A Baseline Study of Munaka Rice Out-Growers: Integrated Value Creation for Smallholder Rice Producers and the Facilitation of Improved Decision Making for Enhanced Market Participation

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INTRODUCTION

As a result of increased risk due to climate change, societies must adjust socially to the eminent climate impacts in order to moderate harm and exploit beneficial opportunities. In the case of rice farming in Western Kenya; there are many reasons as to why irrigated rice production in Bunyala should be exploited as an opportunity for increased food security. The area has well developed water canal and feeders served with all the year round sufficient water supply and two pumping stations. These Pumping stations has 6 pumps each with a capacity of 150 l/s. There is 6,000 acres of land which is laying fallow reserved for rice production, (Mambala,2007).

Rice is a potential crop owing to the revival of the National Irrigation Board (NIB) and increased demand for quality rice by the rising middle class in Kenya. At the moment, Kenya produces only 20% of the rice demanded in the country and the potential for increased rice production is evident with efforts to improve rice husbandry and marketing put in place.

Bunyala is strategically positioned for improved rice production; it is served with a NIB station; offering research, extension, training on innovation and new technologies as well as helping in service provision for capital intensive undertaking like tractor traction. NGO's such as World Vision are working with rice farmers to help them respond to hush climatic conditions especially eminent flooding. Their response include the purchase of irrigated rice pumps and capacity building support. In other words, the infrastructural moulding and the basic institutional support for rice production is already in place.

Munaka Community Based Organisation has 750 acres of land of which self initiated efforts are in place to develop a market oriented scheme with the aim of empowering individual farmers to organise themselves in creating a viable out-grower scheme to run along side the government tenancy system. The rationale behind this scheme is to give the farmer increased market participation and control in making their own informed market decisions on where and how to market their produce. Rice farmers in Bunyala have shown evidence of dependency and over expectation on external intervention , as a result their ability to run their rice framing as an enterprise as been compromised.

Therefore the big question now remains on how farmers in Bunyala could be supported in their quest for Improve rice production, co-ordination and organisation as well as approaching new markets. Currently, support is needed given that farmers in regions affected by climatic impacts like flooding will need to adapt their systems to factor in changing climatic trends. The aim of this baseline is to describe the state of the affair as well as providing recommendation for integrating development in rice production to climate change adaptation.

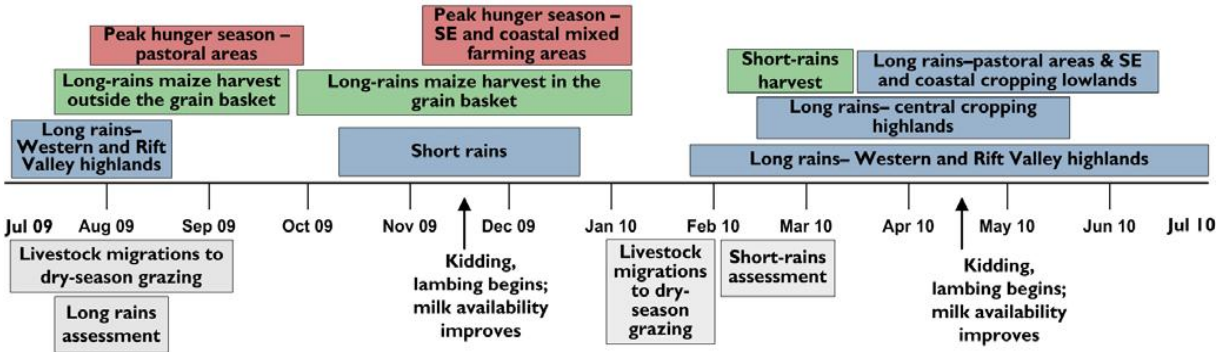
The methodology used in this report included an exploration of literature on food security in Kenya, agriculture in Bunyala and an historic account of the introduction of irrigated farming in Kenya. An exploratory study was conducted in the month of November 2009 where data on farmers' perception on climate change was gathered, the exploratory study also aimed to dig deeper on issues which could compromise quality and yields. This in-depth exploration enriches a survey which was done by the Institute for Sustainable Commodity Chains (ISCOM-Kenya) in 2007 on Munaka Community Based Organisation. The findings of this survey was found relevant for this study and form the pivotal position of this document.

Agriculture in Bunyala

Rice is generally grown in Bunyala as a cash crop, while maize and sorghum are the most grown for food crops. Although the introduction of upland crops or dry land rice production is yet to be implemented, due to labour and resource distribution, farmers apportion one season for food crop production (which is mainly the long rainy season) and embark on rice production during the short season. This is done due to the fact that most of the farmers can not afford initial investments for both rice and food crop production combined in one season. There is also interdependency between the two crop types as excess sales of food crops such as maize can also be used to finance rice production activities such as weeding and vice versa, Onjala, 2002.

The most important effect of climate change the farmers experience is a change in the rainy seasons. Over the last decade the rains delayed by one month and the rain was unevenly distributed over the year, It is also noted that the peak flows have increased. The total amount has remained more or less the same, but the two rain peaks seasons (April, November) are less pronounced. For majority of the crops grown in the area i.e. maize, millet, sorghum, beans, and cow peas. There are two growing seasons, the long season spreading from February –July and the short one from September to December. This differs slightly from the national food security seasonal pattern as shown in the figure below.

Figure 1: Seasonal Calendar and critical food security related events in Kenya



Cassava which is also an important food crop in the area is grown through out the long season and may extend beyond the short season. Sweet potato and cow peas are emergency crops especially during periods of drought, they both have short growing period as the sweet potato can be harvested in 2-3 months after planting; with the cow peas, the leaves are used as vegetable during plant growing period and the pea which come later at the end of the period is a substitute to beans. The farmers also keep a few livestock like cows, goats, pigs and chicken, there will hardly be any serious food shortage for livestock in the area since it rains frequently but the portions of land holding per household inhibit additional investment of local livestock

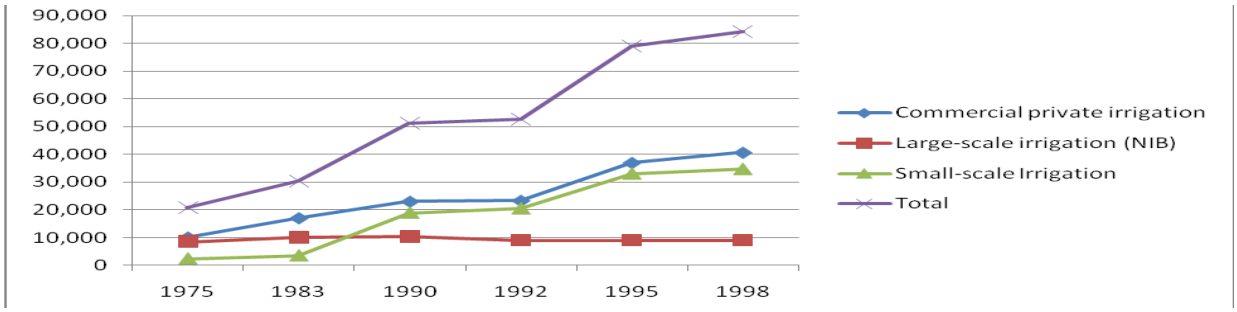
breed. Proceeds from either crop or livestock production are important in augmenting livelihood income and providing improved resilience to vulnerability attacks i.e. they act as safety nets.

The main adaptive mechanism used by majority of the rain fed farmers in Bunyala due to weather variability as outlined in the paragraph above is to postpone sowing. In the light of climate change challenges in Bunyala, possible adaptation strategies can be; a) Introduction of less water demanding crops such as *Nerica* rice in the area, b) Drought tolerant crops, c) Crops that can stand excess water (floods), d) Improved irrigation water management e) Water harvesting at farm level and f) Investment in large water storage reservoirs and fortified embankments along the water canals.

Irrigated rice production

Ngigi, (2002) gives an historical account of irrigation development in Kenya. He argues that there is evidence that local communities especially Marakwet, the Turkana and Pokomo may have practiced some form of irrigation for the past 500 years. Formal irrigation in Kenya started between 1901 and 1905 during the construction of the Kenya-Uganda railway in the area around Kibwezi and Makindu while Large-scale irrigation was started in the mid 1950s with the development of Mwea-Tebere, Hola and perkerra irrigation schemes. He adds that the effort of the government in irrigation development after independence was focused on establishing large scale tenant-based irrigation schemes. This schemes were established three years after the National Irrigation Board was initiated, Bunyala was initiated in 1969 alongside Ahero and West Kano irrigation schemes. Later on smaller irrigation initiatives were constructed along the arid and semi arid regions by UNDP/FAO fund among other initiatives to augment food security and for cash crop cultivation i.e. coffee and for horticultural production i.e. pineaple in Thika. For more about irrigation development in Kenya, read the review by Ngigi, 2002.

Figure 2: Trend in irrigation development in Kenya(1875-1998) (ha's)



Source: Ngigi, (2002)

Note: current studies giving data on irrigation development could not be traced. It is likely that commercial and small scale irrigation as continued with a steady growth. There are no changes experienced in large scale irrigation of late.

According to the NIB website on Bunyala Irrigation scheme, initiatives are ongoing to ensure sustainable exploitation of available irrigation potential. For instance, in the rice growing period 2005/06 NIB started a scheme expansion programme where 80acres in Muluwa and 140acres in Munaka were developed and supplied with water. Just before the 2006/07 growing period, infrastructure to irrigate an additional 100

acres in Muluwa was developed. An additional 100acres in Muluwa has also been developed bringing the total expanded area to 420 acres.

The NIB website also outlines the challenges constraining irrigation development in the scheme as follows; Inadequate funding for Irrigation & Drainage development, Lack of cost-effective Water Supply System, threat of flood damages and effects, Lack of water storage to guarantee adequate supply during the dry spell, Inadequate partnership in irrigation, Rice diseases and pests control, Slow adoption of Participatory Irrigation Management by the farming community. Weak farmers' organizations combined with Inadequate capacity building. Other challenges include; water borne diseases i.e. Malaria and bilharzias and Unstable market for rice products. Rice pest and diseases and inadequate funding for irrigation operation and drainage development were mentioned by the farmers and the NIB officials alike as the most constraining challenges to the scheme operation and progress.

According to the officer in charge – NIB –Bunyala, the strategic plan of the NIB by next year was to start rolling out a program that will embark in training farmers on good rice practices and especially capitalizing on improved cultural practices and introduction of integrated pest management. This is planed to be contacted in a participatory way where the farmers role to control their own activities will be emphasised through initiatives similar to those of farmer to farmer extension and farmer training schools. This is important because the older generation of experienced rice farmers is retiring from active rice production and the younger generation was not quite initiated to rice production since the operation of rice cultivation in Bunyala came to a halt in 2005. During this period, operations of the NIB were stalled (and this is according to the NIB website due to depletion of the revolving fund following the 1998 [1]Mwea Crisis). New rice technologies for production and marketing have also come in to the market during this period of absence and as a result partnership as well as the adoption of participatory irrigation management will need to be promoted.

Towards commercialized rice production in Bunyala

Bunyala rice irrigation scheme is served by two pump stations. One of the pump stations has 4 pumps each with a capacity of 150 l/s. Out of the four pumps, two were in use and the other station has two pumps, this is according to a field visit we contacted in Septembers 2009. With the existing pumps, 750 acres currently in use by Munaka CBO (the target group for this study) should be served well with irrigation water provided that the water levels are not affected significantly by flooding or drought.

According to (Ruigu, 1988), Bunyala had 840 hectares defined as cropped area under rice. The table below compares Bunyala scheme with the other schemes in Kenya. Other than Mwea irrigation scheme, the other schemes survive on subventions from the treasury (the government), Ruigu 1988 and the situation is unlikely to have changed over the course of time. In such a system, Ruigu believes that this scheme most probably fails to break even because of limited resources spread too thin. Thus while the scheme's tenants are waiting for the government to finance their operations the government is finding it difficult to source for the required capital and on time. (Ngigi 2002), documents the need for less government intervention and a need for incorporating public, private sector and beneficiary participation to build a self sustaining system. In such a system, the government would play a central role in policy formulation and coordinating development activities, adds Ngigi. For such a process to be successful continuity must be ensured and the

[1] *Mwea irrigation scheme is the leading irrigated rice product zone in Kenya and important for seed bulking*

transition should involve a sufficient preparation practice to ensure a switch in farmers frames of reference.

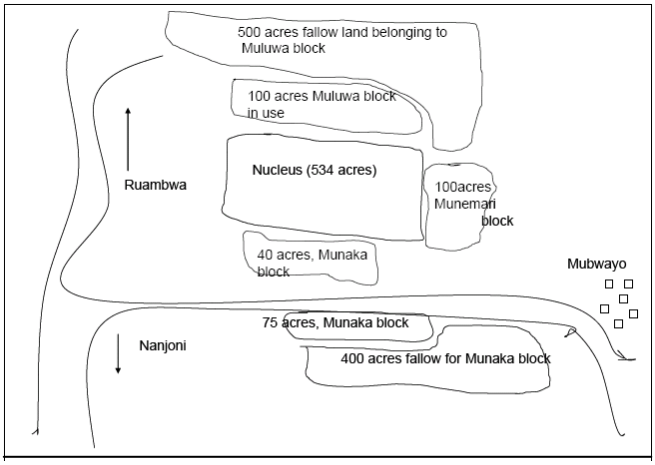
Figure 3: irrigation schemes under NIB

SCHEME	AREA (ha)	MAIN CROPS
Mwea	6,299	Rice
Ahero	840	Rice
Bunyala	212	Rice
West Kano	895	Rice
Hola	870	Cotton
Perkerra	200	Chillies/Onions
Total	9,316	

Source: Ruigu, 1988

Since the inception of the above large scale irrigation schemes, the main idea of initiating them was to settle landless people, Ngigi, 2002. As a result, the farmers don't own the rice farms; the government owns it. It is through a tenancy system that these farmers have rights to the rice farms. Currently, irrigated farming in Bunyala is divided in to two, the **nucleus (in-grower)** and the **out-growers scheme**. The nucleus is the part of the scheme that is under the NIB's mandate and thereby its operations facilitated by government. This is the land which is operated under the tenancy system. In total the nuclear has about 524 acres under rice production. The nucleus is divided in to feeders each feeder taking between 5-7 farmers (tenants) and under this arrangement, each tenant is allocated 4 acres of developed rice field which is apportioned 4 times (one acre each portion) for ease of water flow and management. With this system farmers only need to invest on few capital assets like hoes, machetes, and bird scaring gears. Rice being a capital intensive venture, much of the activities are performed by the NIB, this includes providing input, operation and maintenance of the scheme (especially the canals), and the NIB also will control post harvesting and marketing. The cost of operation and maintenance and likewise that of inputs like seeds and fertilizer is later deducted from the sales of rice and the farmer (tenant) gets the difference.

Figure 4: Shows the map of Irrigated rice farming in Bunyala



Source: Mambala, (2007)

The out-grower scheme is not that different from the nucleus in operation practices. Much of the out-grower scheme was necessitated by the stalled operation of the NIB 1999-2005. When the operation of the

NIB came to a stop, some innovative farmers still with the desire to grow rice through of ways in which they could continue growing rice. In this period of stalled operations, water was not pumped in to the canals and operations such as cleaning the channels and providing inputs were not performed by the NIB. During this period farmers gathered themselves and attempted feeble operations to grow rice with the small entrepreneurial activities they had. After the rival of the NIB, such efforts were supported by the government and are now running alongside the tenant system. Unlike the nucleus tenants, the out-growers must fund the exercises required for rice production this include the purchase of seeds, fertilizer and also the cost of operation and maintenance. By the out growers funding their operations, they have increased control over their yields and could decide where and when to sell it. Because of this point, this study will explore further the activities of Munaka out-growers. **This also explains the rationale of supporting these farmers in improved decision making for improved yields and quality for market exploitation in order to maximizing returns.**

Introduction to Munaka Out-growers

Munaka out growers started as a self help group in1992 with a 4 acre piece of irrigated rice which was later extended in 1995 to 35 acres. These 35 acres forms a block known as Munaka A. In 2006 the SHG was transformed in to a Community Based Organization (CBO) with a rice field of 45 acres and later in the same year 55 acres were added in to a new block known as Munaka B. Total cultivated land in munaka is 135 acres. The expansion of Munaka B coincided with the expansion of the neighbouring Mulua block to an area of 40 acres and Ruambua to an area of 35 acres. Nemari was expanded in 2007 to76 acres. Currently Munaka, Mulua, Ruambua and Nemari which were once self help group have teamed up under Munaka Community based Out growers scheme and there current acreage is 750. There is still room for further expansion in the scheme and the estimated land at the disposal if scheme is 6,000 acres. There is however an on going world bank project in the area that aims at flood protection and further extension of the irrigation system along the dyke downstream of the current system. Such an external intervention coupled with the adaptation of the local population towards poverty and climate vulnerability could help boost food security, help protect hardly earned farm investment, enhance human and natural capital.

Function of Munaka out growers

1. Mainly to coordinate the activities of the CBO
    a. Collective seeds acquisition
    b. Collective storage of the harvest
    c. Sourcing funding to cover standardized production activities (NIB programme),
- The NIB Program is supposed to start in September, not being financially ready may lead to a lost season
- In the nucleus this activities are supported by the government and the cost involved is deducted later

Below is a presentation of the background and the production effects of Munaka. This presentation originates from a survey that was conducted by ISCOM Kenya and it is complemented by a field visit conducted by the author of this document to Bunyala during the month of November 2009.

Social Economic Dynamics of Munaka Out-Growers

Rice is the most grown and the highest ranked crop in the irrigation scheme and grown by all the interviewed farmers. There were cases where some farmers did not own land but they were growing rice. The table below shows a cross sectional comparison of some socio-economic attributes by age and sex.

Table 1: Social economic dynamics of Munaka

Age	**Rice experience (Average)**	**Sex**		**Education beyond primary**	**Average Land size (Acres)**	**Average Rice field (Acres)**	**Yield**
		% Female	% Men				
18-35	3.0	21%	79%	13%	2.4	1.3	38kg
36-55	5.0	41	59	20%	2.4	1.3	++140kg
55 >	5.4	43%	57%	16%	2.5	1.3	+++160 kg
Sex	**Rice experience (Average)**	**Age**		**Education beyond primary**	**Average Land size (Acres)**	**Average Rice field (Acres)**	Yield
		<55	>55				
Female	4.4	62 (51%)	59 (49%)	10%	2.0	1.0	*182 kg
Male	5.2	106 (53%)	81 (43%)	21%	2.7	1.4	**111kg

+ yield from 6 young farmers who managed some yield despite rice blast

+ +Average yield from 20 medium aged farmers who managed some yield despite rice blast

+++ Average yield from 27 aged (O) farmers who managed some yield despite rice blast

**Average yield from 22 female farmers who managed some yield despite rice blast*

*** Average yield from 33 male farmers who managed some yield despite rice blast*

Gender: The survey was conducted to 121 female farmers and 187 male farmers thus a ratio of 4:6 respectively. Most of the farmers who were interviewed were classified as either medium aged or aged, these two groups formed more than 80% of the interviewed. Only about 13% of the farmers were classified as being young. The categories were formulated as follows, 18 to 35 years = Young, 35 -55 medium and above 55 years were classified as aged. With such a classification as above it was surprising to note that most of the farmers (approximately 80%) had 1-7 years experience in rice cultivation. With most of the farmers having 4 years experience.

Education: A great number of the interviewed farmers had no education at all. This was 35% of the interviewed farmers while farmers who had primary education constituted 50% of the total respondents. Only about 10% of the farmers had access to secondary school education with just about 5% who had attained college and university education. Despite the fact that there were less female respondents than male, the percentage of the farmers with low education mainly comprised of female farmers as shown in the table below.

Table 2: Comparison between Sex and education level

Sex	Education levels			
	None	Primary	Secondary	*College & University
Female	78	31	9	3
Male	27	120	31	9
Total	105	151	40	12

**With only two male university graduates, the rest of 12 were collage graduate*

Comparison between (rice) farming and other occupations

Alternative income options for income diversification were not accessed by most of the farmers interviewed (77%). Some farmers had formal employment such as teachers, village elders, employees of NIB and of the fish company. Most of the alternative occupation was mainly petty trade, fishermen, basket weavers, brick makers, artisans and milk sellers.

Table 3: Farmers alternative occupations

Occupation in Percentage	
Farming only	77
Farming and Small trade	10
Others	13
Total	100

Comparison of rice and other crops: The irrigated Bunyala flood plain was designed for intensive rice cultivation and rice is still a favourable crop among many farmers in the irrigation scheme. The importance of rice in Bunyala is likely to increase since the flood plain has been identified by the government as one of the 8 schemes targeted for the emergency food production program in 2009, Kiome, 2009. This program is aimed at boosting food production in high potential areas. Maize and rice are the identified crops due to their importance to food security in the country.

Farmers in Bunyala were asked to rank their favourite crop according to the order of importance to them (as a food crop and cash crop). Rice emerged to be the most favoured crop as shown in the table below.

Table 4: Rice comparison with other 5 major crop

	Rank 1	Rank 2	Rank 3
Rice	162	10	12
Maize	52	151	37
beans	10	40	140
Sorghum/Millet	30	94	72
Roots and tubers	5	11	33
Fruits and vegetables	5	9	18

Given its popularity among farmers, rice is grown mostly in portions of between 1-3 acres by most of the farmers. The survey did not capture a farmer who had more than 10 acres under rice cultivation only 5 farmers interviewed had portions of land which were more than 10 acres. It is therefore plausible to say that rice cultivation in Bunyala is under small scale arrangements. Below is a complete table showing the comparison between the total land size of the interviewed farmers and that under rice cultivation. The number of farmers with no land but also cultivated rice was thought to be too high. It is likely that farmers were afraid to disclose their land due to the fear of it being auctioned due to debts.

Table 5: farm size and area under rice cultivation

Categories of land apportioning	**Total Farm size**	**Area under Rice**
zero acre	62	1
0.1- 2.9 acres	134	274
3.0 - 4.9 acres	64	26
5.0 - 10 acres	43	7
10 >	5	0

While this survey questionnaire dwelt more specific on rice; Farming practices and decisions on crop choice of other crops has been covered in part 2 on the study of literature.

The huddle of financing a group initiative and related management

Rice production requires sufficient preparation to ensure timeliness and effective sequencing of events. To be able to grow sufficient rice that can capture the benefit of resource pooling, Munaka CBO will need to be able to coordinate its activities well and to be able to avail the funds needed to cover the cost of production on time. For each acre of rice, Ksh. 18,000 is needed for standard production cost each season as shown in the tabulation below. This cost is for facilitating production, and other related costs which will be discussed in the paragraphs below.

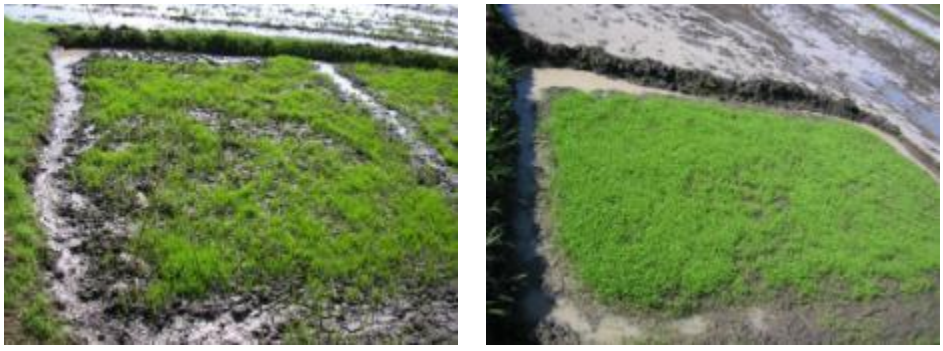
Activity	Cost (Ksh)
Water –operation and maintenance	4,000
Rotavation	3,500
Seed acquisition	2,000
Fertilizer	6,000
Chemicals (pesticides)	2,500
Total	**18,000**

Munaka CBO is composed of 5 sections, as illustrated in the table below. In total the group has 479 farmers and 750 acres of land ready for rice production. To be able to utilize of the 750 acres, the group will need to source for Ksh. 13,500,000.

Table 6: Budget estimate of Munaka Out-growers

Section	No. of farmers	Acreage	Cost/Acre	Cost /Section
			(Ksh)	(Ksh)
Munaka A	153	35	18,000	630,000
Munaka B	86	100	18,000	1,800,000
Mulua	115	100	18,000	1,800,000
Nemari	104	400	18,000	7,200,000
Ruambua	21	115	18,000	2,070,000
Total	**479**	**750**		**13,500,000**

Planning and preparation also includes individual action by the farmer. The farmer is expected to perform land preparation and decide how much rice he want to grow in his plot, thus spacing is important. Decisions about nursery bed preparation and are also important. i.e. the nursery bed design should ensure proper water regulation and distribution to avoid losing seedlings. If the canal banks are not well constructed and levelling is not done very well the crop yield is likely to be compromised. The observation done during the exploratory study revealed that many farms did not have well constructed banks and levelling was still a problem as shown in the photos below. The first step to maximizing returns will be to reduce any possible crop loss or stress as early as possible. Normally nursery bed preparation is key to having improved yields. See the comparison in the photo below. The box in annex II below also illustrates the efforts of Munaka CBO in an attempt to source for funding. This further emphasises the need for improved yield (from each individual farmer) in order to realize a possible break even point. Record keeping will help the farmers track their actions over the years and be able to easily identify point of improvement. Out of the farmers interviewed in the survey, only 53 % kept records.



The first picture to the left: a poorly designed and maintained bed against the second photo with a better maintained one

Agronomy in rice production and accompanying cultural practice

Inputs such as seeds, fertilizer and pesticide are sourced from the National Irrigation Board (NIB) and covers part of the standard cost of production as shown above. According to our survey of the 308 farmers, there are a few agro-vets (input stores) which were approached by a few farmers (less than 5% of the interviewed).

Seeds and rice varieties

Basmati Variety is most preferred by farmers as it has a shorter growing period. More so, it has high demand in the country since many Kenyan prefer aromatic rice; as a result, its price could be up to 5 times that of the other varieties such as IR and BW. Its yields is above the areas average but it is highly susceptible to rice blast. Current, there is not appropriate solution for rice blast in the area. Basmati also attracts a lot of birds due to its aroma, as a result the farmer has to invest too much time on bird scaring. The NIB officials thought that careful farmers who had mastered and applied basic rice best practices had benefited from this rice variety.

IR Variety is the most dependable and less likely to be affected by diseases. Since it is grown widely, its prices are modest and its yields with the application of good production practices are high. BW similar the IR variety but is less demanded. The other rice varieties on the table below are not all the time available and are also likely to face marketing problems.

Table 7: rice varieties grown in Bunyala

Variety	Basmati	IR	BW	UPR	ITA	BG
Farmer preference	155	134	90	8	76	36

Pest and diseases

A general practice for pest control amongst many farmers is the application of Furadan (a pesticide). Currently the NIB is in the processing of replacing Furadan with other better alternatives. Other methods used are like scaring bards literary or with scare crows, weeding and uprooting the affected plants. Cleaning bands is also a practice that help reduce disease transmission from the grass that grow along the bands. Traps are also laid for rats. Crop rotation in the rice fields i.e. introduction of upland crops could also help reduce disease incidence. So is the alteration between dry and wet rice. Preventing injuries during transplanting and also from vectors in addition to using disease resistant variety will help reduce pest and disease incidence. Rice blast for instance is said to be transmitted by a vector. Below are the most important pest and diseases according to the opinion of the farmers in Bunyala.

Table 8: Pest and diseases

Type	Rice blast	Worms	Yellow M. Virus	Caterpillar	Birds and rats	Stock borer	Rust	Blight	Termites
Frequency	145	95	91	51	38	25	5	2	1

Fertilisation

Fertilizer application is important to the yield of the rice crop. Since the last 3 years the price of fertilizer has gone up at a percentage of more that 100% in the whole country. Too much application of it is also detrimental to the environment and too less of it might not yield the expected yield. How and when it is applied also affects its uptake by the plant. The rule of the thumb is that farmers apply 2 bags of Urea and 1 bag of ammonium sulphate per acre. Soil testing is costly and thus hardly done. The need for fertilization is thus based on farmers' assessment. The standard procedure of fertilizer application as captured by Mumbala involves broadcasting triple super phosphate before transplanting. Immediately after transplanting the crop is topped up with SA fertilizer and this is repeated 40 days later.

Labour

Casual hired labour and family labour are the most relied forms according to the interviews for the survey we contacted. Own labour whereby the farmer has had to work without much input from the rest of the family members was moderately adopted by the farmers. Few farmers (approximately 12 farmers out of 308) benefited from communal and friends labour pooling. The survey also was interested in the distribution of labour for rice cultivation whereby land preparation, weeding, harvesting and rotavation were thought to be the most labour involving activities. Bird scaring, nursery bed preparation and transplanting, were thought to be moderate in labour demand while water drainage, spraying (fertilizer and chemicals) and transporting harvested rice to the depot were thought to be least involving. This assessment was based on how frequent these activities were mentioned by the farmers in the survey. The table below shows labour involving activities, gender involvement, man hour employed and cost. Payment for work done can be rewarded in kind (with rice grain after harvest) or in cash.

Table 9: Labour Activities For Rice Production

Activity	Executor	man hour/acre	Value(Ksh)/acre
Land preparation	men	10 days X 6hrs	1,200
Rotavation	tractor	Aprox. 30 min	3,500
2nd land preparation	men	6 days X 6hrs	800 – 1000
Setting up nursery bed	Farmer	3 days X 6hrs	800 - 1,000
Daily Nursery maintenance - Bad scaring	Farmer	21X20 min	700 - 1,000
	youth	7 days X 12 hrs	
Transplanting	(Wo)men	4 workersX3 daysX10hrs	1600
Flooding (water charges)	NIB	Unknown	4,000/season
Water control-feeder leaders	F. leaders	I hrs/week/4 acre	600
Fertilizer application x2	Farmer	30 min	150
Pesticide application	men	30 min	350-400
Weeding	women	2X6 hrs	2,000
Band cleaning	Farmer	2X 6hrs	500
Bird scaring	youth	1 month X 12 hrs	Ksh. 300 + 20kg rice
Harvesting - cutting	men	4 men X 4 days X 6hrs	1,500
Threshing	women	8 women X 3-4 days X 11hrs	Ksh. 800+ 100kg rice
Transportation farm to store, loading and off-loading	men	20 hrs/ 4 acres	80-100/ bag
Drying and re-bagging	Farmer	12 hrs/ ~ 59 bags	1,500- 1,800
Storing and floor charges	NIB	Unknown	Ksh. 85/ 50 bags

Bird scaring

It is not yet known how much yield is lost due to birds' infestation. A Basmati farmer estimated the yield loss from bird alone to be over 60% if no action is taken to scare away the birds. Even with daily scaring mechanism put in place the farmer thought that he losses up to 10-15% of his yields to birds. In an attempt to reduce these farmers build temporary houses on their rice field which could then enable them to have a better surveillance. Bird scaring techniques are diverse, they rage from literally shouts, clapping and erecting noisy instruments that knock on each other once wind blows. A slang like weapon is mainly used to scare birds that are further away from the farmer and will not easily respond to his/her noise. The weapon is a flexible stick with a wire attached to its end to make it even more flexible. A small pitch of clay is then rolled to a ball and mounded to the extreme end of the wire, with a complete golf-like swing the clay ball could be cast at a distant covering a radius of a two acres land thus making it possible for one person to perform bird scaring on a four acre plot. An example of a such a slug is shown on the photo below.

Figure 5: photo 1st , a field hut to facilitate bird scaring; 2nd photo, a farmer getting ready to swing the slag; 3rd photo, a farmer just about to reliece the clay ball.

Production and Yield

Taking a good harvest year and taking an average production, Mumbala, (2007) estimates the productivity of an acre of land as follows; the returns presented below are arrived at after deducting the cost of production of which external and hired labour is quite sourced.

Table 10: Gross margin estimates

Activity	**Amount**
Paddy yields 30 bags @ Ksh. 2550	76500
Variable Cost	
Rotavation	3000
Levelling and Nursery preparation	2000
Fertilizers	3393
Pesticides	4553
Water Charges	4000
25 Kgs seed @ Ksh 70	1750
Transplanting	1500
Weeding	2000
Other labour needs	2200
Harvesting	3200
Sacks and twins	1100
Working capital – Sub-Total	**28696**
Interest on working capital@10% of 50%	**2850**
Gross margin/acre	**44934**

The table below shows production of Munaka since the growing period 2005-2006. Taking total variable cost from the table above as constant over the years, we also attempt to calculate the gross margin per acre over the years on a separate table below.

Table 11: production and sales over the years

Years	Variety	Acreage	Production in (80kg bags)	Production Average/acre	Unit price/ bag	Sales
2008-2009	IR	135	1,260	9.3	2,500	3,150,000
2007-2008	IR	76	668	8.8	2,000	1,336,000
2006-2007	*None*	*0*	-	-	-	-
2005-2006	*Basmati*	*135*	*96*	*0.7*	*2,620*	*251,520*

For the year 2006-2007, the CBO did not manage to source funds to meet its operation cost. Therefore no rice was grown by the out-grower farmers. 2005-2006, there was a rice blast attack, resulting to negligible harvest which was consumed by the farmer or retailed individually by the farmers who manage to get any harvest.

Based on the average production estimates per acre for the two successful years, we attempt to calculate the gross margin per acre. We assume that total variable cost does not change over time.

Table 12: adjusted gross margin over the years

Years	Production Average/acre	Unit price/ bag	Sales/ acre	Less variable cost	Gross Margin
2008-2009	9.3	2,500	23250	31566	-8316
2007-2008	8.8	2,000	17600	31566	-13966
2006-2007	-	-	0	0	0
2005-2006	*0.7*	*2,620*	1834	31566	-29732

From the table above, it is clear that Munaka CBO is yet to break even.

Post harvest Handling

Post harvest losses include threshing, drying, re-bagging, storage, milling and subsequent handling, Mumbala, 2007. Care must be taken to bring the loss as low as possible by adopting improved post harvesting technologies, improved cultural practices and use of more efficient machines. The following table shows post harvest losses in South East Asia, the total loss in Bunyala will likely be closer to or surpassing the higher estimate (37%).

Table 13: ***Range of post harvest handling and processing of rice in South-East Asia***

Operation	**Percentage**
Harvesting	1 to 3
Handling	2 to 7
Threshing	2 to 6
Drying	1 to 5
Storing	2 to 6
Milling	2 to 10
Total	**10 to 37**

Source: Mambala, (2007)

Discussion

From the evidence already presented through literature, survey and field observations it is clear that the rice sector in Bunyala has potential for up lifting the lives of the local from vulnerable economic circumstances. What is also clear is that the sector performance can be improved in order to operate better. The major constrains and key issues will be now be discussed in connection to the findings above in order identify how the climate change debate at the local level could also be embedded in to the existing development nexus. Key to such embeddedness is identifying the perception and the understanding of the local population towards climate change. Based on a questionnaire filled by the farmers before a workshop on climate change and development in Bunyala contacted in January 2010, their views and opinions will be presented on a separate document attached to this baseline.

Marketing

Marketing is an essential part of the rice chain as the production cost incurred is too high and so is the labour investment. Cultural practices should be effected for reduced losses and a proper assessment of progress initiated. The choice of variety will be important for marketing as varieties like heater will have hardly any market. While Varieties like Basmati will have better prices, the variety is very susceptible to rice blast thereby risky. Collaboration among research, extension and farmers could help grow basmati variety for better returns. While IR and BW are stable varieties in relation to moderate return and reduced risk of pests and diseases, production will need to be maximized in order for the farmers to make profit with the variety.

Option for value adding i.e. marketing polished rice instead of unpolished could perhaps ensure better returns. This will need investment in to improved milling technology with minimum post harvest loss and good marketing outlet and management to ensure a steady market.

Relying on NIB as the only suitable marketing could be a cheaper option as the initial cost of searching for the market, building good will, storage and transportation cost is not incurred. On the other hand, NIB relies on National Cereals and Produce Board for marketing (an autonomous government body (NCPB)). NCPB might not give the most competitive prices but will be reliable and have build confidence with both the farmer and NIB.

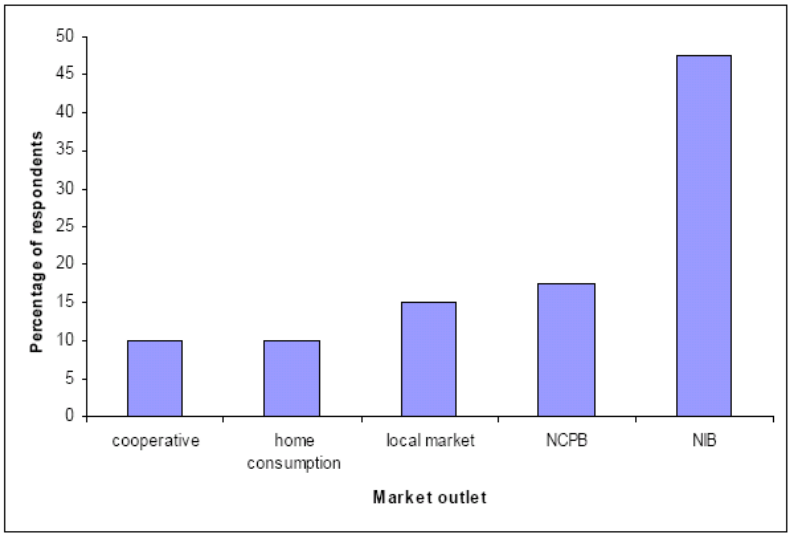


Fig 6: market outlet as mentioned by farmers of Munaka CBO expressed as a Percentage of those who sold the crop (2005-2006). Source, Mumbala, 2007.

Production Constrains and Suggestion for Improvements from the Farmers.
It appears from the response from the farmers on their perceived production constrains that financial capability is seen to be a solution from the vulnerabilities they experienced. Donor intervention is preferred perhaps for the introduction of new technologies and to help build adaptive capacity. Only few farmers were keen to suggest local solutions such as improved planting schedules, improved labour sourcing, collective action i.e. revolving fund, and crop rotation. The farmers felt that government participation was needed in availing Research institutes closer to the scheme, better regulation of pesticide quality, better extension and communication service provision, improved early warning systems as well as upgrading the irrigation station.

The farmers felt that the market could contribute by ensuring better pay and especially immediately after delivery of produce. As it were mentioned earlier, rice farmers in the scheme get most of the external inputs i.e. seeds, fertilizer and pesticides on credit through forward marketing. It is imperative in such an arrangement for the farmers to request for crop insurance. Though flooding was seen by many farmers as a production constrain, the farmers did not suggest any direct solution to the flooding problem. Finally the price of inputs in Kenya has doubled in the last 3 years. It is a problem especially when the farmers experience failed crop as it was the case during the time this survey was conducted. See annex III for a comprehensive table of the constrains and solution from the farmer.

Stakeholder engagement

As discussed earlier Bunyala is strategically positioned for improved rice production. There are several stakeholders working in the area to promote rice production in different stages and scope. A list of such stakeholders is presented by Mumbala, 2007 as follows.

Stakeholder	Function in relation to rice production
Ministry of agriculture	Projects implementer
BUCODEV	Food security and capacity building
FFS	Food security, capacity building and production techniques
Social services	Group dynamics and capacity building
KENFAP	Lobbying, advocacy and marketing for farmers
Action Aid	Food security and education
K-Rep bank	Loans farmers
CDF	Funds community projects
Ministry of youth affairs	Loans and capacity building to young farmers
World Vision	Loans and capacity building
National Irrigation Board	Provides water and maintains canals
KAPP	Trying new varieties of rice on-farm
Dominion farm	Large scale rice producer and seed merchant
SACRED Africa	Running NERICA trials in nearby Bungoma district
Kadet	A microfinance for traders

Fig. 7: Rice stakeholders and their role in Bunyala irrigation scheme. (Source, Mambala, 2007)

With the above stakeholders each performing different functionality, rice production would be expected to show positive trends but this is not the case. Efforts need to be put in place to ensure that all this group work together more often to reap the benefit of collaborated efforts.

2. Group consolidation

The desire of Munaka out-growers is to be able to grow and market their own rice at a price favourable for them. For this to be achieved, a lot of coordination and organisation will be needed. At the moment the basic structure are in place and all the legal requirements for a community based organisation are in place. The next big step will be to ensure control of the groups activities and to erect structures which will check irregularities when they occur and take appropriate action. This could be achieved with the willingness of the farmers to work together and directed external intervention to provide guidance and instituting change. Group consolidation is a prerequisite for reduced production cost and access to better markets.

3. Record Keeping

Although more than 50% of the farmers interviewed said that they kept records; it was observed during the November 2009 field visit that it was difficult for the farmers to link their daily operations and decision making to the records. There is need for training the farmers on how to interpret records and data in to actions and interventions. One aspect constraining this is the high number of illiteracy in the area especially among women farmers. A possible alternative is to ensure proper records at the group level and the decisions emanating from such data communicated to the farmers during group meeting. Such a step has a risk of having piles of data in to the groups office which is too bulky for any one to develop interest in to exploring it. A good cause of this maybe the high number of farmers of Munaka out-growers scheme, a possible control action is the development of tiers whereby documentation and decision making is clustered in to small groups which when summed translates to the entire groups' decision.

4. Production Losses

During the November 2009 field visit, it was observed that their was a lot of production loss in each stage of rice production. Much of these losses can be easily controlled but it was rather difficult for the farmers to control them. The main reason for poor management resulting to losses was; poor nursery bed management, lack of enough labour, lack of enough capital to invest in proper land preparation and band making, lack of know how and delays in planting. The Government through the NIB invest in good seed propagation and bulking, there is also a lot of research done on pest and disease, and the result of this tests is communicated to farmers through the existing governance structures. The NIB as taken the step of helping the farmers dry, weigh, package, storage and market the produce of the farmers; this post harvest steps are delicate in Bunyala given that it rains regularly in the area and the farmers don't have their own infrastructural arrangement to perform this activities by their own. The NIB post harvest site was build years ago and only targeted the tenant farmers. With expansion of rice farming in the area, the post harvest facilities are now being over stretched. To carter for increased acreage and production thereby controlling losses, new post harvest sites will have to be introduced.

'Our farms are tired', said a tenant farmer. Over the years, rice has been grown on the in-grower scheme by tenants. There has been talks to introduce upland crops to the scheme but this as not taken effect. The only time the land at the in grower scheme had remained fallow was when the operation of the NIB had come to an halt.

In the strategic planning of the Munaka outgrower scheme, not much attention is done to avoid their farms being tired. There are also general talk on introducing upland crops but practical actions are yet to take effect. But while their farms are still fertile, Munaka farmers will need to link production losses with loss on investment and profit. That link does not seem so clear in their discussions. Giving production loss a monetary value could thus help the farmers to take responsive action.

5. Time Management

Diversification is practiced by majority of the farmers whereby they are engaged in food crop production of crops such as maize, beans, cassava and millet. Some of this farmers have other occupations other than farming, some are teachers, petty traders, masons, carpenters and fishermen. With most of their children at school most of the time, it is sometime difficult to rely on family labour in juggling the various farming requirements. Hired labour is said to be expensive according to the majority of the farmers we talked to. Time allocation for high productivity is thus a big constrain to improved production especially where proper planning and scheduling is not put in place. Proper planning will ensure better preparation of task and activities for loss minimisation.

6. Finances and Meeting Operation Cost

For some reason, farmers in Bunyala think they are poorly resourced to meet their daily farming expenses. There is a perception that external intervention will help them improve their wellbeing be it from relative in the cities or from donor organisations. This perception maybe attributed to the fact that Bunyala is a famine prone area whereby each flood attracted a battery of donor institutions who in turn dished their goodies to the affected families. Consequently, the danger of playing the victim affects the farmers ability to exploit the available opportunities within his/her reach for improved wellbeing. Dependency on the NIB to provide external input such as fertilizers and also to source for market for the rice as also made the farmers less entrepreneurial. It is also said that their saving habits is poor. As a result of the above, each growing period finds the farmer group and individual farmers ill-prepared to perform harvesting on time. Currently Munaka is relying on micro-credit organisations to provide the initial cost required for the basic production cost. Any failed crop will total-amounts to debt, making it difficult for the farmers to earn a living from rice farming despite the potential. Since rice is viewed by most the farmers in Bunyala as their only cash crop it implies that most of the household expenses are also expectant of the proceeds from rice. Proper system will need to be put in place to ensure that the farmers benefit from their rice production despite the shortcoming thereof.

Planning and organisation

Grass-root adaptation mechanism will most likely involve resource pooling for shared liabilities and for the strengthening of strugling livelihood investment if small holders will have to compete in a free market. The growth of self help groups and their traslation to community based organisation could be tapped to ensure improved resilience and collective action. It is also believed that adaptation to climate change should not attempt re-inveting the wheel but should make use of existing institutional frameworks and arrangments, (Mertz, 2009). In that respect, initiatives borne of food security and poverty reduction could be induced

with climate change related attributes which can be fitted in the exising projects and intervetions for improved performance . Improved perfomance will most likely translate to increased resilience if proper management and decision making is effected. It is therefore not business as usual with climate change adaptation as the consequences of poor decision making will not wait for decades to manifest.

Small scale irrigated agriculture could be a potential opportunity for growth to farming households and likewise a potential contributor towards food security if coherance and proper group management systems is ensured. One important new element in african growth is the micro-financing as stipulated in Dambisa Moyo's book "Dead aid". By exploiting trust and solidarity that groups of farmers have amongst themselves. Micro-financing market orinriented initiatves is thereby possible, this financial intervetion done in form of loans will give the farmer increased control and less reliance on donations and external agencies. Timeliness in growing is one of the critical factor in crop production as it influnces, weeding, pest management and eventually yields. Small scale initiatives organised in Community based organisation will therefore have control over the marketing of their produce. This freedom to market their own produce could be exploited to search for a market that rewards quality and stability in pricing. Such suggestions would require proper decision making and control mechanism to ensure accountability and own self responsibility.

Finally, small scale farmers in africa are often blamed for poor saving techniques. Without such culture instilled to the farmers, the hand to mouth operation will not optimise returns as value adding and strategic-price-sourcing demands discipline from production all the way to the management of household revenue. There is therefore no delination between agronomic good practice and house hold revenue ethics if proper adaptation to future climatic impacts will have to be a success story. The group concept could take a central role in this as it has done it very well in microfinancing for the poor. A market led and supported initiative is here exploited as a potential opportunity to build resilience and banking on the group concept by small holder growers.

7. Improved Markets and Autonomy

As long as Munaka farmers can not dry, sorting, weigh, store and preserve their own rice before they can sell it, the possibility of adding value will only be restricted to the growing stage of the rice. Post harvest loss can be very de-motivating owing to the effort that the farmer has invested in to realising a better crop only for the quality to be compromised at the latter stages. Investing in efficient post harvest technologies will therefore require huge capital investment and a responsible management to ensure their proper utilisation and maintenance.

Searching for better market will require spending money and will also require waiting (holding) until the prices are better. This will require improved negotiation to be able to get the best deal in the market. Though it is the desire of the group to obtain better prices for their produce such calculations seems to fit in to the present reality of the farmers. one of the constrain as suggestion for improvement that most of the farmers suggested was prompt payment of their proceeds after delivery. This symbolises that the needs of the farmers proceeds the available alternatives to meet them. Thus waiting or holding will be difficult. Munaka community based organisation could have a fund to give the farmers an advance payment immediately after delivery and the remaining cash could wait until the rice has found good market.

Conclusion:

Must do in value creation Translated to Munaka Out-growers

Below are some of the key points of consideration for value creation adapted and summarised from attra.ncat.org

Value creation is not about what is external, what is introduced by foreigners or what is new in the market and what everyone with the capability is trying to lay hands on. On the contrary it is having a focus that you are determined to achieve drawing a possible path to get there and stepwise seeing yourself get there day after day using your little resources and re-using them and the little value obtained from consequently investing the little you have to build something meaningful

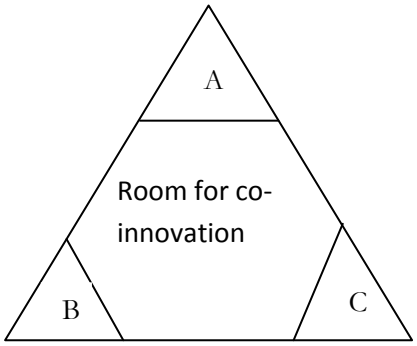
a) It is paying attention to detail and not quickly assuming or taking accepting lame and cheap justifications. It is thus investing in sufficient fact finding exercises/ operations
b) Capitalising on what you know best (specialisation), or what others might quickly dismiss or take for granted (detecting windows of opportunity).
c) Evaluating progress in consistent manner. Having a form of routine check
d) Gradual growth but strategic through re-investment and saving. At the moment saving is a problem for the out-grower farmers.

There is a need to turn Food security upside down and explore opportunities in which food insecurity could be utilized as a challenge increased market participation for increased yields and likewise quality. This study introduces food security situation in Kenya and singles out irrigated rice production in Bunyala as an avenue through which food production and food self sufficiency could be achieved. Irrigated rice farming if properly controlled and proper institutional linkages ensured could provide increased household income thereby helping improve resilience to climate related vulnerability as well as other social historic induced vulnerabilities. Institutional linkages could be increased through increased control and active planning of the farmers. A participatory rice management system is thought by many as a bridge between institutions such as extension services, research and micro-financing which when interweaved is bound to produce an entrepreneurial thinking farmer.

Group concept, operationalised in a form of community based organization (CBO) is advantageous because; of its independence to influence its transact for increased value, the availability of ranging capabilities and endowments by the group members which can be utilized for peer learning, a collective action stimulate ownership and increased individual responsibility which ultimately cumulate to improved efficiency, ease of coordination and increased value.

The role of individual farmer and the household decision making is paramount. This consequently translate to important farming decisions such as the ability to save for future uncertainties, the habit of keep record, personal evaluation and feed back, inquisitively engaging to find out what is new or improved to in order to evaluate its function and contribution to the existing framework.

The figure below summarises the three paragraphs above, by attempting to consolidate the three important institutions that are important for a successful market oriented channel development. This are; - linking (supporting institutional) arrangements, the group, and the individual farmer.



Legend:

A= Linking arrangement

B= Farmer group

C= Individual farmer

Fig XX: An ideal model to work toward insuring better market participation through improved stakeholder participation

In attempting to predict reality, this simple model argues that a shift of any of the three small triangles either inwards (diminishing) or out-wards (expanding) will affect/compromise the effective co-working towards ensuring competitiveness of the product produced under such a skewed triangulation. A need is therefore necessary to ensure reliable service delivery of all the involved parties in order for the farmer to be left with time to project, plan course of action and ensure communication with the group, master the art of improved cultural practices and cooperation with the other stakeholders. In such an ideal model, investing in trust and accountability of the involved parties production and post harvest losses for instance are transformed from agronomic text books open dialogues of the next course of action to take initiated at the heart of the rice fields (this is what is referred above as *room for co-innovation*). To initiate a journey towards such an ideal situation for out-grower farmers in Munaka, the following six points are proposed with possible recommendations alongside.

Point of discussion	**Recommendation**
Production and post harvest losses: Munaka's average production now stands at 9 bags per acre when the area's average is 30-35 bags. This is definitely running at a loss	Group exercises should be designed so that during the workshop, farmers identify production and post harvest losses and find practical intervention mechanisms (mainly cultural practices) which they could easily adjust to. They should also mention possible draw backs that might hinder them. Each group should be given an opportunity to present its findings and the other groups members should participate in pointing out grey areas and asking questions.
Self responsibility v/s group solidarity. Unlike a grant, borrowed money should be returned. This means money should be borrowed when the chance of reclaiming that money with a margin is high.	Innovativeness is needed in planning and decision making on how to invest and where to invest. Lesson learned should not be repeated without clear justification. Farmer Research is hereby advised. This is where local knowledge of say fertility assessment will need to be revisited and combined with current techniques. Projections will need to be done and independent follow up assessment instituted. This can be done in a sort of farmer field school approach whereby farmers are divided in small groups which are responsible by reporting progress in monthly meeting

	to the rest of the group and likewise members are responsible to each other.
Participatory rice management system; this approach with the good will of the major stakeholders would help everybody play his role and on time to ensure commitment for quality and improved yield	A brainstorm session should be held with all the stakeholders whereby bottlenecks, constraining factors, rivalry, misunderstandings and the need for integration could be discussed openly. This should be done in a wise manner without finger pointing for the purpose of finding the best way possible to initiate a team work spirit given the existing resource base. A table should be drawn on possible constrains, effect on production, how they can be overcome, by whom and with which mechanism, its reliability and alternative path. Later a critical path to success should be drawn by the participant ranking the most influencing aspects to value creation and attempting to see how they interweave. If possible, losses in such a critical path could be quantified.
Need base assessments: it is perhaps crazy to start thinking of introducing precision farming now to Bunyala out-growers. But a degree of precision should be attained if Munaka will have to compete in the market with giants.	Lecture on Record keeping should be given; the aim of the lecture is not to see the farmers heap volumes of data in their huts or CBO office, but to be able to read and interpreter data. The participation of the farmer could be an attempt of making a simple system that they can relate with which they can be able to track important changes, events, and decisions, loses investment, mistakes and experiments over time. Records are also useless if they cannot be accessed in the future when they are needed. It would be interesting how the farmers mix fox knowledge, and indigenous knowledge in to the classical.
A simple quality management check up system.	The last day of the seminar farmers should be able to develop a system in which they could be evaluated from. They should also decide on how it will be effected by whom and what possible 'punishment' could be instilled to 'law breakers'
A follow up assessment	To teach the participants on how to evaluate themselves, an individual exercise should be done requesting the farmers to list down the major points he/she learned from the workshop and how he instead to translate that to action on his farm. Views of the illiterate could be taken or recorded or a literate person could help them write the points down. Alternatively this could be a two people assignment whereby an illiterate person could be grouped together with a literate. Both could narrate their experiences to the other.
Climate change and variability in precipitation – effect of farming and livelihood in Bunyala	A DVD presentation by Harco Jellema and a Quiz.

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Annex 1: Comparison between arable land and population growth in Kenya

	ARABLE LAND (1000ha)	POPULATION (1000's)			ARABLE LAND HA PER CAPITA		
		1969	1979	1989	1969	1979	1989
Central	924	1,676	2,476	3,882	.55	.37	.24
Western	741	1,328	1,896	3,015	.56	.39	.25
Nyanza	1,252	2,122	2,863	4,335	.59	.44	.29
Eastern	2,692	1,907	2,756	4,261	1.41	.98	.63
Rift Valley	3,148	2,210	3,415	5,289	1.42	.92	.60
Coast	1,148	944	1,342	1,936	1.22	.86	.59
North Eastern	--	246	323	502	–	–	–
Nairobi	--	509	863	1,286	–	–	–
Kenya	9,905	10,942	15,942	24,506	.91	.62	.40

Source: Ruigu, 1988

Annex II: ***Box 1: Munaka CBO operation since the revival of the NIB***

There are two possible rice growing seasons in Bunyala one beginning in Mid February and the other beginning in September. Due to lack of fund to cover both seasons with rice production, Munaka farmers so far utilize the September season for rice growing.

In the growing period 2005 -2006 just after the resumption of NIB's activities, Munaka managed to secure a loan of Ksh. 2.5 million from K-rep to meet its production cost for the 135 acres of Munaka A and B. whereby they planted basmati rice, that year their rice crop was affected by rice blast leading to a major crop failure and consequently failure to repay the loan in the stipulated time.

The following year 2006-2007, having a huge debt due to failed crop, the group did not manage to secure any funding for rice production. In addition to this K-rep was expecting its money from them. The group managed to negotiate for an extended repayment scheme.

Still In 2007-2008, the CBO did not manage to secure funds for its entire rice field. Nonetheless they managed to obtain sufficient funds to grow rice in the 76 acres land in Nemari. With this season the farmers had a successive harvest of which they paid back approximately 23% of the K-Rep loan (Ksh. 570,000). They grew IR rice variety and managed to get 1,336 tons of rice grain.

In 2008-2009, the scheme managed to source some additional money for its production activities and managed to pay a fraction of the loan and currently 46 % remains unpaid. They grew IR rice variety and managed to get 3,150 tons of rice grain. Production during this season was done in the 135 acres rice field of Munaka A and B.

This year the group has secured a loan from Equity bank and hope with a good harvest that they are able to pay back the immediate loan and the balance of the previous one. The government initiative to boost food security is also helping in the expansion, repair and maintenance of the water canals for out-grower rice production. The future plan of Munaka CBO is to be able to cultivate the 750 acre land of which much of it is laying idle. They also intend to be able to develop their own marketing arrangement whereby they have more control in processing and value adding of their produce. They also intend to introduce upland crops in the scheme to facilitate crop rotation and thus avoid land idling and achieve reduced disease incidence.

Annex III: Production constrains and farmers suggested solutions

Production Constrains			Farmer suggested solutions to the production constrains	
Type	**N**		**Type**	**N**
[5c]Financial constrains	110		Financial assistance from donors and well-wishers	112
[5a]Water related problems	63		Better disease control applications – chemicals	21
Flooding and poor drainage	40		Timely pay after delivery of produce (to the NIB?)	21
Insufficient skills and knowledge	28		Farmers training and advisory	20
[5b]Poor production techniques	20		Research station	16
Poverty	15		Better irrigation systems	5
Research station proximity to farmers	14		Improved production techniques and product quality	4
Hailstorm			Early warning system, improved maintenance of dykes and expansion	4
Lack of market	10		Timely planting	1
Unreliable labour supply	3		Improved labour sourcing	1
Lack of supporting amenities	2		Crop insurance	1
High prices of inputs i.e. fertilizers	1		More community engagement in collective action (affirmative action?)	1
Birds and Rats	1		Better crop rotations	1
			De-silting irrigation channels	1
			establishing a revolving fund	1