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HOW VIABLE ARE COMMUNITY CEREAL BANKING SCHEMES IN THE FACE OF CLIMATE CHANGE AND FOOD PRICE DISPERSION?

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1. INTRODUCTION

The debate concerning public reserves mainly revolves around the cost effectiveness and sustainability of the practice (Newbery and Stiglitz 1981). The evidence from the grey literature suggests that there are divergent experiences across communities on the successes, failures and sustainability of cereal banking schemes (Kent 1998). For example, a food expert once noted; "when I first heard about the idea of cereal banking in the 1980s, I had expectations of high successes, widespread adoption in rural communities and positive impacts on food security and rural development. However, today, the experiences now show that the schemes are not always as successful."

However, Non-Government Organisations (NGOs), projects, governments and sub-regional organisations continue to fund cereal banking initiatives across arid and semi-arid regions of the world (Basu and Wong 2012, ECOWAS Commission 2012). In demand-driven interventions, communities also favour cereal banking schemes (Arcand et al 2010). Similarly, a study by WFP noted that 8 years after establishing a group of cereal banking schemes in Burkina Faso and Niger, more than 75% are still functional (SOS FAIM 2009).

In this section, we attempt to answer the following questions: Are cereal banking schemes viable? If they are so important for participating households, why do they sometimes fail? What are the factors required for their sustainability?

Our approach incorporates a review of the evidence from cereal banking schemes in different parts of The Gambia and profitability analyses of such schemes. Due to time and resource constraints, we were unable to carry out cross-country comparisons.

Cereal banking schemes function slightly differently in different parts of the world. The most common types in the Sahel are often initiated through a community driven process supported by NGOs, aid organisations and projects. The start-up of the schemes generally involves:

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- Planning meetings and the development of community action plans
- Construction of warehouses
- Election and training of cereal bank management committee members
- Setting up rules on mode of operations
- Seed money (starting capital)

A start-up capital or seed money is provided by the NGO to the community to buy cereals at harvest and store them. During the lean period, the stored cereals are given out as loans or sold to participating households at low prices. The loans are repaid after the next harvest, stored and given out as loans or sold during the following lean period. The cycle is repeated in subsequent years. A minimal interest is charged to pay for the operational cost of the cereal banking scheme. The accumulated interest also increases the stock of cereals in the scheme.

1.1 Comparing Social and Private Benefits and Cost of Cereal banking

Evaluating cereal banks requires consideration of both direct and indirect positive outcomes as well as the direct and indirect costs incurred when a community or a household participates in cereal banking. Direct costs or benefits are the primary positive or negative outcomes or consequences of the programme that accrue to participants involved in the programme (Lambur 2009). They are typically derived from programme objectives. Indirect costs or benefits are the secondary outcomes or consequences of the programme.

In choosing adaptation strategies, economic agents often weigh the expected benefits against the cost of adopting certain actions (Stern 2007). For example, in deciding whether to invest or not to invest in cereal banking, communities and households assess the expected benefits against the cost of implementing cereal banking. These assessments are not only limited to tangible costs and benefits but include all the expected gains and sacrifices from taking a particular set of actions.

Similar studies have all modelled the choice to adopt a scheme or a strategy from the mind-set of costs and benefits. For example both Shiferaw et al and Bhattamishra present such choices as based on the value society places on project adoption (Shiferaw et al 2014, Bhattamishra 2012). If $\mu(cb)$ is the benefit society attaches to cereal banking and $\pi(cb)$ as the cost of adopting cereal banking, the community will only choose cereal banking P(cb) if

$$\mathbf{P(cb) = \mu(cb) - \pi(cb) > 0}$$

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In such a case, P(cb) will be a latent variable which is determined mainly by the set of characteristics that determine the benefits and costs. This is similar to the set of covariates that determines selection of cereal banking in our case.

1.1.2 Overview of Cost and Benefits

Table 3 summaries some of the cost and benefits of cereal banking to communities and households.

Table 1: Cost and Benefits of Cereal Banking

Cost		Benefit	
Social cost	Private cost	Social benefit	Private benefit
Crowding out private storage and trading schemes	Operating expenses may be high. These include warehousing, labour, management and storage cost, loss of value, etc.	Reduced cost of borrowing. Reduce the credit and storage constraints in communities	Income Transfer Saved income from buying food at low prices and low interest on loans
Embezzlement by officials is possible often leading to conflicts	Savings made by households may be lost through embezzlements by officials	Reduce prices and seasonal price volatility in villages	Provide food to households at critical periods. Shortening food unavailability gap
The cost of meeting, planning, recovery by communities may be high		Enhance experience in managing other projects	Allow households to concentrate, invest in farm work and not adopt inefficient coping strategies.
	Opportunity cost of not being able to sell cereals	Enhance social network creation	Enhance savings in livelihood assets such as livestock
	Collateral systems may exclude poor households from accessing loans	Reduce migration	Enhanced forced saving
		May reduce inequality between farmers and money lenders	Loss of stored cereals due to fire outbreaks is reduced due to more secured storage
		Cereal banking can yield profits and income	

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2. BENEFITS OF CEREAL BANKING

From the information gathered through Focussed Group Discussions (FGDs), key informant interviews and expert interviews, we summarise the impacts and divers to some of the benefits of cereal banking.

- By supplying food to participating households during the critical lean period, cereal banking enhances the availability of food during the lean period. This shortens the lean period gap (June – September) and stabilizes food intake. It is also likely to impact the nutritional level of household members, especially children and women.
- By engaging in time arbitrage, cereal banking lowers prices and reduces variability in commodity prices. It also helps to relax credit constraints and shield participating households from having to buy food at high prices or taking loans at high interest rates. This impacts household's incomes and livelihood.
- When participating households have access to food, they can afford to concentrate on their own farm operations. This increased investment may lead to timely farming operations and better crop yields.
- The management of cereal banking schemes enhances the ability of communities to plan and manage similar community-based organisations. This may eventually lead to more cohesion and social capital.
- Cereal banking schemes also relax savings constraints by allowing poor households to store their excess food in more secured stores. In addition, given that they are close to communities, cereal banking schemes are often the first point of call when disasters strike. These include incidences such as bushfires. Risk of fire destroying stocks is reduced when stocks are kept in a cereal bank.
- Rural households in the Gambia spend more than 75% of their income on food (WFP 2011). By participating in cereal banking schemes, participating households enjoy an income transfer from not buying food at high market prices during the lean period. Cereals make up about 62.6% of food intake in The Gambia (FAOSTATS 2009). Per capita adult equivalent cereal consumption is estimated at 107Kgs whilst average household size is 12 (GoG 2003). Therefore, since on average cereal banking schemes provide 2 months' worth of feeding for an average household of 12 members (GoG, 2003), this indicates that this may represent 16 – 26% of household income spent on food in a year.
- The income transfer is the difference between the cost of cereals during the lean period and the cost of cereals at harvest, plus their storage cost. It is estimated that inter-seasonal prices in most rural areas can range from 50% to 300% (von Braun et al 1989, FAO 2012). Storage losses depend on the place, the way and the duration of storage vary from 5 - 10% (Ruijs et al 2002). Thus, cereal banking can give an income transfer to participating

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households of at least 6% of the income spent on food. This is consistent with our regression results in subsequent chapters.

- Cereal banking reduces use of coping strategies. To cope with the threat and impact of shocks such as rainfall and price volatility, households and communities adopt various coping strategies. These coping strategies are employed to stabilize livelihood and food security. The degree to which a shock impacts livelihoods is a function of the probability of the shock occurring, the degree to which livelihoods are exposed and household access to or stock of endowments used as alternatives or coping strategies (Boko et al, 2007). However, the extent to which coping strategies are used have different implications for livelihood stability in the short and long term (Maxwell et al 1999). Common coping strategies include;
    - Adopting high yielding or early maturing crop varieties
    - Changing from cash crop to food crop production
    - Taking loans
    - Distress selling of livestock and other assets
    - Hiring out self-labour
    - Reduce frequency, quality and quantity of food intake
    - Migration (Jaimovich 2012, Yilma et al 2014, Ruijs et al 2002, Fafchamps et al 1998, Carney 1992, von Braun and Webb 1989).

The adoption of some of these coming strategies can increase the indebtedness, deplete savings and increase vulnerability of households to shocks, especially repeated shocks (Gilbert 2012).

Subsistence agrarian households in most arid and semi-arid regions grow once in the year (during the rainy season), but have to consume throughout the year. As such, households must allocate their produce, livelihood endowments and other incomes for consumption in both harvest and lean periods.

We can represent this in a simplified framework that allows us to show seasonal consumption variability, credit and savings constraints. If

$$\boldsymbol{Y(t) = Y(h) + Y(of)} \ldots\ldots\ldots\ldots (1)$$

Where $Y(t)$ is Total Income, $Y(h)$ is Income at harvest and$Y(of)$) is off-farm income

Assuming the household only produces during the farming season and does not have any off-farm income generating activities, then $Y(of) \approx$ zero

$$\boldsymbol{Y(t) = Y(h)}$$

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Income during harvest will now have to be allocated for consumption both at harvest time and during the lean period

$\boldsymbol{Y(h) = C(h) + C(l)}$ ……. (2)

where$\boldsymbol{C(h)}$ is consumption during harvest and$\boldsymbol{C(l)}$ is lean period consumption

This implies that consumption during the lean period is funded from the excess of income at harvest $\boldsymbol{Y(h)}$over minus the consumption at harvest$\boldsymbol{C(h)}$.

$$\boldsymbol{C(l) = Y(h) - C(h)}$$

When $\boldsymbol{Y(h)}$is lower than$\boldsymbol{C(h)}$, there is a food gap that may result in acute food insecurity, peaking during the lean period.

This situation can be partly addressed by access to credit. Credit increases$\boldsymbol{Y(t)}$,which may then be used to fill the consumption gap. Cereal banking provides an opportunity to relax credit constraints faced by households in these circumstances. The timing for the disbursement of the credit also has important ramifications for production. For example, when food loans are issued during the lean period, which also coincides with the farming season, they allow poor households to concentrate on their own farm work. In the absence of such loans, poor and food insecure households may adopt inefficient and costly coping strategies such as taking loans at high interest, hiring out their own labour, etc. These coping strategies may increase the indebtedness of households and lead to low production, productivity and a vicious cycle of poverty and deprivation (Action Aid 2009).

However, where $\boldsymbol{Y(h)} > C(h)$, the household has excess income, at least during harvest. The decision then becomes what to do with this excess income during the harvest. One option is to save. In the absence of suitable warehouses, high loss due to infestation, high saving costs, or absence of institutional arrangements to promote savings, this may lead to no or low savings (Rashid and Lemma 2011). This is similar to claims that institutional arrangements provide incentives, costs and benefits and thus determine to large extent savings behaviours. Cereal banking provides an opportunity to save in kind.

Whilst some research findings suggest that there is potential for high saving losses (von Braun et al 2009, 2012, FAO 2011), it is often also argued that savings in-kind may depreciate less than savings in cash, especially during periods of high inflation (Basu and Wong, 2012, Barrett and Bhattamishra 2008). In addition, such in-kind savings hedges price volatility, acting as a cushion to food price increases.

Yet still, where $\boldsymbol{Y(of)} > 0$ and a cereal saving scheme is in place then:

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$\boldsymbol{Y(t) = Y(h) + Y(of)}$ ....., But $\boldsymbol{Y(h) = C(h) + S(h)}$

where$S(h)$ is savings during harvest.

$\boldsymbol{Y(t) = C(h) + S(h) + Y(of)}$…… (3)

$\boldsymbol{C(l) = S(h) + Y(of)}$ …… (4)

This means that consumption during the lean period is financed by savings made at harvest and income from off-farm income sources.

2.1 Price Stabilisation

The argument for and against commodity price management is guided both by the theory of price stabilisation, its welfare effects as well as the empirical experiences emanating from attempts at managing price instability. The theory of commodity price stability has been influenced by questions of; welfare effects of price stability, the demand and supply elasticity of staple foods, what is the appropriate stock level, and the cost of storage.

The theory of commodity price stabilisation is influenced by contributions of Newbery and Stieglitz, as well as Gustafson (Newbery and Stiglitz, 1981). For several decades, the dominant approach for managing food price instability has been to stabilize income without affecting prices. Direct price intervention was seen to be distortionary for resource allocation and behaviour.

However, the experience of 1973 showed that direct price control may be used as a means to correct market failures.

One of the common methods for controlling prices is through buffer stocks. In practice, this means:

- Buying foods when prices are low
- Selling or giving out on loan when prices are high

To incorporate inter-seasonal price dispersion from equation 4 above, we represent $\boldsymbol{Pl}$ and $\boldsymbol{Ph}$ as the price of food during lean and harvest periods respectively, as the inter-seasonal food price dispersion. An increase in the inter-seasonal food prices dispersion, calculated by $\boldsymbol{Pl/Ph}$, has the potential to reduce lean period consumption through lessening real incomes and cash savings.

Changes in real value of savings can be represented by the equation:

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$(\boldsymbol{S(h)} + \boldsymbol{Y(of)})^{*}\boldsymbol{Pl}/_{\boldsymbol{Ph}}$

Thus if $\boldsymbol{S(h)}$is in cash and where $\boldsymbol{Pl}/_{\boldsymbol{Ph}}$ is significantly higher than interest paid on savings, then it may pay better for savings to be made in–kind, especially when storage cost is minimal. According to von Braun et al and Action Aid, inter-seasonal food price dispersion in rural Africa can be up to 100 – 400%, which suggests higher gains from in-kind savings compared to savings in cash (von Braun et al 1989, Action Aid 2008). The above is also true for off-farm income that is used to purchase food. High food price inflation reduces off-farm income Y(of). By implication, a food price crisis deepens food insecurity. In such situations, savings in kind become even more important.

In addition, savings can either be made by households or by a community. The difference between individual savings and community savings rests in the rules and regulations on the period of savings and credit distribution. In other words, whilst private stocks may be used anytime the household prefers, in the case of collective savings, disbursements are only allowed at specific time periods. Empirically, it has been observed that households who save on their own tend to sell most of their stock even before the critical period of the hungry season, whilst for community cereal banking schemes, the rules only allow credit to be given out to members during the critical period of the hungry season or during emergencies (Action Aid 2009). The argument that a household consumes private savings earlier is also supported by empirical research on poor rural households (SOS FAIM 2009).

In addition, cereal banking schemes tend to instil a type of "forced savings in collective action" and thus encourage a high savings rate in a community (Bhattamishra 2012). This notwithstanding, one important risk of collective savings is mismanagement by committee members and potential reduction in real value of stored cereals due to poor storage when cereals are jointly stored (Kent 1998).

2.2 Estimating Profitability of Community Cereal Banking Schemes

It is important to factor all direct and indirect costs and benefits in evaluating the importance of cereal banking schemes. Such holistic assessment provides an indication of the gains and sacrifices households and communities consider in the choice of whether to participate in cereal banking schemes. Whilst most quantitative profitability models are limited to the application of quantifiable costs and benefits, the operations of cereal banking include some significant intangible cost and benefits that affect community's and household's choice to participate in cereal banking schemes (Action Aid 2008, 2009, Crola 2011, SOS FAIM 2009, FAO 2011, Bhattamishra 2012, Basu and Wong 2012, Msaki et al 2013).

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However, the financial profitability assessment is important in evaluating the sustainability of cereal banking schemes. In order to assess the profitability, it is necessary to limit this analysis to tangible cost incurred and direct benefits gained by households from participating in cereal banking schemes. Such analysis considers cereal banking as a business that must be profitable in its operations. Whilst this is used to provide information of how viable or not viable a scheme is, it may underestimate all the costs and benefits of a scheme to society. An important consideration is that of externalities. In this section, we review some of the costs and benefits that are important in the viability of cereal banking schemes. Simply put, cereal banks must be viable, profitable and increase their value of stock or business in ways that are sustainable.

Buying grain at harvest when prices are low, storing and selling or giving out loans during the hungry season when prices are high does not always generate profits in all years and at all situations (Kent 1998). The gross margin resulting from sales at high prices minus purchase price is not the only cost to factor in cereal banking operations. The profitability of cereal banking is determined by factoring all the costs of planning, developing and operating cereal banking schemes.

In Kent 1998, profit is estimated as:

$$\boldsymbol{Saleprice\ (market) - Purchasepriceatsource\ =\ grossmargin}$$

$$\boldsymbol{Grossmargin - Operatingcost\ =\ netmargin}$$

Similarly, to estimate the returns from cereal banking, we adapt a simple model by Dhuyvetter 2011, who estimates return to storage as:

$$\boldsymbol{Return(t)\ =\ Price(t) - StoragecostXweeks - Price(h)x\ (1 + Int(t)\ Xweeks \div 48)}$$

where $Return_t$ = return to storage in week t, $Price_t$ = price of the stored product at time of sale (t), Storage cost = physical storage cost, Weeks = weeks grain is stored, $Price_h$ = price of the stored product at harvest time and Int_t = interest rate at time(t).

If returns are positive, then it implies a positive gain in storing food whereas negative returns means that it makes more economic sense to sell than to store the food. In other words, a gain is realized from storage of grain only if the value of the grain when released exceeds the sum of the cost of buying and storing the food.

To provide information on some of the major costs and benefits of cereal banking, we undertook Focussed Group Discussions and Semi-Structured Interviews in 1/3 of the treated communities. The semi structured interviews were conducted with village authorities, Village Development Committee members and Cereal Banking Committee members and beneficiaries. We also

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conducted expert interviews with officials of four NGOs and two government projects that fund cereal banking schemes in The Gambia.

From the FGDs, we noted the following as the most important costs of operating a functional cereal banking scheme:

- Warehousing costs
- Labour/handling costs
- Packaging
- Insecticide/fumigants
- Transportation cost
- The costs of physical losses due to pests, rotting, theft, etc.
- Interest costs (or the opportunity cost of tying up one's resources)
- Management costs

These costs are similar to those enumerated by (Ruijs et al 2002).

2.3 Quantifying Major Costs of Cereal Banking

In estimating costs and benefits, market prices are used whenever markets are functioning well as a representation of actual willingness to pay. If markets are not functioning well, values are estimated by using the replacement cost, the avoided cost or the opportunity cost (Lambur 2009). The table below shows the different costs attributed to the management of cereal banking schemes in our Focus Group Discussion (FGD) and Key Informant Interviews (KII). These costs are averaged over the 12 cereal banking schemes visited.

Table 2: Major Cost of Cereal Banking

Item	Millet (Price in GMD per 60- 70kgs bag)	
Purchase of cereals at harvest	450	
Operating cost[1]		% operating cost
Warehouse renting for six months	10	5.26
Interest per bag	50	26.32
Storage cost (Insecticide & Fumigants)	20	10.53

[1]Costs are expressed per bag. We do not factor economies of cost with storing larger quantities of cereals. Thus, total costs are likely to be over-exaggerated. The amounts were averages from the Focus Group Discussions held in one-third of our treated villages.

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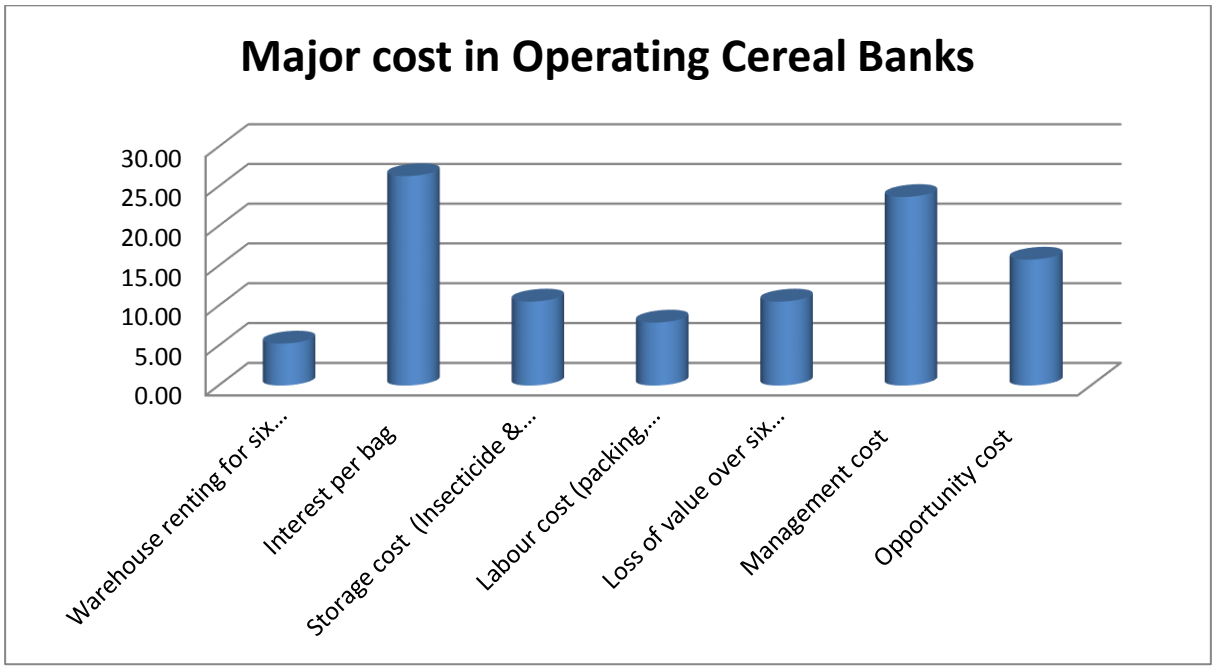
Labour cost (packing, fumigation)	15	7.89
Loss of value over six months estimated at 5%	20	10.53
Management cost	45	23.68
Opportunity cost	30	15.79
Total operating cost	190	
Total cost of cereals	640	
Selling price at lean period	900.00 – 1,200.00	
Net Profit (business motive)	260.00 – 560.00 40.6% - 87.5%	

NB: GMD (D) is Gambia's local currency (US$ = D30.00)

Table 4 show the costs expressed as a percentage of the operating cost of cereal banking schemes.

Figure 1: Major Costs of Operating Cereal Banking Schemes



Source: Author

Operating cost can be significant, ranging from 15 – 25% of the cost of cereals purchased depending on what costs are considered.

Cereals are kept in solid and specially made stores for the purpose of enabling community members to safely store their harvests. The warehouses are often built by the government and

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government projects. To estimate the cost of warehouses, we use the estimate of monthly rent paid by businessmen for the use of similar stores for similar purposes. The cost is estimated per bag of millet, which on average weighs 70kgs. Interests on loans for each bag taken by participating households are estimated by the average of interest paid for cereal banking schemes. Often this is in kind, but we estimate a monetary value. The labour cost is the cost of hiring labourers for manual jobs in the storage process. The management cost reflects minimum wages for two members of cereal banking committees. Often these are the banking agents who are responsible for the day-to-day functioning of the cereal banking schemes. The opportunity cost is calculated by using the interest rates on savings by community-based Micro Finance Institutions. Official interest rates on savings in The Gambia range from 12 – 14.6% (CBG 2011)[2]. In general interest rates are set based on the forces of supply and demand for credit. However, in rural areas, another key determinant of interest rates is the power relations between the lender and the borrower. Interest rates, especially interest on loans, in rural areas are often higher than that of urban areas as a result of low penetration of formal credit schemes in rural areas (GoG, GNAIP 2011).

Adapting the Dhuyvetter 2011model, we estimate

Return (lean period) = Price (lean period) – (Storage cost & other costs + Price at harvest (1+Int x months/12)

Returns = 900 – (190 + 450 (1+0.14*5/12))

Returns = 900 – (190 + 476.25) = D233.75 for every bag saved.

This yields a return of D233.75

Using the figures in the table above as our average, we compare the profitability of operating schemes based on their different motives. The motives or business model determines the interest rates applied. Profit margin under the different possible business models showed the following interest payable for every 70kgs of cereals acquired as loan:

[2]http://www.cbg.gm/research/statistics.html

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Table 3: Profit margins under Different Operating Models

Scheme	Profit	Interest in Quantity
Businessmen and moneylenders (63% interest)[3]	64.05%	45kgs
With only 14% interest (current practice)	-18.52%	10kgs
With 50% Interest	19.53%	35kgs
To Breakeven 22%	0.00%	15kgs

*** Estimates are based on average costs incurred by middlemen and cereal banking schemes

This implies that to make profits or be viable, cereal banking schemes cannot continue to operate as purely humanitarian entities. They must factor in all operating costs before charging interest. Cereal banking schemes have been particularly vulnerable to the inconsistent pursuit of both social and business objectives often resulting to failures (Coulter 2009, Ruijs 2002). The current practice of charging about 14% will yield losses of about 18% if all the costs are factored.

However, one must point out that most of these costs, like management, labour, and opportunity costs are not actually paid in cash. While we do suggest that these costs must be factored to enhance sustainability, the current practice of operating without payment of these costs has been sustainable in some instances.

In the Focus Group Discussion of the most successful cereal banking schemes, we found out that cereal banking schemes can lead to other gains after operating for a while. This makes sense when one considers that cereal banking schemes that operate consistently for a while generally have a tendency to be more sustainable. This is likely as a result of the learning and accumulation of wealth that occurs. A simple calculation will show that most cereal banking schemes can generate more than 2 times the value of assets they started off with by five years after their commencement.

Experience in the management of cereal banking schemes by community members enhances the ability to manage other similar projects and development schemes whilst building networks, trust and accountability. This is evident in most communities that operated cereal banking schemes for a while. In five of the sample communities, this experience enhanced their ability to attract and maintain Village Savings and Credit Associations (VISACA) (see IFAD 2011). But also

[3] Based on costs incurred by moneylenders, whilst the other cost incorporate cost incurred by cereal banking schemes

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negative indirect costs such as the cost of reducing private sector initiative, crowding out private investment and the potential for embezzlement and mismanagement by officials are possible in cereal banking schemes. In the case loans from cereal banks are issued without security or collateral, the probability that some members will not pay is high during years of poor rainfall thus leading to most cereal banking failures.

Comparing the cost of food during the lean period between communities with functional cereal banking schemes and those that do not, we observe even greater importance of cereal banking schemes. This is mainly because communities that do not operate cereal banking schemes incur other costs beside the actual price of buying cereals at lean period prices.

Cereal banking also entails some important intangible costs, benefits and externalities that may accrue to even non-participating households or communities. These include food price stabilisation effects and stability of food supplies.

2.4 The Opportunity Cost of Savings in-kind.

The argument that there is an opportunity cost for savings provides an interesting debate for respondents (Deaton 1990). For example, Kent argue that villagers usually have better things to do with their own grains which may yield better outcomes than storing them (Kent 1998). Building assets (savings) among poor households is also seen as a lost opportunity for current consumption. This means a high propensity or preference for current consumption than future interest (Deaton 1990). The argument for not saving was that one can use the cereals for other more viable profit making ventures that can yield more income. Examples include buying and selling of smaller quantities of food in weekly markets, petty trading, saving in banks or VISACAs.

In a simple experiment where we randomly select 20 household members in 5 villages, we compare respondents' willingness to save with price variability. Our respondents were head of households or their spouses. We ask the question "will you be willing to participate if prices were to change given hypothetical but possible changes in prices?" We then state the price changes and ask respondents to choose Yes/No for their willingness to participate in cereal banking or storage schemes compared to selling their produce. To avoid having individuals influence each other, we tried to separate respondents. For some respondents, we started with high prices, whilst for others we started with the low prices.

The observations show that the higher the price risk (captured in the degree of price dispersion from harvest to lean period), the greater their willingness to participate in cereal banking schemes. The responses confirm earlier research findings that the higher the risk, the more

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people may be willing to participate in risk management strategies. In other words, the anticipated returns in the risk management strategy will be higher (Cole et al 2012).

Furthermore, a disaggregation of the responses, we observe that that men were more risk averse than women. Some plausible reasons could be that:

- Given the role of primary heads of household, men are responsible for feeding the household and would prefer to take as low of a risk as possible with regards to food availability for the household,
- Women are more enterprising and displayed more confidence in their ability to obtain profit from various small businesses, and/or
- Women who were younger and coming from smaller households were less risk averse.

It would have been interesting to assess the linkage between poverty level and people's willingness to participate in cereal banking in the face of price volatility. Various literature supports the assertion that that poverty is positively correlated with risk aversion (Cole et al 2012).

In addition, cereal banking schemes take different forms in different parts of the Sahel. Warrantage (often used in French speaking countries) or Warehouse Receipt systems (WRS) is a more formal credit provision mechanism (Beer 1990, ECOWAS Commission 2012, SOS Faim, 2009, Ruijs 2002, Coulter, 2009). WRS are practiced to enable participating members to secure financial loans from a local bank backed by cereal collaterals in a store. Besides having the advantage over Warehouse Receipt Systems of being more decentralized and low-cost (Coulter, 2009, p. 25), cereal banking schemes are easier to manage and are favoured by farmers during times of high inter-seasonal price variations or food crisis.

Cereal banking schemes have also been noted for a significant failure rate. One puzzling question is thus, in the presence of all these benefits, why do some of them fail? Do communities not value and recognise these net benefits? Are the causes of the failures of some schemes related to the fact that they were poorly targeted?

It is common for safety nets that attempt to manage covariate risks such as rainfall and price volatility to be adversely affected when shocks occur recurrently. An understanding of why some of them fail will help to inform policy makers and funders of necessary interventions to minimise the occurrences of failures.

We summarise some of the main reasons for the failure of cereal banking schemes from the focus group discussion. The most common responses include:

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- Harvest failure due to poor rainfall is responsible for the discontinuity of most cereal banking schemes in The Gambia. Poor rainfall is a covariate risk and affects rural households dependent on rain-fed agriculture (Vicarelli 2011 p.2, Gilbert 2012). Since most schemes give physical food loans to members during the lean season for repayment from their subsequent harvest, a poor harvest reduces the ability for participating households to produce enough food to pay their loans. Since it affects many, including management committee members who are responsible for loan recovery, the commitment to recover the loans is reduced. If poor rainfall is recurrent, it leads to the failure of cereal banking schemes. For example out of 32 cereal banks supported by Action Aid in a district in Central River Region of The Gambia, 18 ceased to operate after the poor rainfall of 2007. However, this is not particular to cereal banking schemes as most village level credit schemes also often suffer as a result of poor rainfall and harvest. However, our observation is that the longer the schemes have been operated consistently, the lower the probability poor rainfall will cause failures. This point to the need for accompaniment for the first years of cereal banking operations to enhance learning and continuity.
- When cereal banking schemes give out loans without some sort of collaterals, this may lead to defaults and subsequent discontinuing of cereal banks (Msaki 2013).
- Often problems such as free-rider behaviour also affect the motivation and sustainability of cereal banking schemes. Cereal banking schemes are normally managed voluntarily on behalf of villages by committee members. We observe that during the first year after starting the cereal banks, there is a lot of motivation. However, since some operations require time and effort, some members often free ride and do not participate in labour demanding activities such as fumigation, meetings etc. As a result, other committee members begin to lose the incentive to voluntarily mobilise, recover loans, and implement sound storage and cost savings mechanisms on behalf of the other members (Kent 1998).
- Cereal banking is often not implemented with a profit making motive. Buying cereals above market rates and selling or giving out loans below market rates may reduce the margin or eventually lead to a loss when all costs are factored. The low margins may be an impediment to growth of the cereal bank.
- Management challenges such as chances of embezzlement, illiteracy and elite capture are also blamed for the failure of some cereal banking schemes

2.5 Strategies to sustain Cereal Banking Schemes

In most discussions, community members identified the following strategies or characteristics as responsible for the sustenance of their scheme.

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- Establishment of a collateral system for loans enhances repayment.
- Formation and functioning of a committee with set rules laid by community members or participating households.
- Targeting is an important factor when placing community development projects. Communities do not have an equal need for cereal banking schemes (Bhattamishra 2012). For example, communities that are predominantly rural and remote farming communities tend to require cereal banking schemes more than communities that are connected to the market and are in the surplus producing areas.
- Interest payment in-kind (Kgs of cereal) and not by cash, minimise the possibility of embezzlement by committee members.
- Communities that have more women in their management committees tend to do better than communities with more men in their management committees. One reason that was advanced was that women are more experienced in loan management.
- Factoring all costs in establishing prices for purchase and sale is important so that cereal banking schemes do not operate at a loss. These costs include management and storage costs.
- Other benefits of cereal banking schemes are that cereal banking is more engaging and creates active agency for farmers. It builds the capacity of rural households to manage their own food security situations. In addition, it can be an effective channel for food aid delivery during drought. However, operationalization of cereal banks requires high initial cost to erect solid storage systems, buy start-up cereals, and build member and managerial capacity, as well as monitoring during the first years of operation.

Whilst cereal banking schemes are important community institutions in enhancing food availability, they must be viable. Their operations must be profitable in such a way that all operating costs are factored before prices are set. From our estimation, this implies that for cereal banking schemes to be viable they must charge at least 22% interest, which is 8 percentage points higher than their current average interest rate.

The estimates also indicate that the operational cost of operating cereal banking schemes is higher than that of moneylenders and middlemen.

Moneylenders can make up to 63% profit from time and space arbitrage activities. This implies that there is a business opportunity for cereal banking initiatives in the grains market in the rural areas of The Gambia made possible by the high inter-seasonal price dispersion of at least 84%.

From the analysis above, we conclude that climate change and, in particular, rainfall variability pose the biggest challenges to the sustainability of cereal banking and other community-based

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safety nets. Thus, linking cereal banking schemes to other instruments, such as weather-based index insurance, may be feasible and sustainable.

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