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Analysis of Seasonality Variations and Copping Strategies among Cocoa Growers: A Case of Kyela and Rungwe Districts

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ABSTRACT

The study investigated how cocoa farmers cope with seasonality variations in Kyela and Rungwe districts in Mbeya Region Tanzania. The study had two specific objectives; to identify main buffer sources of income at times when cocoa produce go down; and to identify challenges that face cocoa growers in the study area. The study adopted a descriptive research design. Simple random sampling was used to select 224 sample population. Data was collected through questionnaire administration, in-depth discussion with key informants, focus group discussion, observation, and documentary review. Thematic data analysis was adopted to analyze qualitative data whereas simple descriptive statistical analysis was adapted to analyze quantitative data. The study identified such crops as maize, beans, groundnuts, paddy, watermelon, banana, oil palm, and cassava to be major buffer crops at times when income from cocoa go down in both districts. Off farm activities including livestock keeping, fishing, selling of forest products, and petty business also add income among farmers. Off-farm activities including food vending, selling of forestry products and petty business also play an important role in income generation among cocoa growers. The study suggests that farmers should be

encouraged to invest not only on farming rather in off-farm activities too especially because rainfall for agricultural production is no longer reliable. The government should also assist farmers to regulate prices.

Key words: Seasonality, Cocoa, Sustainable Livelihood, Rungwe, Kyela

1. INTRODUCTION

Cocoa is among crops that make an important livelihood options in Kyela and Rungwe districts. However according to Anim-Kwapong and Frimpong (2005) cocoa yields fluctuates with seasons, in some seasons cocoa yields tend to be high whereas in others they tend to be low. A study by Bushesha (2011) indicated that seasonality is an issue of concern among cocoa growers in Kyela district which is one of the study areas; this is particularly because rainfall data in kyela shows inter-seasonal and inter-annual variations. Not only that but also length of dry seasons varies between years. The major concern of this study was on how farmers, who depends mainly on cocoa for their livelihood cop in different seasons.

1.1. The Problem

Cocoa is one of the most important sources of income among its growers in Kyela and Rungwe districts (Bushesha 2011). The crop gives yields throughout the year and it can be sold throughout the year hence allowing farmers of having petty cash throughout the year (Bushesha 2011). The crop, however, is sensitive to seasonal variations in terms of yields (Anim-Kwapong and Frimpong 2005; Bushesha 2011). Variations in yields mean variations in income among its growers. This study intended to establish how farmers cope with such variations in cocoa yield. Answer sing this question has implications on peoples' livelihoods; this is key for sustainable development planning.

1.2. Research Objectives

The main objective of this study was to produce a holistic study of the examination of the seasonality copping strategies and their implications on livelihoods of cocoa farmers in Tanzania. Specifically the study intended to:

1. Identify main buffer sources of income at times when cocoa yields go down.
2. Examine implications of buffer sources of income on farmers' livelihood.
3. Identify challenges facing cocoa growers in the study area.

1.3. Research Questions

The study strives to answer one main question which is: In which ways cocoa growers buffer themselves from income fluctuations within different seasons? The study will answer the following specific questions: -

1. Which months around the year are characterised by heavy rains and which ones are characterised by drought and how these vary annually?
2. What produce are available within different seasons and how these complement sources of livelihoods?
3. What off-farm activities are perceived important for buffering at times when cocoa yield dwindles?
4. What are the implications of coping strategies on livelihoods?

1.4. Literature Review on seasonality copping strategies among small holder farmers

The term seasonality is defined as the variation that occur in different seasons and characterized by a series in which the data experiences regular and predictable changes which recur every calendar year. Any predictable change or pattern in a time series that recurs or repeats over a one-year period can be said to be seasonal (http://www.investopedia.com, 27.09.2012).

According to Devereux (2009) farming process among small holders is dependent of a hypothetical expectations among farmers that rains will timely start, adequately rain and be normally distributed; this hypothetical situation tend to be within the minds of farmers hence the courage of undertaking the different farming activities including field preparations, seed planting, weeding, and tending fields in all ways while looking forward for a bumper harvest. When this hypothetical situation fails to materialize farmers become victims of wasting resources and eventually of hunger and poverty. Communities most vulnerable to seasonality variations are rural that derive their livelihoods predominantly from farming. They cultivate food and other crops for subsistence and income (Devereux 2009).

Swift and Hamilton (2001) describe the concept of coping strategy as "a behavior or action that helps smallholders respond to seasonality by using available resources and create additional income for consumption or investment in order to adapt to environmental changes" (Swift and Hamilton 2001: 73). Where rains happen to rain inadequately or happen to be poorly distributed as a result they cause poor harvest, farmers opt to sell assets such as livestock, bicycles, to cover up the gap of income which could otherwise be generated from cultivated crops (Swift and Hamilton, 2001).

According to Below *et al.* (2010) adaptation practices to seasonality variability can be classified as follows: Farm management and technology; farm financial management; diversification on and beyond the farm; government interventions in rural infrastructure; the rural health care services, and risk reduction for the rural population; knowledge management, networks, and governance. Some known seasonality coping strategies among farmers in different areas include migration and sales of assets. Male

members or whole families migrate to nearby towns to search for work in the non-agricultural areas, mostly in the construction sector. In hard times, children are taken out of school and send to work to support the family (Devereux, 2009).

The other known coping strategy for prolonged dry seasons is delayed sowing (Devereux, 2009). This is adaptation per necessity, sowing early without irrigation would lead to crop failure. Further, changing cropping patterns is another noted adaptation strategy for seasonality variability around the world (Toulmin 2009). As the growing seasons get shorter, for example, farmers tend to be constrained to change their cropping patterns (Toulmin 2009). Where no irrigation is available, farmers have stopped growing (ibid). Indigenous knowledge also plays a significant role in early warning and weather forecast, forest and pasture conservation, soil and water conservation and disaster preparedness (Kihupi, 2000; Mhita, 2006; Kasahun Kitila Hunde, 2015).

It is not clear whether these strategies apply to small scale farmers in Tanzania. Using the case of cocoa growers this study is likely to shed light on the applicability of these afore said copping strategies to seasonality variability among small holder farmers in Tanzania. However the research is specifically focusing at explaining how and what do farmers do to supplement income at times where cocoa income dwindles due to seasonality variations.

Around the world seasonality copping strategies have been a major agenda in improving crop production to small holder farmers. With unpredictable changes in seasonality different countries in the world have adopted different strategies to help small scale farmers cope with seasonality variations. Bruns, (2004) for example reports that Indonesia spent US dollar 10 billion on irrigation to assist small holder farmers to cope with prolonged dry seasons between 1968 and 1993. As of 2004 the Indonesian government had supported 1.5 million hectares of small holder farmers in coping with prolonged drought (Bruns, 2004). IPCC advocates more intensive use of water impoundment; several useful examples are given from Indonesia, Sri Lanka, Niger, and Burkina Faso. Perm culture, water harvesting and infiltration pits, together with the use of drought tolerant crops, have been more recently extended in Zimbabwe, particularly by women in response to recurrent droughts (Stigter *et al*., 2005).

In Tanzania, use of excavated banded basins for rice farming particularly in the Lake Zone; creation of raised broad basins locally called *Vinyungu* for prolonged drought in Iringa region; and use of water storage structures locally called *Ndiva* in Kilimanjaro are some of coping strategies to seasonality. Growing high water demanding crops in the lower parts of a landscape using rainwater from the surrounding high grounds has been practiced in semi-arid areas of Tanzania (Mbilinyi *et al.,* 2005). According NAPA (2005), the existing adaptation and coping strategies for Tanzania for the agriculture sector include alternative farming systems; promotion of indigenous knowledge; change of planting dates in some agro ecological zones; increase of irrigation; drip irrigation for specific regions; growing short-season and drought tolerant crops such as sorghum and millet over maize; shifting crop farming to more appropriate agro ecological zones; changing crop rotation practices; integrated crop and pest management; make better use of climate and weather data, weather forecasts, and other management tools; create awareness on the negative effects of climate change; sustainable water management; and insist on annual and short term crops (NAPA, 2005).

Empirical evidence regarding seasonality coping strategies among cocoa growers in Tanzania is limited. The crop was first planted in Mbeya region in 1952 (URT 1988). From that time cocoa was grown in the then Tanganyika British colonial government farm estates in Kyela and Rungwe districts. In 1960, the government of Tanganyika encouraged small-holder cocoa production, such an encouragement led to expansion of small cocoa farm establishments in parts of Kyela and to a lesser extent in the lowlands of Rungwe district (URT 1988). However there no literature explaining how cocoa farmers have been copping with season variations since then. The agricultural and livestock policy of 1997 for example does not state anything concerning the seasonality copping strategies among small (cocoa) farmers despite the fact that past policies (i.e. 1983Tanzania Agricultural and Livestock Policy) recognized cocoa as an important crop for income generation among small scale holders. The 1983 Agricultural policy acknowledged that cocoa is a good small-scale foreign exchange earner (nearly $4 million in 1992) surpassing many other non-traditional exports. The policy stated that due to the importance of cocoa in the country, the government would use its extension service to promote the crop and would encourage cooperatives and the private sector to continue with the marketing of the crop (URT 1983). Therefore lack of literature in the study of cocoa cultivation and seasonality copping strategies in Tanzania has left such unanswered questions as: - To what extent are earnings from cocoa contribute to peoples' livelihoods in the study area? How such earnings vary with seasons? What options are there for farmers at times when cocoa produce does not satisfy needs? The study was therefore undertake to answer these questions.

2. METHODOLOGY

The Study Area

Kyela (Figure 1) and Rungwe (Figure 2) districts were selected basing on the fact that they are the major cocoa growing districts in the country (URT 1982). Kyela district lies between 9º 25º and 9º 40º latitudes south of Equator and 35º 41º and 30º longitudes east of Greenwich meridian. The district borders Makete and Ludewa districts to the east, Ileje district to the west, and Rungwe district to the north. The district also borders Lake Nyasa and the Republic of Malawi to the south. The district has an area of 1322 km^2 (132,200 ha). The district receives rains of about 2000 - 3000mm per annum. The main rainy season is between November and June, with the heaviest rainfalls usually occurring in April and May (Bushesha 2011). The district has a warm and humid climate, with mean daily temperature of 23ºC. The natural vegetation is of tropical savannah forest and grass, with lagoon vegetation on swamps and rivers mouths. Agriculture is the main economic activity in the strict. Production of food and cash crops account for 79.3% of employment and 88% of the district's Gross Domestic Product.

Rungwe District is located between $80^{0}30'$ and $9^{0}30'$ latitudes South and 33^{0} and 34^{0} longitudes East. The District borders Kyela district to the South, Ileje district to the West, Makete district to the East and Mbeya district to the North. The district is mountainous and it experiences average rainfall ranging from 900mm and 2,700mm. Temperatures are moderate ranging from $18^{o}C$ - $25^{0}C$ all year round. Agriculture is the mainstay of Rungwe District economy (Rungwe *DADP Draft 2012-13*).

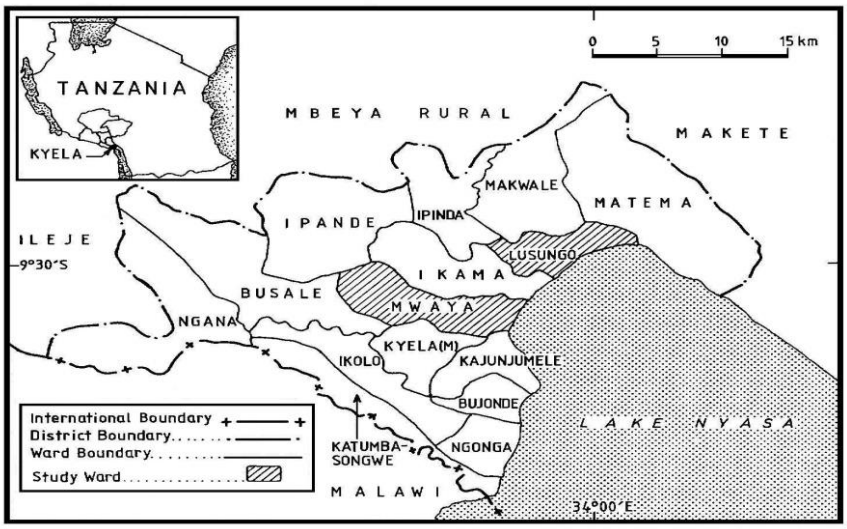

Figure 1
Kyela district
Source: Department of Geography University of Dar-es-salaam (2013)

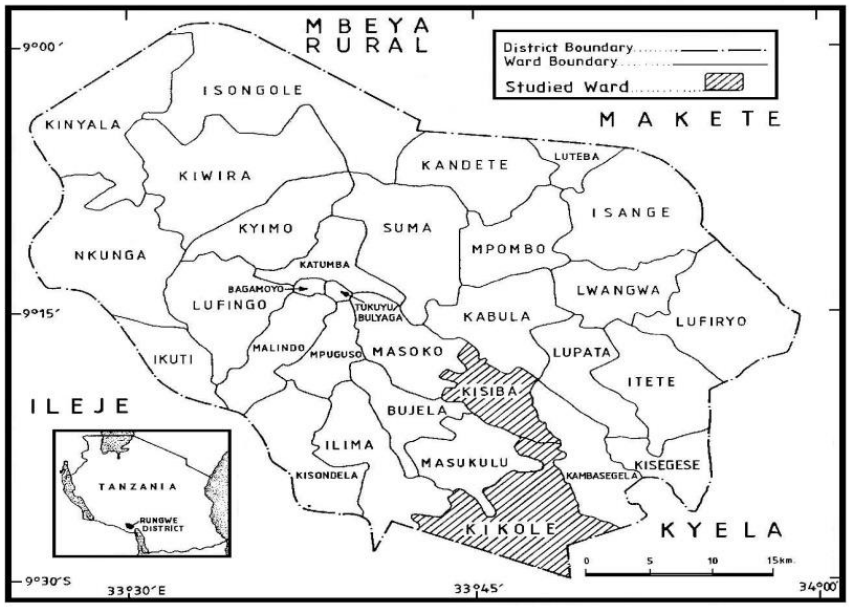

Figure 2
Rungwe District
Source: Department of Geography university of Dar-es-salaam (2013)

The Research Design

This study applied a descriptive research design. Hence the adoption of such data collection techniques as focus groups and interviews; these approaches allows for probing through asking follow-up questions so as to get the in-depth information for depth description of events (Silverman 2005). A questionnaire was administered to generate descriptive statistical data. The use of more than one set of data sources allowed data triangulation.

Sample Size and Sampling Procedures

In Kyela district the study was conducted in two wards namely Mwaya and Lusungo. The total number of households in two wards were 3938 and a sample of 114 households was randomly selected. In Rungwe District the study was conducted Kisiba and Kikole wards. The two wards had a total of 2337 households and a sample of 110 households was randomly selected for the study. Key informers for in-depth interviews were selected purposively where by former and current cocoa growers were interviewed.

Data Collection and analysis

The study employed multiple survey data collection techniques including documentary review which included instrumental records of rainfall and temperature, interviews with key informants, questionnaire administration, and Focus Groups Discussions (FGDs). Qualitative data was thematically analyzed. According to Robson (2002) thematic data analysis is one of the most common approaches to data analysis in qualitative research. As recommended by Ryan and Bernard (2003), repetitions, indigenous typologies, metaphors, similarities and differences, and linguistic connectors, were key issues which were observed when searching for themes. The researcher then described these themes and subthemes, critically interpreted them and finally made recommendations. Simple descriptive statistical analysis was used to analyse quantitative data.

3. FINDINGS AND DISCUSSION

Respondents Characteristics

Out of 224 respondents 193 were male and only 31 were females (Figure 3). Further majority of the respondents were aged 36-45 years old, followed by respondents aged 46-55, above 55, 26-35 and 16-25years respectively (Table 1).

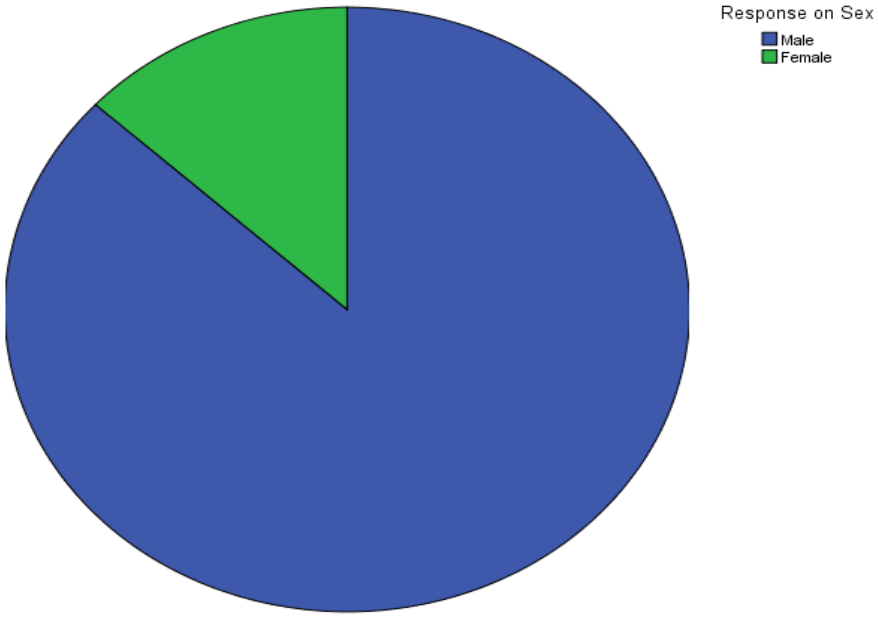

Figure 3

Pie chart showing percentage between males and females

Table1

Age Characteristics of respondents

Age group	No of respondents
16 - 25	13
26 - 35	45
36 - 45	74
46 - 55	48
Above 55	44
Total	224

Source: Field data 2013

Main buffer sources of income at times when cocoa produce go down

Buffer income from crops other than cocoa

In Kyela district cocoa harvests and sells are poor during dry season (Figure 4); during this season buffer crops include paddy, cassava, banana, beans, ground nuts, sweet potatoes, and water melon (Table 2). In Rungwe district during wet season where cocoa is not available in abundant (figure 5) buffer crops include beans, banana, corn and cassava (Table 2).

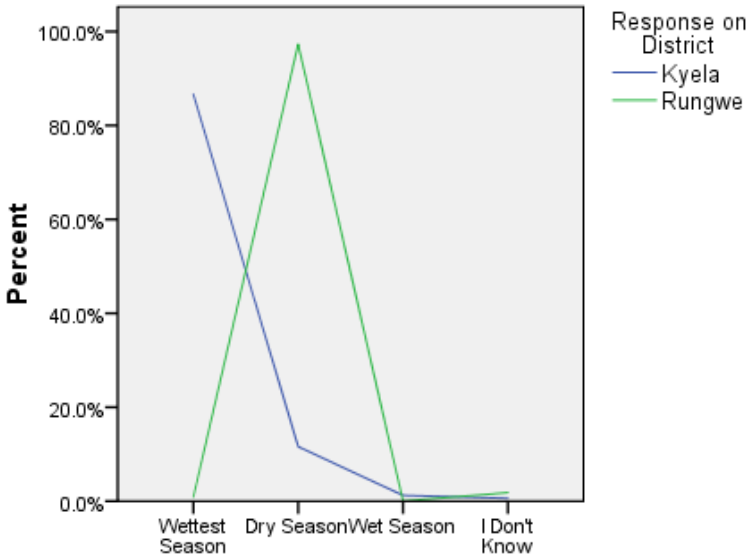

Figure 4

High and low seasons for harvesting and selling cocoa

Table 2

Buffer crops at times when cocoa is not available in abundance (respondents could tick more than one option)

Buffer crops	Kyela n=164		Rungwe n=110	
	Frequency	%	Frequency	%
Banana	81	49.4	68	61.8
beans	32	19.5	26	23.6
cassava	58	35.4	16	14.5
groundnuts	27	16.5	0	00
Sweet potatoes	44	26.8	0	00
Watermelon	8	4.9	0	00

Source: Field data 2013

Crops as groundnuts, watermelon and sweet potatoes are not grown in large quantities as cocoa and paddy in the study areas Table 3 However farmers were of the opinion that these crops make good buffer at times where cocoa harvests go down. A farmer from Kyela made a comment as follows:

"I have few acres ...about three...I grow a mix of crops .... Groundnuts and sweet potatoes...they supplement the income from cocoa especially in August say up to October, without these I would be in trouble"

Table 3

Crops grown in the study area

Crops Grown in the study are	Kyela n=114		Rungwe n=110	
	Frequency	%	Frequency	%
Cocoa	92	80.7	99	90

Paddy	106	92.9	61	55.5
Banana	80	70.1	88	80
Cassava	47	41.2	62	56.4
Round potatoes	00	00	47	42.7
Coffee	00	00	09	8.2
Corn	63	55.3	38	34.5
Beans	86	75.4	42	38.2
Groundnuts	61	53.5	18	16.4
Njugu mawe	28	24.6	11	10
Sweet potatoes	57	50	04	3.6
Palm oil	79	69.3	02	1.8
Watermelon	69	60.5	00	00

Source: Field data 2013

Watermelon is a newly introduced cash crop in Rungwe district; only few farmers grow the crop (Table 3). But according to FGD members in Rungwe, the number of farmers who grow watermelons is increasing day after day.

Buffer income from Livestock Keeping

Cocoa farmers keep livestock to generate income. Animals kept include pigs, goats and dairy cattle. Farmers also keep birds such as chickens and ducks. Table 4 presents types of livestock kept to subsidize income from cocoa and other crops.

Table 4

Livestock kept for subsiding income from crops

Livestock kept	Kyela		Rungwe	
	Frequency	%	Frequency	%
Cattle	36	31.6	22	19.3
Goats	12	10.5	08	7
Pigs	17	14.9	15	13
Chicken	49	43	32	28
Ducks	09	7.9	03	2.6

Source: Field data 2013

Buffer income from fishing

Fishing is another source of buffer income in the study area. In Kyela district fishing is mainly practiced in Lake Nyasa while in Rungwe district farmers have their own fish ponds, very few individuals have fish ponds in Kyela (Table 5).

Table 5

Households with fish ponds

	Kyela		Rungwe	
Do you have a fish pond?	No of respondents	%	No of respondents	%
Yes	03	2.6	22	20
No	111	97.4	88	80
Total	114	100	110	100

Source: field data 2013

Selling forestry products

Selling of forestry products makes another source of buffer income for cocoa farmers in the study area; this includes selling charcoal, furniture fire wood, honey and timber (Table 6).

Table 6
Forest products sold for income generation

Products	Kyela		Rungwe	
	Frequency	%	Frequency	%
Charcoal	11	9.7	07	6.4
Furniture	07	6.1	03	2.7
Firewood	11	9.7	08	7.3
Timber	09	7.9	07	6.4
Honey	04	3.5	09	8.2

Source: Field data 2013

Because of cutting trees without replanting, the supply of wood is decreasing, and people have to walk further and further to obtain firewood as one of the farmers from Rungwe commented:
"Nowadays we really walk and walk far far far to get wood. Timber product is not good nowadays because of transport costs wood is found far to the interior of the forest".

Petty Trade
Selling of brown sugar by street vendors is the major trade between Kyela and Malawians. In Rungwe trading is not as popular as in Kyela. Farmers also engage in other small business activities as food vending such as frying banana, fish, chicken and cassava, retail shops, bars and restaurants. Table 7 presents types of petty business that some farmers engage in as part of subsidizing income from farming activities.

Table 7
Petty business in the study area

Business	Kyela		Rungwe	
	Frequency	%	Frequency	**%**
Sugar vending	16	14	5	4.6
Food vending	12	10.5	7	6.4
Retail shop	4	3.5	3	2.7
Restaurant	2	1.8	3	2.7
Bar	2	1.8	1	0.9

Source: Field data 2013

Although trade is significantly done in the study areas, there is the need to follow up which products do better in the market and how. That will help to promote such products in order to improve farmers' income status in the study areas.

Non Seasons bottlenecks facing cocoa growers in the study area
Market, lower prices, delayed payments, land shortage, transportation, pests and diseases and Monkeys
Market is a challenge for cocoa farmers. Farmers were asked to identify their most liable buyers of cocoa; most of them indicated that small vendors famously known as njemke are the most liable buyers of cocoa in both Kyela and Rungwe districts (Table 8).

Table 8
Most reliable cocoa buyers

Buyers	Kyela		Rungwe	
	No of respondents	%	No of Respondents	%
Small vendors	104	91.2	93	84.5
Cooperative unions	3	2.6	5	4.5
Industrial producers	5	4.4	6	5.5
Fellow farmers	2	1.8	6	5.5
Total	114	100	110	100

Source: Field data (2013)

Most farmers identified that the problem with small vendors is that they use exploitative containers to measure cocoa beans. They use plastic containers that have been warmed hence enlarged in size such that they take more than meant amount of cocoa beans (Table 9).

Table 9
Small vendors' means of measuring cocoa

Measurement	Kyela		Rungwe	
	Frequency	%	Frequency	%
Exploitative containers	98	86	88	80
Weighing Machine	16	14	12	11
Sacks	34	30	26	24

Source: Field data 2013

A respondent from Kyela made a comment that indicates the extent to which farmers perceive that middle men exploit them; the comment is in line with findings on table 7.
"….the Njemke are not that much good buyers because they play with our minds…they measure using buckets meant for 10kgs or small tins meant for 3kgs famously known as *"vilita"*. But they deform these containers so that they can take more cocoa but we can do nothing, they are our common buyers of cocoa her…"

Cocoa price is another problem for cocoa growers in the study area. Table 10 shows that over 85% of respondents in Kyela and over 83% of respondents in Rungwe indicated that prices are at a lower side. Likewise over 78.1% and over 76% of respondents in Kyela and Rungwe respectively indicated that there is a delay in payments. The data further shows that buyers pay less than agreed.

Table 10
Bottlenecks in cocoa production

Bottlenecks	Kyela		Rungwe	
	Frequency	%	Frequency	%
Lower price	97	85.1	92	83.6
Delayed payments	89	78.1	84	76.4
Less pays than agreed	58	50.8	57	51.8
Land shortage	65	57	79	71.8
Pests and diseases	45	39.5	46	41.8
Transportation	84	73.6	89	80.9
monkeys	48	42.1	08	7.3

From table 10 it can be noted that farmers were of the opinion that land for cocoa cultivation is limited. Table 11 also shows that sizes of cocoa farms per household range from 0.5ha to 6 ha only. During Focus group discussion in Kyela it was learnt that there is suitable land for cocoa growing but far away from homesteads, farmers avoid such land for security reasons. Table 11 shows that in both Kyela and Rubgwe people aged between 36-45 years own large cocoa farms than the rest of the age groups whereas age group 16 to 25 do own the least.

Table 11
Age groups against cocoa farm sizes in the study area

Age Group	Farm Sizes (acres)			
	0 – 5		6 – 10	
	Kyela	Rungwe	Kyela	Rungwe
16 – 25	12	07	0	6
26 – 35	3	11	2	4
36 – 45	57	38	4	11
46 – 55	21	16	2	7
Above 55	12	4	1	6

Source: Field data (2012)

Table 10 indicates that 73.6% and 80.9% of respondents in Kyela and Rungwe respectively were of the opinion that transportation is a problem to cocoa farmers. Through observation it was noted that, in Kyela, villages with poor road network includes Lusungo, Kikuba, Kikole, Mperangwasi, and Mpakani. In such villages buyers also have not established sales centers hence cocoa farmers have to transport their produce to nearby villages where they can find sales centers. In such villages famers use motorcycles and bicycles as cheap means of transport to access market places. Otherwise farmers walk up to more than 10km to access markets.

4. CONCLUSION AND RECOMMENDATIONS

The study set out to identify main buffer sources of income at times when cocoa produce go down; and to identify challenges facing cocoa growers in the study area. The study has shown that the main buffer sources of income at times where income from cocoa goes down include income from selling crops other than cocoa including paddy, sweet potatoes, ground nuts, beans and watermelon. The study has also identified such off- farm activities as petty business, livestock keeping, fishing and selling of forestry products to be important sources of income buffering farmers when income from cocoa is not sufficient.

This study concludes that there is a number of copping strategies that farmers can adopt and get away with the impact of cocoa yield variations with seasons. Farmers need to be encouraged to grow such crops as cassava, irrigated paddy, water melon, oil palm, and banana as these can make good buffer income at times when yields from cocoa declines. But also off farm activities such as petty business has been found to play an important role in terms of income generations in the study areas. Therefore farmers need to be educated on business management to increase income through petty business. Livestock keeping, professional careers and talents activities persuaded as well as fishing, all acts as income buffering activities to cocoa producers in Kyela and Rungwe district; all these need to be promoted. Adding value to farm produce may also promote income in the study area. Hence farmers should be encouraged to sell dried cocoa for example as well as to process most farm produce instead of selling them raw.

The study also concludes that there are a number of challenges facing cocoa growers that different stakeholders need to address. One of the challenges is land shortage. Farmers need support especially in terms of increasing productivity per area since land is not enough. Further, farmers need to be assisted to search for reliable markets for these buffer crops. The government should also find ways to regulate cocoa price.

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