thursday
14.	Break			Habib/Marie Rose	Thursday
15.	Appointment Scheduling - Mushroom		Kigali	Marie Rose	Friday
	Booking Accommodation for Kigali and Musanze	Habib/Marie Rose	Kigali & Musanze	Jackson Mutebi	Friday
16.	Saturday	Saturday			Saturday
17.	Habib –Arrive from Uganda		Kigali	Habib	Sunday
18.	Data Analysis & Drafting of Preliminary Findings	Preliminary Review	Kigali	Habib	Monday

19.	Drafting of Preliminary Findings - Mapping	Enterprise Mapping	Kigali	Habib	Tuesday
20.	Interview of Mushroom Customers	Hotels, and Restaurants	Kigali	Habib	Wednesday
21.a	Interview of Mushroom Customers	Hotels, and Restaurants, & Selected mushroom growers	Kigali	Habib	Thursday
21.b	<b>Travel to Musanze</b>	<b>Fieldwork on Mushroom</b>	<b>Musanze</b>	<b>Habib/Marie</b>	<b>Thursday</b>
22.	<b>Field work – Interview of Farmers, Cooperatives in Musanze and Burera</b>	<b>Mushroom Growers</b>	<b>Musanze</b>	<b>Habib/Marie Rose</b>	<b>Friday</b>
23.	<b>Fieldwork –Mushroom &amp; Travel to Kigali</b>		<b>Musanze, Burera,</b>	<b>Habib/ Marie Rose</b>	<b>Saturday</b>
24.	Draft Preliminary Findings on Mushroom value chain		Kigali	Habib	Sunday
25.	Preliminary Presentation of Enterprise Mapping and Mushroom Value Chain	CARE Staff and the Consultant	Kigali	Habib/ Marie Rose	Monday
26.	Prepare Materials for the Roundtable workshop with the selected stakeholders		Kigali	Habib	Tuesday
27.	Prepare Materials for the Roundtable workshop with the selected stakeholders		Kigali	Habib	Wednesday
28.	<b>Meeting Mushroom Input Suppliers</b>		<b>Kigali</b>	<b>Habib/Marie</b>	<b>Thursday</b>
29.	<b>Stakeholder Roundtable Workshop</b>	<b>CARE and its Partners</b>	<b>Kigali</b>	<b>Habib/Marie</b>	<b>Friday</b>

## Value Chain Assessment Checklist

Analysis Checklists
<b>Market Access</b>
1. To whom do you sell your product?
2. Is there a strong demand for your product or service? (Justify)
3. If demand is strong, what is preventing buyers from buying more or giving a better price?
4. How do you determine the price for your mushrooms?
5. What do you do to promote the sale of your mushrooms?
<b>Technology/ Product Development</b>
1. What kind of machines, equipment and/or tools do you use for production, and why?
2. Is there equipment that you know of that would improve your business?
3. What have you done recently to improve your mushroom business?
4. What technical skills do you use in the mushroom business?
5. What new skills do you need to improve your mushroom business?
6. What type of personnel skills are you searching for and what appropriate time would you need the personnel?
<b>Management/ Organization</b>
1. Do you manage all aspects of your cooperatives, associations or your mushroom business? If no who manages what?
2. What can you do to better manage your mushroom business?
3. What management skills would you like to acquire to enhance your business?
<b>Input Supply</b>
1. What raw materials do you use?
2. Where do you obtain your raw materials?
3. Are there constraints to getting them? Explain.
4. Have you ever purchased raw materials together with other businesses? Explain.
<b>Finance</b>
1. Where do you go when you need money for your business?
2. What trading arrangements do you have with your buyers/ sellers?
<b>Policy</b>
1. Are there any policies or regulations that are beneficial to businesses like yours?
2. Are there any that are constraints to businesses like yours?
3. What policies or regulations do you think are needed to support businesses like yours?
<b>Infrastructure</b>
1. What are the biggest constraints that your business (or those who buy from or sell to you) faces in areas such as roads, electricity, water, telephone, communication, warehouses, marketplaces, etc?
2. In your view what can be done to address these problems?

### **Annex 3: Profile of Consultants**

**Habib Tibrichu:** Has over 13 years' extensive hand-on skills and experience in designing and implementing BDS projects in Uganda. He has a Diploma in Market Oriented Small Business Development Services, Italy Turin and a post graduate Diploma in Business Management. He has a Bachelors Degree in Public Administration and a certificate in BDS Program Design, Financial Accounting/Taxation, and consultancy development services.

He worked for three years with a World Bank funded Business Uganda Development Scheme (Matching Grant Scheme) under the Private Sector Competitiveness Project and later worked with the USAID funded Support for Private Enterprise Expansion and Development (SPEED) as BDS Specialist. He has designed and implemented a BDS program on MSMEs Consultancy Best Practices in Mbarara and Lira. He carried out socio-economic impact assessment on modern energy use and BDS for Shell Foundation, UK. He developed BDS provider's roster. He designed BDS interventions for Honey, Pyrethrum, Maize, Fish farming, and Coffee sub sectors under the USAID funded Productive Resources Investment for Managing the Environment (PRIME-West).

He participated in the design of West Nile Region Development Concept program funded by GTZ and DANIDA. He coordinated Solar PV training program for rural solar technicians in 14 districts in Uganda on behalf of BUDS ERT/PSFU. He developed and implemented on behalf of BUDS ERT/PSFU Productive Energy Use Campaign in West Nile region in partnership with WENRECo. He carried out impact evaluation of a matching grant scheme called SME Competitiveness Facility in Tanzania funded by DANIDA. He provides BDS support services to DANIDA funded ASPS ABDC project on agribusinesses based on framework sub contract to date. He is part of the team of consultants reviewing and re designing the financial accounting, inventory and procurement systems for Joint Clinical Research Centre (JCRC). The Consultant carried out short term consultancies for CARE international in Uganda in the fields of BDS, mid term review KBDS end of Project Evaluation and sesame project assessment. Coordinated 2 months Export logistics for Midland Holdings Ltd for exports of Maize flour, Maize grains, cooking oil, and Salt to Juba, Southern Sudan. He carried out Consumer Market Survey for Fresh Cuts Ltd on meat products in Kampala, Uganda.

His expertise are in: BDS program design and implementation (Matching Grant, Voucher Program, and Embedded Business Services), monitoring and evaluation, financial planning and management, training, business diagnostic and planning, strategic planning for institutions, solar market development, competitive service providers procurement, human resource management, sub sector analysis and project impact evaluation.

#### **BYUKUSENGE Marie Rose**

She is a Rwandese national with over 20 years work experience. She holds Masters Degree in International Business, and Bachelors Degree in Business Administration. She has worked with projects, NGOs, and Government departments in different capacities. Currently she is working as Business Development Specialist with PRODEV Consult based in Kigali City in Rwanda.

## Annex 4: Mushroom Cultivation Media and Type of Mushroom

Growing Media	Mushroom Species
Rice Straw	Straw (Volvariella) Oyster (Pleurotus) Common (Agaricus)
Wheat Straw	Oyster (Pleurotus) Common (Agaricus) Stropharia Straw (Volvariella)
Coffee Pulp	Oyster (Pleurotus) Shiitake (Lentinus)
Sawdust	Shiitake (Lentinus) Oyster (Pleurotus) Ear (Auricularis) Ganoderma (Reishi) Maitake ( <i>Grifola frondosa</i> ) Winter (Flammulina) Lion's Head or Pom Pom (Hericium)
Sawdust Straw	Oyster (Pleurotus) Stropharia
Cotton waste	Oyster (Pleurotus) Straw (Volvariella)
Cotton seed hulls	Oyster (Pleurotus) Shiitake (Lentinus)
Log	Nameko (Pholiota) Shiitake (Lentinus) White jelly (Tremella)
Sawdust and Rice bran	Nameko (Pholiota) Ear (Auricularis) Shaggy Mane (Coprinus) Winter (Flammulina) Shiitake (Lentinus)
Maize cobs	Oyster (Pleurotus) Shiitake (Lentinus)
Paper	Oyster (Pleurotus) Stropharia
Crushed Bagasse and molasses wastes from sugar factory	Oyster (Pleurotus)
Water hyacinth	Oyster (Pleurotus) Straw (Volvariella)
Beans Straw	Oyster (Pleurotus)
Cotton Straw	Oyster (Pleurotus)
Cocoa Shell waste	Oyster (Pleurotus)
Banana Leaves	Straw (Volvariella)
Distillers grain waste	Lion's Head or Pom Pom (Hericium)

## **Annex 5: Proceeding of the Stakeholders Roundtable Meeting**

### **ROUNDTABLE STAKEHOLDER MEETING**

#### **EEEEGL ENTERPRISE NETWORK MAPPING STUDY CONSULTATION MEETING**

**VENUE: MUSANZE DISTRICT – EER HOTEL**

**14<sup>TH</sup> NOVEMBER 2008**

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### **AGENDA OF THE MEETING**

- Introduction of Participants –Marie Rose -Consultant
- Opening Speech by the EEEGL project Manager
- Presentation of Value Chain Concept – Habib Tibrichu & Marie Rose -Consultants
- Presentation and discussion of Mushroom Value Chain Analysis findings– Habib Tibrichu & Marie Rose - Consultant
- Presentation and discussion of EEEGL potential enterprises mapped– Habib Tibrichu & Marie Rose -Consultant
- Question and Answer session– Habib Tibrichu & Marie Rose -Consultant
- Closing Remarks – EEEGL Project Environment Officer

### **Introduction**

All participants introduced themselves based on the organization they represented, and positions held. The workshop was attended by about 25 participants comprised of Local Government officials, farmer representatives, processors, and selected mushroom farmers.

### **EEEEGL project Manager**

The project manager presented to the stakeholders the objective of EEEGL project and the objective of workshop and of undertaking enterprise network mapping study in the four districts. He said EEEGL program has the mandate to address the inter-related problems of poverty, conflict, and environmental degradation within the Virunga landscape. The program has been designed as a joint venture project of CARE and the International Gorilla Conservation Program (IGCP) who provides lead in conservation in this region, while CARE is known for its community approaches as well as support to small enterprise development by engaging the private sector.

The overall goal of the EEEGL is “increased livelihood opportunities based on sustainable use of natural resources, and improved governance of these resources. They have made a substantial contribution to poverty reduction and environmental conservation in the Virunga landscape of the trans-boundary region whose benefit has been enjoyed by the marginalized and vulnerable groups in the population”. He urged the participants to actively participate in this brainstorming workshop aimed at collecting views from the stakeholders as the consultant present their preliminary findings on mushroom value chain and enterprise network mapping study. He declared the meeting official open.

## **Consultant's Presentation**

The Consultant briefly presented to the stakeholders the concept of value chain and how it contributes to the development of rural program interventions. The Consultant presented the value chain map right from input supply, production, transportation, processing and to the final markets. The participants asked questions regarding on how project are implemented using the value chain approach and challenges associated with resource allocations for value chain development. The Consultant answered by providing project implementation strategies using mushroom value chain as an example.

The second part of the presentation specifically concentrated on the mushroom value chain, which covered functions, actors and their roles, major constraints and opportunities (see the attached power point slides in Annex 1). The participants contributed in developing possible interventions which included increasing access to spawn production by supporting COPEPEC, identifying actual markets and signing contracts to assure farmers of the market availability, increasing access to financial services for rural farmers through microfinance institutions and Banque Populaire du Rwandaire, and finally provision of support to the cooperatives to enhance their capacity to operate as viable businesses. The need to introduce technology for drying mushroom especially using electric drier system was also recommended.

The third part of the presentation focused on the preliminary findings of potential enterprises that EEEGL project can possibly select 2-3 enterprises from. The Consultant presented 11 major potential enterprises identified, which included: Irish potato, wheat, maize, mushrooms, pyrethrum, beekeeping, fruits and vegetables (Garlic and Tree Tomato), livestock (goat and sheep), and handicraft to stakeholders to provide an option on the suitability or identify other more potential enterprises that have been excluded on this list. The Consultant presented an overview on each of the enterprise to the stakeholders using the value chain approach. The stakeholders did not have any further comments and observations on the choice of the enterprises above and they unanimously recommended the list for further review and mapping.

## **Questions and Answer Session**

RADA made a short presentation on the mushroom project. RADA commended CARE for the initiative to expand mushroom in the Northern Province which fits well with their development outreach plan. RADA representative made it clear that RADA shall continue to play key role in the mushroom value chain in order to guarantee supply of quality mushrooms to the population. RADA pledged to work with CARE to develop regional spawn supplier based on RADA's best practices. Technical assistance can be provided by RADA to the regional supplier and the supplier can act as the major outlet for the technology transfer.

The stakeholders questioned CARE on its intervention approach and the level of resources available to support the development. CARE representative provided a precise answer to the question by making reference to the project mandate and design proposal, which emphasis facilitation role of the project as opposed to NGO type of business. He urges stakeholders to embrace commercialization of interventions as long term sustainable strategy.

## **Closing Remarks**

EEEGL project Environment Officer officially closed the workshop by requesting the participants to disseminate this workshop information to large number of other stakeholders. He said, EEEGL shall wait for the consultant to prepare the final reports and these reports shall be disseminated to the stakeholders in the four districts. On mushroom, the project officer said, EEEGL has already started to work with COPEPEC and soon, mushroom stakeholder meeting shall be held to discuss the value chain development strategies. On other enterprises, he said once the consultant report is completed a stakeholder meeting shall be held in Uganda to select 2-3 enterprises. Thereafter, enterprise specific meetings shall be held with the specific value

chain stakeholders to map out the way forward. He thanked the participants and the consultant for actively participating in this roundtable meeting and declared the meeting officially closed.

**Annex 1: Consultant's Presentation**

Slide 1



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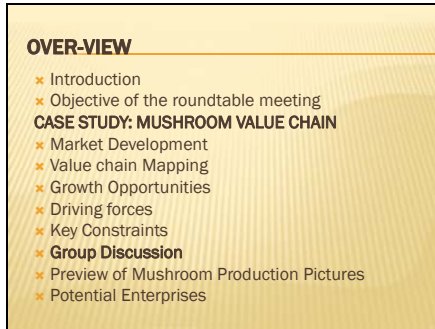
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Slide 2



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Slide 3

**STUDY OF THE ROUNDTABLE MEETING**

- ✦ To sharing our field findings
- ✦ To identify other new strategic issues
- ✦ To validate some of the information we collected from different stakeholders.
- ✦ To develop strategies in a participatory manner to improve the mushroom value chain –as a case study.
- ✦ Strengthen the local partnership among the stakeholders.

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Slide 4

**MUSHROOM CASE STUDY**

**MUSHROOM VALUE CHAIN STUDY**

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Slide 5

**STUDY OBJECTIVE**

- ✦ To Identify the market opportunities
- ✦ To identify market channels and trends
- ✦ To identify primary actors, roles and relationship
- ✦ Analyze the value chain
- ✦ Identify major constraints and opportunities
- ✦ Develop possible interventions that can address the constraints – program design

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Slide 6

**WHY MUSHROOM**

- \* Provide daily food menu for local community e.g. Hotels, Households and People Living with HIV/AIDS, cancer patients etc
- \* Mushrooms can be cultivated on a small and larger scale.
- \* Helps to conserve the wild mushroom in the protected area and domesticated mushroom is environmental friendly.

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Slide 7

**WHY MUSHROOM**

- \* Mushroom cultivation can be started at a very low cost and can generate revenue.
- \* Mushroom cultivation requires limited space of land and can be grown in the houses / small huts.
- \* Mushroom cultivation offers a wide range of activities that can be suited for people with various needs, interest and capabilities.

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Slide 8

**MARKET DEVELOPMENT**

- \* **DOMESTIC MARKET:**
- \* 3 Hotels surveyed in Musanze district revealed an estimated weekly demand of 55kg for fresh quality mushroom. (average price: 1,500 frw)
- \* 10 hotels surveyed in Kigali City revealed an estimated weekly demand of 260kg. (average price 2,000 frw - 3,000 frw).
- \* Domestic market depends on the imported mushroom from China (sold at 1,200 Rfrw canned product -227 grams - Alpha)

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Slide 9

**MARKET DEVELOPMENT**

- \* **REGIONAL MARKET:**
- \* Uganda and Burundi provides inputs (laboratory chemicals, planting materials) to Rwanda.
- \* In Kenya, Mushrooms in grown by small scale farmers in central Kenya. Profit from mushroom sales are low because of lack of significant market (perception -Mushroom is for the rich).
- \* Mushroom cost is about Kshs. 300 (Rfrw 2,460) – Kshs. 600 (Rfrw 4,920).

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Slide 10

**MARKET DEVELOPMENT**

- \* Kenya grows - Shitake mushrooms known for their medicinal values and Oyster mushrooms.
- \* Tanzania has extensively involved the private sector to grow mushroom through cluster. Tanzania has potential to grow 800,000 tons of mushroom using agricultural waste. 50 farmer groups have been established each producing 200 bags and generate Tshs 500,000 p.a.
- \* Uganda Mushroom Growers Association (with 250 farmers) exports mushroom to Europe.

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Slide 11

**VALUE CHAIN MAPPING**

1. **Input Supply:** Production seeds, training, and extension service)
2. Growing:
3. Organization
4. Collection and Storage
5. Processing
6. Trading

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## Annex 6: List of People Consulted

Names	Title	Organization	Location	Enterprise	Contact
Nyiranzirorera Jacqueline	Presidente	Ibyiringiro	Shingiro Sector	Mushroom	08417568
Mpayimana Noheli	In-charge Justice and Peace	CARITAS -Busogo	Busogo Sector	Mushroom	
Mukamabano	Chairperson	Terambere Munyarwandakazi	Musanze Sector	Mushroom	08597604
Ntezilyayo Eustache		Dukundibihumyo	Gahunga Sector/Burera	Mushrooms	03117113
	President	COJEKIPPIA	Cyanika Sector	Mushrooms	08787653
Nyirasuku Edith		Association Tuzamurane	Kabatwa Sector/Nyabihu District	Mushrooms	03228018
Mutagoma	President	Twihazemubiribwa Association	Kabatwa Sector	Mushrooms	03309504
Bizimana Fidele	V/President		Kabatwa Sector	Mushrooms	0868 498
Jean Pierre	Agronomist	Kinigi Sector	Kinigi	Government	08847802
Damascus	Accountant	Fatima Hotel	Musanze	Hotel	08775536
Matemane	Food & Beverage Officer	Virunga Hotel	Musanze	Hotel	08648647
Vincent	Assistant Head of Waiters	La Palme Hotel	Musanze	Hotel	08452406
Betty		Private Sector Federation	Musanze	BDS	08525872
Salongo Nsoro	Cooperative Officer	Musanze District	Musanze	Government	08834913
Ndagijimana Emmanuel	Officer in charge of Marketing	COAMV	Burera	Maize processing	08510141
Nibishaka Thade	President	COAMV	Burera	Maize processing	08869830
Ntwali Eric	Agronomist	Gahunga Sector	Burera District	Government	
Edith	Member & employee	Jyambere Munyarwanda	Kabuye-Kigali	Mushrooms	08461572
Pelagie	Trainer	Jyambere Munyarwanda	Kabuye-Kigali	Mushrooms	08441994
Mushimiyimana Chantal		RADA/Kabuye	Kabuye-Kigali	Mushrooms	08514241
Agnes	Agronomist	RADA/Kabuye	Kabuye-Kigali	Mushrooms	0858 4293
Kaberuka Innocent	President	COPEPEC	Musanze	Mushrooms	08524701
Mathien	Purchasing Officer	Mille Colline Hotel	Kigali City	Hotel	08642614
Alex	Director	Kalisimbi Hotel	Kigali city	Hotel	08517073
Sadiki	Accountant	Chez Robert Hotel	Kigali City	Hotel	08448000
Tom	Purchasing Officer	Hill Top Hotel	Kigali City	Hotel	08586355
Safari	Manager	La Palusse Nyandungu	Kigali City	Hotel	08434390
Augustin	Purchasing Officer	Iris Restaurant	Kigali City	Restaurant	08692851
John	Purchasing Officer	Chez John Hotel	Kigali City	Hotel	08502544
Claude	Purchasing Officer	Banana Guest House	Kigali City	Guest House	08441077
Alexandre	Purchaser	Top Tower Hotel	Kigali City	Hotel	08232218
Kizito	Purchaser	Isimbi Hotel	Kigali City	Hotel	08305663
Lin Zhan Sen	Consultant	RADA JUNCOA	Kabuye Kigali	Mushrooms	08581433

## Annex 7: List of References Consulted

1. **National Sustainable Agricultural Services - Mushrooms Cultivation and Marketing**, Alice Beetz and Michael Kustudia, 2004
2. **The Mushroom Marketplace**, *Mushroom Councillor Professionals in Grocery Industry, Volume 1, Issue- 1<sup>st</sup> Quarter 2008*
3. **Consumer Price Index** –National Institute of Statistics of Rwanda, Jan 2008
4. **External Trade Statistics**, Ministry of Finance and Economic Planning, NISR, Jan – March 2008
5. **Market Analysis, opportunities and Strategic Plan for Australian Mushroom Industry**, Richard de Vos
6. **Small scale Mushroom Cultivation**, Peter Oei, Bran Van Nieuwenhuijzen
7. **The Dutch Mushroom Sector**, *Small Mushrooms – Big Business, Project Report 1, EUROPEAID, 2004*