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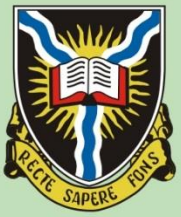

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ACRONYMS/ABBREVIATIONS

BEST-EAC	Beans Enterprises & Structured Trade in the East Africa Community
CARI	Competitive African Rice Initiative
CESDEV	Centre for Sustainable Development
EAC	East African Community
FAO	United Nations Food and Agricultural Organization
FGD	Focus Group Discussion
GAP	Good Agricultural Practices
GDP	Gross Domestic Products
GPS	Global Positioning System
IFAD	International Food and Agricultural Development
IMF	International Monetary Fund
MATI	Ministry of Agricultural Training Institute
MDP	Master's in Development Practice
MT	Metric Tonnes
PHH	Post-Harvest Handling
PRS	Poverty Reduction Strategy
PSDS	Private Sector Development Strategy
RCV	Randomization Control Variable
REACTS	Regional East African Community Trade in Staples
RGL	Raphael Group Limited
SHIRCO	Southern Highland Rice Consortium
SME	Small and Medium Enterprises
SWOT	Strength, Weakness, Opportunity and Threat
UNDESA	United Nations Department for Economic and Statistics Agency
USD	United States Dollars
USAID	United State Agency for International Development
WEF	World Economic Forum
WFP	World Food Programme
WHS	Warehousing System

ABSTRACT

This study assessed the effectiveness of consortium approach to food value chain development on productivity and income of smallholder farmers vis-à-vis conventional approaches in Tanzania, East African Community. The study was conducted in Mbarali district in Mbeya region, covering smallholder paddy farmers and partners in the Southern Highland Rice Consortium (SHIRCO) under the Competitive African Rice Initiative (CARI) project. The study adopted survey methods, employing multistage purposive cluster sampling techniques to select 155 smallholder farmers and 17 key informants. Data were collected using open-ended questionnaires, key informant interview and focus group discussion guides and documentation review. SPSS IBM 20 and Excel spreadsheet were used to analyse the data. Descriptive (frequencies, percentage, means, and standard deviation) and inferential statistics (t-test) as well as cost-benefit analysis and SWOT analysis were employed.

Results revealed that mean farm size before and after the consortium were 1.36ha and 1.44ha respectively. The minimum and maximum outputs recorded by farmers before the consortium were 0.60MT on 0.20ha (5 bags per 0.5 acres) and 26.40MT on 8.90ha (220 bags on 22 acres) respectively, with mean harvest per hectare of 3.46MT (28.83 bags) at 1.21MT standard deviation. After the consortium, outputs ranged from minimum of 1.56MT on 0.40ha (13 bags per acre) to maximum of 79.20MT on 8.9ha (660 bags on 22 acres) with mean harvest per hectare of 7.20MT (60 bags) at standard deviation of 1.71MT. Mean harvest for male farmers before and after were 3.41MT/ha and 6.83MT/ha respectively. Female farmers realised 3.39MT/ha and

7.29MT/ha before and after the consortium. Yield increased by 749.98MT on 211.55ha, representing 104.08% above outputs recorded before the consortium. Mean revenue per acre realised by farmers before and after the consortium were US$443.35 and US$1160.49 respectively. Mean gross margins per acre before and after the consortium were US$228.09 and US$762.19 respectively, indicating strong significance of P<0.0000** (P<0.05).

Climatic change condition, especially drought, delay in loan processing and disbursement, delay in input supply, lack of gender-friendly labour-saving technology were major constraints that farmers faced. The study concludes that consortium approach has improved the production outputs, productivity and income of smallholder paddy farmers. The approach has the capacity for scalability and replication and potentials for sustainability.

Key Words: Smallholder farmers, Value chain, Consortium Approach, Productivity, Income.

1. INTRODUCTION

1.1 Background of the Study

This monograph articulates the results of the study conducted on the effectiveness of consortium approach to food value chain development on productivity and income of smallholder farmers of Southern Highland Rice Consortium under the Competitive Africa Rice Initiative (CARI) project in Mbarali district of Mbeya region in Tanzania. The research focuses on key areas of: (1) effectiveness of consortium approaches in increasing productivity and income of smallholder farmers; (2) critical success factors of consortium approach for sustainability; (3) strengths, weaknesses, opportunities, threats of the approach, as well as (4) lessons learnt for scalability of the approach. The various aspects of the approach, involving the phases of activities required to produce paddy and move it to market were considered with the aim of assessing the impacts on productivity and income of smallholder farmers in the consortium. Several value chain approaches have been adopted in addressing the underlying challenges of low productivity and income of smallholder farmers in East African Community (EAC), including Tanzania, with varying outcomes. The approaches operated were designed to solve problems in one or more phases in the chain and not the entire chain. Thus, the methods in question work in isolation and find it hard to get buy-in of all actors, making them less inclusive and sustainable.

Included in the evidence-based study are recommendations and policy prescriptions for value chain strengthening, adaptability, and scalability of consortium approach to food value chain development in Tanzania, the EAC, and Africa,

to boost agriculture by enhancing smallholder farmers' productivity and income. The East African Community (EAC) is a regional intergovernmental organization of six partner states made up of Kenya, Tanzania, Uganda, Rwanda, Burundi and South Sudan with headquarters in Arusha, Tanzania.

Majority of the over 2.5 billion people in these developing countries are involved in full or part-time smallholder agriculture, managing an estimated 500 million small farms, earning less than US$2 daily, thereby living in extreme poverty. Most smallholder farmers are constrained by low productivity and low income which make them unable to feed adequately throughout the year; and vulnerable to shocks, stress and poverty. Smallholder farmers dominate the agricultural sector of the EAC, occupying the majority of the land and producing most of the crops and livestock. Agriculture is an important driver and enabler of the economic development of the EAC. As one of the most important sectors, agriculture accounts for about 80% of the workforce, involving smallholder farmers in rural areas for their livelihoods. In spite of this, the EAC, with a population of 185 million in mid-2017, is characterised by low agricultural productivity and income, thus rated among the poorest in the world. In the region, the key long-standing challenges of smallholder farmers' low productivity arise from poor access to farm inputs and lack of access to markets, credit and technology, compounded by volatile food and energy prices (EAC Vision 2050, 2016). Approximately 60% of the EAC's 2016 population of 150 million live below poverty line while 46.36 million (Kenya 36.08%, Tanzania 25.19%, Uganda 15.81%, Burundi 13.75%, Rwanda 9.17%) of the EAC's poor live in rural areas,

majority of whom are smallholder farmers (State of East Africa Report, 2016). Rural-urban migration combined with population growth is resulting in increased demand for food of 5% to 10% per annum and this will be the key driver for development of a market-oriented agricultural sector in the EAC. The growing population and urbanization, concomitant with high poverty rates, as well as vagaries weather, pose serious challenges. The EAC's vision 2050 commits to achieve 270 million metric tonnes of food production and 10% contribution of agriculture to GDP as well as reduce under-five child stunting from 14.8% to 0.3%. This creates the need to adopt innovative approach to value chain development to address low agricultural productivity and income; reduce poverty as well as delink challenges confronting the food subsector.

In Tanzania, agriculture accounts for more than a quarter of the GDP, employing 80% of the workforce and providing 85% of the country's exports. 34% of the women and 37% of the men own land alone or jointly (DHS and MIS, 2015-16), yet the country is one of the world's poorest. Agriculture is dominated by smallholders and four-fifth of the population depends on subsistence agriculture. A large percentage of the population, 67.7%, lives in rural and semi-rural areas (WEF and WFP, 2016). While poverty rate has declined from 60% in 2007 to an estimated 47% in 2016, based on US$1.90 per day, global poverty line, the absolute number of the poor, has not changed, given the fast pace of its population growth at over 3% per annum. Farming is predominantly rain-fed with traditional farming techniques, making smallholders vulnerable to climatic, economic and seasonal shocks, and invariably poverty. Smallholders are constrained by limitations of subsistence farming practice

that leave them vulnerable to climate change, low knowledge of good agricultural practices (GAP), poor access to efficient market and lack of access to finance, biological, agrochemical and mechanical inputs, which often result in low productivity and income.

Agriculture offers a way out of poverty, but to maximize its potential, smallholders need to be integrated into agriculture value chain that is built on win-win partnership rather than a zero-sum game. The constraints smallholders face can be addressed through partnership with other actors involved in the different phases required to bring commodity from production to end-use. Value chain approach is a viable vehicle for linking smallholders with market and it improves productivity and income. It is also an instrument for pro-poor initiatives.

1.2 Study Objectives

The broad objective of the study is to analyse the contribution of consortium approach in the improvement of productivity and income of smallholder farmers in rice value chain under the Competitive African Rice Initiative (CARI) project in Tanzania. The specific objectives of the study were:

1. To determine the effectiveness of the consortium approach vis-à-vis conventional approach on productivity and income of smallholder farmers.
2. To determine the critical success factors for sustainability of consortium approach.
3. To investigate the strengths, weaknesses, opportunities and threats of consortium approach.

1.3 Value Chain Approach in Agriculture

The multipronged challenges facing the agricultural sector reinvigorated the need for innovative approaches to tap the potentials of the sector by addressing its underlying challenges. Miller and Jones (2010) assert that the future of farmers, traders and agribusinesses in the food or agro-industrial chain and the level of finance, whether loan or investment, that could be attracted depend upon their ability to compete in the marketplace and/or to adapt to markets in which they can compete. The agricultural sector is a global marketplace driven by competitiveness which demands certain levels of efficiency and productivity. Likewise, success depends on the collective competitiveness of everyone involved in the particular value chain. Their study describes value chain as the full range of activities and participants involved in moving agricultural products from inputs suppliers to farmers' field and ultimately, to consumers' table. For FAO (2015), value chain is the range of activities required to move a commodity from the first point of production to the last point of consumption. A working definition of value chain offered by this study entails 'the interconnected activities and actors involved in the various phases of production, including underlying support services required to produce and move a product from producer to end-user.

Value chain approaches vary mainly in their focus on specific products or target markets, in the activity that is emphasized, and in the way they have been applied (Webber and Labaste 2010). In the EAC, not many value chain approaches employ collaborative model, and documented studies on impacts of collaborative value chain approach on productivity and income of smallholder

farmers are not widespread. This study fills the gap by assessing the consortium approach to food value chain development on productivity and income of smallholders in Tanzania vis-à-vis conventional approaches.

1.3.1 Forms of Value Chain Approaches in Agribusiness

Value chain approaches such as productive chains, value chains, filières, clusters, marketing chains, supply chains or distribution chains have been applied in agricultural sector to address challenges of low productivity and income confronting smallholder farmers. The French Filière Approach to value chain development describes the flow of physical inputs and services in the production of final products of goods and services with concern on quantitative technical relationships. The approach started by studying contract farming and vertical integration in French agriculture in the 1960s and was later applied to analysis of developing country agriculture to achieve French Agricultural Policy in developing selected export commodities in rubber, cotton, cocoa and coffee. Transaction cost management was not given due attention until 1980s, when international trade and processing was incorporated in the approach. Following the negative consequences of market liberalization in developing countries, regulatory, transaction cost, trade and market dimensions were incorporated into the approach (Raikes, et al 2000 and Kaplinsky and Morris 2002). The constraint of the approach was the inability to integrate smallholder farmers into the value chain in a manner that builds local capacity to sustainably develop agribusiness rather than servicing supply needs of the French interventionist policy of source of raw material for its industries.

Cluster-based approach to value chain development is a collection or networks of production populated by strongly interdependent firms (including specialized suppliers) within a value-adding production chain as well as service providers and associated institutions in a particular field (Theus and Zeng, 2012). The approach is built on the thinking that individual firms face constraints within the sector they operate and the solution to it requires the inputs of other firms in the sector. It holds that the firm alone cannot address the challenges. The approach is an industry-based one which focuses on geographic concentration of interconnected companies and their interactions. It views collaboration between cluster members as the source of resolutions of common problem. Based on the geographic focus of the approach, cluster approach does not always focus on the entire value chain, but on core and supporting companies in specific locations (USAID, 2008).

1.4 Consortium Approach to Food Value Chain Development

Consortium approach is a collaborative approach to agribusiness value chain development built on a win-win partnership that focuses on closing gaps of low productivity and income of smallholder farmers. The approach catalyses private sector investment, involving all actors and ensuring smallholders are integrated into the value chain in a manner to enhance their capacity building in good agricultural practices, improve their access to inputs, credit and market for their commodity. The approach is holistic, providing intervention on the entire value chain, involving key actors **-** smallholders (producer), input suppliers, lead firm (buyer/processor) and service providers (banks, marketing, training and research institutions) in value chain

development. Kilimo Trust adopts Consortium Approach to Value Chain Development (CAVCD) in implementing its agribusiness projects; the Competitive African Rice Initiative (CARI) project in Tanzania and Regional East African Community Trades in Staple (REACTS) project in Tanzania, Uganda, Kenya and Rwanda in East African Community.

> *"Consortium approach is the road and the projects travel on the road. The model pushes for private sector ownership".*
>
> *"Consortium approach is the road that is laid up by Kilimo Trust and all the projects travel on the road. The projects use the approach to achieve their objectives".*
>
> Prof. Nuhu Hatibu, CEO Kilimo Trust

1.4.1 Southern Highland Rice Consortium (SHIRCO)

The study population includes farmers in SHIRCO consortium, a rice value chain of smallholders and partners in the Southern Highland of Tanzania (SHT). The consortium is made up of smallholder farmers, lead firm (Raphael Group Limited), input suppliers (improved seeds - Agriseeds Tech. Ltd; fertilizer - Yara Technology; pesticides/herbicides - Obo Investment Co. Ltd) and support service providers (training and research - Ministry of Agriculture Training Institute; bank - National Microfinance Bank and marketing firm - Khebandza Marketing Co.). The consortium was organized by Kilimo Trust Limited under the CARI project. The SHT refers to region covering provinces of Iringa, Mbeya, Rukwa and Ruvuma. Agriculture accounts for over 75% of the people's occupation.

Box 1*:* Five Steps to Form Consortia

Step 1:

- ☑ Open Invitation to agribusiness firms and FBOs to express interest to forming consortia
- ☑ Intensive due diligence and selections of promising firms and FBOs

Step 2:TA and BDS to enable firms and FBOs to negotiate and agree on partnership and shared vision of success – i.e. putting the consortia backbone in place.

Step 3:

- ☑ Each consortium backbone then identifies critical constraints to capturing and competing in the identified market, so as to deliver their VoS.
- ☑ They then determine which partners from the inputs and services sub-sector they should invite to their consortium.

With support from KT Team the two parties, then identify, profile, assess, select the most suitable suppliers of inputs and other services, to join their Consortium.

Step *5*: All the willing partners negotiate, develop and sign/approve:

- ☑ A Memorandum of Understanding (MoU), stipulating roles and responsibilities; and
- ☑ A sub-project to deal with the most binding constraints – to be supported by the project through matching grants funding.

About the Consortium Approach: Distinguishing Attributes

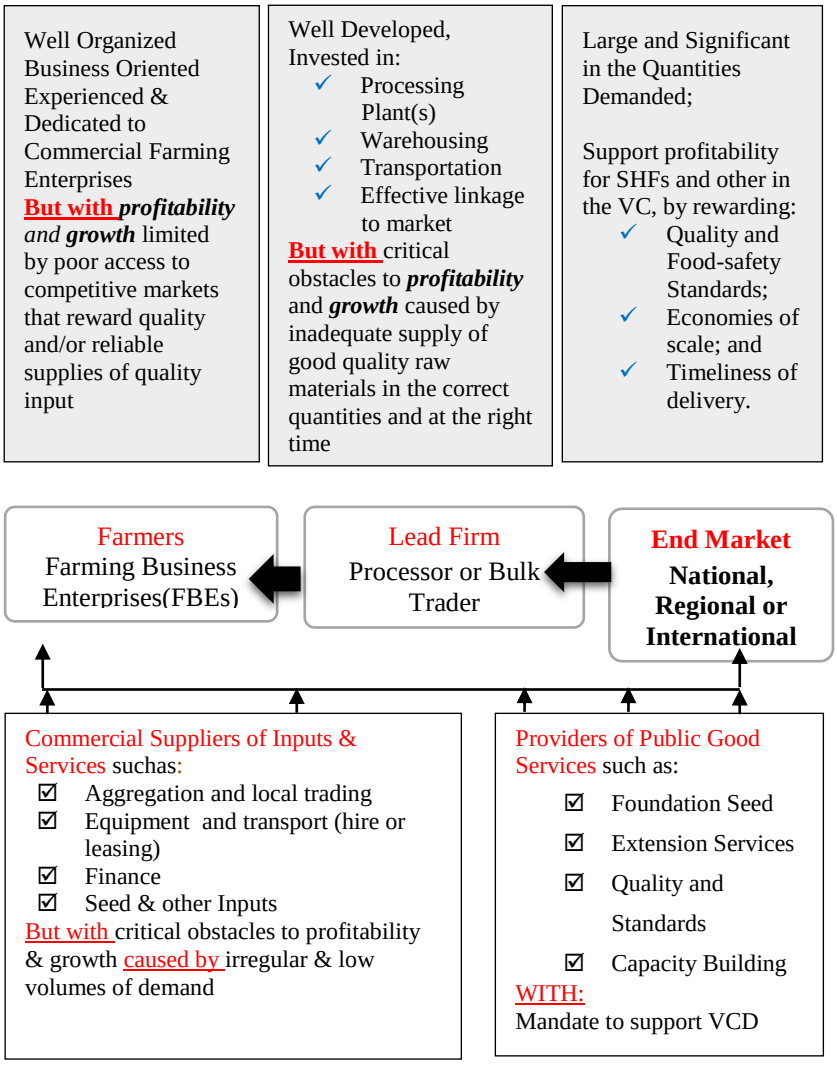

Figure 1.1 Kilimo Trust Consortium Approach to Value chain Development (KTCA2VCD)
Source: Why Regional Trade? Kilimo Trust (2017)

1.4.2 Competitive African Rice Initiative (CARI) Project

The Competitive African Rice Initiative (CARI) project is a multi-donor funded project initiated by Bill & Melinda Gates Foundation, BMZ and Walmart Foundation; implemented in East Africa (Tanzania) and West Africa (Nigeria, Ghana and Burkina Faso) and has a project period of 2014 to 2017 (which was extended to 2018). The project, a partnership-based development programme, is a response to bridging the gap in rice food subsector to safeguard food security, save foreign exchange from food importation and foster rural economic growth. The CARI project builds on the optimization and expansion of sustainable business model that integrates small-scale rice producer with daily income below US$2, using value chain approach. This prompted the application of Kilimo Trust Consortium Approach in the implementation of CARI project in Tanzania. The project provides

Matching Grant Funds (MGF) to partners as a development incentive and to ensure ownership and high commitment. The implementing agencies are GIZ (Nigeria), Kilimo Trust (Tanzania), JAK-F (Ghana) and Technoserve (Burkina Faso). The project aimed to improve the livelihoods of smallholder rice farmers double incomes of 120,000 smallholder farmers (30,000 in each country) in rice the value chain.

1.4.3 Regional East Africa Community Trades in Staple (REACTS) Project

REACTS, formed in 2014 with an exit period of 2017, is an IFAD-funded, Kilimo Trust-implemented project in Tanzania (Arusha), Uganda (West Nile Region, Northern region), Kenya and Rwanda (Eastern region) with the main objective of assisting smallholder producers of key food

commodities to 'farm as business' and increase farmers' income through regional trade. The REACTS project was executed through two output components: knowledge-driven, focusing on the EAC's regional cross-border markets and improvement in the structuring of business-linkages for integrating smallholders to cross-border markets, and building-on successes of access to national markets. The project is addressing inadequate access to markets caused by limited regional trade in food commodities which in turn affects low agricultural productivity. At the conclusion of the project, it is expected that the beneficiaries will experience an increase by 20% on income of at least 10,000 smallholder farmers, of the 15,000 small-scale farmers targeted by the IFAD projects in the EAC and ensure inclusive business linkages to cross border market (IFAD Report, 2014).

1.5 Rice Production, Consumption, Import, Export and Market

1.5.1 Global Rice Summary

Globally, rice is central to food security of over half of the world's population. It is the fastest growing food source in Africa and the demand for it has been growing faster than anywhere else in the world, in recent years, far outstripping the sub-region's population growth. Global production reveals that Asia ranks top and Africa places 4th. Of the top 10 rice producers, 9 are from Asian and one (Brazil) from American region. China mainland is topmost in rice production. FAO Rice Market Monitor (2016) indicates that global rice production in 2015 was 494.6 million metric tonnes (milled basis), driven by increase in acreage rather than productivity. The increased demand in China, Middle

Eastern countries and marginally in Africa influenced the global rice market. The reduction in demand by major world rice importing countries and the declining land for cultivation in Asia affected rice production. Consumption of 507 million MT in the period exceeded production for the year by 5 million MT. However, in Africa, import decreased by 1 million MT attributed to import substitution measures and effect of persistent depreciation of currencies. In 2015-2016, global supply of rice was 709.2 million MT (milled basis), food use and feed use were 397.2 million MT and 18.0 million MT (milled basis) respectively (Kilimo Trust BGRMD Report, 2016 and FAO RMM, 2017).

1.5.2 Rice Production in Tanzania

In the EAC, over 1.5 million farming households depend directly on rice for food and income security. Smallholders on average earn about US$550 per household yearly from rice production, growing rice on farms of less than 3 Ha, and 1.1 million are in Tanzania. Tanzania and Uganda are the leading rice producers in the EAC with Tanzania at the top, accounting for a third-quarter of rice production. Rice is both a staple crop for 70% and cash crop for 80% of farming families. Rice production increased from about 0.62 million MT in 1995 to 2.6 million MT in 2015 (FAOSTAT, 2014). Tanzania's production during the 2016 season was estimated to increase to 3.4 million tonnes (2.2 million tonnes, milled basis), up by 15% with expansion credited to increase in area and yield, driven by attractive price at planting time and fair growing conditions in 2016 (Kilimo Trust and FAO RMM, 2017). Avergae rice yield per hectare in Tanzania is 1.5MT, lower than 2.5MT in Africa and Asia's 4.4Mt/ha average production. 75% of Tanzania's average yield per hectare by smallholders are under rain-fed lowland ecosystem (FAO,

2015) and yield varies greatly by ecosystem and variety used (Nkuba et al., 2016). Rice production in the lowland rain-fed ecosystem is prone to vagaries weather effects (drought, floods), causing irregular yields. During drought, as a coping strategy, farmers often reduce size of cultivation in the following season, and low production is likely to be reported in that season. Rice production in irrigated lowland in the country is mainly carried out in Mbeya region, Mtibwa and Kilombero districts. Mbeya region is the third largest rice producer out of the 7 leading producing regions (Shinyanga, Tabora, Mwanza, Mbeya, Rukwa, Arusha and Morogoro) in Tanzania.

Rice grown in upland ecosystem is without irrigation and is under dry land conditions. The crop yields tend to be low and are affected by drought, biotic stress and low soil fertility. The consortium farmers in Mbarali district used river-fed irrigation scheme, and varying data of 5% to 40% were cited as the ratio of farmers who used irrigation. Tanzania is largely self-reliant in rice, but increased production is required to sustain rising local demand to minimize importation.

Table 1.1*:* Estimates of Tanzania Rice, 2001-2011 (tonnes milled rice)

Year	Production	Consumption	Exports	Imports	Population
2001	724 162	824 447	4 768	139 053	35 117 019
2002	826 610	857 805	9 055	76 530	36 105 808
2003	746 582	88 197	11 006	189 621	37 149 072
2004	786 800	924 299	2 487	181 986	38 249 984
2005	964 769	976 646	10 618	67 495	39 410 545
2006	996 504	1 033 891	10 093	90 480	40 634 948
2007	1 102 874	1 084 885	20 176	45 187	41 923 715
2008	1 158 631	1 132 699	34 197	64 147	43 270 144
2009	1 230 121	1 177 027	48 218	39 607	44 664 231
2010	1 353 714	1 250 465	62 239	1 493	46 098 591
2011	1 423 236	1 332 078	76 260	32 884	47 570 902

Source: FAO 2015 based on data from Stryker and Amin, 2012

1.5.3 Rice Consumption in Tanzania

Rice is the second highest consumed commodity after maize in Tanzania and the EAC. Per capita consumption in the EAC shows that Kenya consume 10-18kg per person, 5-7kg in Uganda, 4kg each in Rwanda and Burundi and 25-30kg in Tanzania, the highest per capita consumption in the EAC. Tanzania's rice consumption is rising rapidly in excess of 25 kg/person/year. In Uganda, rice is more produced by farmers in Eastern Uganda and the farmers consume less than the quantity sold; they produce more for cash than food crop. Tanzania's rural consumption of rice by farmers is high, preceded by Ugandan and Kenyan farmers. Rice is a major food staple for two-third of rice farmers. The demand for rice in Tanzania is projected to triple by 2020, and a substantial deficit is forecast; 1.15 million tonnes in 2009 to 2.84 million tonnes in 2020 (FAO, 2015). The National Bureau of Statistics of Tanzania forecast consumption to triple by 2020, driven by rising urbanization, population growth and income.

1.5.4 Rice Market in Tanzania

There is a buoyant market for rice in the EAC. Up until 2009, rice import exceeded export, but from 2009 to 2011, export exceeded import. From 2012 to 2016, imports exceeded exports as shown by FAO and USDA data. Rice import is greatly influenced by price, coupled with politics of food security. The international price of Thai Super Al broken rice was significantly lower than the domestic wholesale price of Tanzania's rice, causing regular importation. Due to issues of inconsistency in data and challenges of data on informal trade, import data shows variance with export data at country level. Tanzania's exports are mainly to neighbouring countries of Kenya, Uganda, Rwanda and Burundi, and occasionally to Malawi and Zambia. In these markets, consumers have preference for good quality Tanzanian rice over other imported rice. However, the rice is not available in regular supply. In Tanzania, consumers have more preference for the aromatic long grain rice to the sticky white long grain rice and the brown rice.

Table 1.2: Tanzania Rice Production, Consumption, Export and Import, 2001-2016

Year	Harvested Area ('000 Ha)	Yield Paddy (t/Ha)	Production		Consumption Milled Rice ('000 t)	Export		Import	
			Paddy ('000)	Milled Rice ('000 t)		Qty ('000 t)	USD ('000)	Qty ('000 t)	USD ('000)
2016	1100	2.55	2800	1848	2018	30	NA	200	NA
2015	1000	2.7	2700	1782	1972	30	NA	200	NA
2014	925	2.83	2621.03	1730	1875	30	NA	190	NA
2013	928.27	2.36	2194.75	1463.9	1178.04	51.43	20003	284.79	128436
2012	799.36	2.25	1800.55	1200.97	1141.59	17.49	5427	197.52	94681
2011	1119.32	2.01	2248.32	1499.63	1053.97	35.18	12719	50.85	24227
2010	1136.29	2.33	2650.12	1767.63	1026.88	48.28	14348	74.88	33612
2009	805.63	1.66	1334.8	890.31	970.76	0.81	216	39.6	11161
2008	887.66	1.6	1420.57	947.52	1047.4	5.59	1648	64.19	16357
2007	557.98	2.4	1341.85	895.01	922.97	20.16	3974	48.45	6114
2006	633.77	1.9	1206.15	804.5	892.36	4.39	1410	94.2	22498
2005	701.99	1.66	1167.69	778.85	845.77	9.29	1734	75.02	15170
2004	613.13	1.73	1058.46	705.99	885.42	2.43	524	194.28	50770
2003	620.8	1.77	1096.92	731.65	854.64	10.91	1678	189.2	34064
2002	565.6	1.74	984.62	656.74	722.31	9.05	1972	76.5	11916
2001	405.86	2.14	867.69	578.75	707.55	6.43	2486	139.03	29939

Source: IRRI World Rice Statistics Query Result, 2017 based on data from FAO, USDA. Aggregated by Author. Note: 2001-2013 (FAO) and 2015-2016 (USDA); NA = Not Available

The preference on rice quality is based on region of cultivation and place of origin. The two common varieties in Tanzania are from (i) Mbeya region: Kyela rice (Kyela district) viewed as the best quality aromatic rice followed by Mbeya rice (Mbarali district) and (ii) Morogoro rice from Morogoro region, viewed as average-quality semi-aromatic

rice. Dar es Salaam is the major end market for rice in Tanzania and accounts for about 60% of national consumption (FAO 2015). The capacity of the country to sustain an export surplus requires a 10% annual growth rate due to a rapidly growing domestic demand, driven by growing population, increasing urbanization and growing middle class. A 5% growth rate would result in trade deficits and warrant importation.

1.6 Theoretical, Empirical and Conceptual Issues

There are different approaches to value chain development in food subsector. Some focus on one or more nodes of the chain, while others adopt collaborative approach in delivering value to actors. Several value chain approaches have been adopted in the EAC, but low productivity and income of smallholder farmers prevailed. In Tanzania, very few value chain approaches yield to a collaborative model with documented empirical studies of the impacts on productivity and income of smallholder farmers. The approaches operated were designed to solve problems in one or more phases in the chain and not the entire chain, thus the methods in question work in isolation and find it hard to get buy-in of all actors, making them less inclusive and sustainable. This empirical study seeks to fill the gap in documenting the effectiveness of consortium approach vis-à-vis conventional approaches in increasing productivity and income of smallholders in Tanzania with the view to scalability and sustainability of the model.

Watabaji., et al (2016) assert that value chain integration can only materialise when members collaborate through resources, capabilities and risk sharing. Their study affirms that no one member possesses all resources and capability,

no matter how huge and diverse the resources it owns. Value chain integration offers a strategic tool for members to acquire complementarities of resource, capabilities and risks sharing that give rise to greater value chain performance. Pooe et al. (2015) affirm that information sharing is an important dimension of value chain integration that drives value chain performance in varying degrees, stating that supplier synergy has a strong influence on supplier performance than the influence supplier trust has on supplier performance. Collaboration is a form of interim partnerships which are established in order to obtain advantages, such as cost sharing, pooling or spreading risks, specialization or the access to complementary resources within supply chains (Madlberger, 2015). Simatupang and Sridharan (2002) identify four phases of a typical collaboration lifecycle to include:

i. Engagement process aimed at identifying the strategic needs of the collaboration, finding the right partners with the right capabilities and setting mutual agreements concerning performance of the chain;
ii. Forward-looking planning to manage interdependencies of resources, tasks and capabilities for future requirements;
iii. Implementation process: Chain members perform daily operations to meet the requirements of short and long term goals;
iv. Evaluation process to decide either to modify or terminate the agreements.

Collaboration is important to joint decision making (Schmitz, 1999), competitive advantage (Simatupang and Sridharan, 2002), cost reduction and revenue growth (Matopoulos et al., 2007). Ralson (2014) opines that desired

collaborative benefits may actually prevent supply chain collaboration from occurring in the instance where some firms view collaborative win as a redistribution of their expenses to other members in the chain. A collaborative value chain that operates in a win-win partnership and integrates smallholders in a manner that provides interventions in the entire nodes of the chain will capture more value, enhance efficiency and improve competitiveness. Notably, consortium approach is built on a win-win partnership that integrates smallholders in a manner that seek to enhance productivity and income.

The study identifies cluster-based approach, French filière approach and global commodity chain in the theoretical exposition of value chain. A value chain approach can be used in the absence of a cluster approach, but value chains must be supported for a cluster approach to work. A cluster represents a specific segment of value chain issues (Theus and Zeng, 2009 and USAID, 2008). Cluster approach can be used to support and complement value chain mainly in the area of transforming stakeholders' relationships, governance and trust building among stakeholders. Consortium approach focuses on intervening on issues on the entire value chain to capture value added, increase efficiency, and improve competitiveness for partners in a win-win manner.

1.6.1 Conceptual Framework

Consortium approach is a collaborative approach built on win-win partnership, involving actors along all the nodes of the value chain, intervening on the entire value chain. The approach is private-sector driven. The lead firm (buyer) determines the training component which is market-focused and the training institute (MATI-government organization)

conducts trainings for farmers and extension workers. Farmers were trained on GAP, PHH and farming as business (record keeping, being profit-minded and financial literacy) through demonstration plots, facilitation and pictorial representation. Farmers accessed power tiller and combined harvester through hire from farmer groups, fellow farmers and service providers. Payments for hire are either in cash, part or credit. Some farmers own power tillers and one of the farmers' group, Mbuyuni irrigation scheme, owns three combined harvesters and allows members the option of credit hire. Other farmers' group hire combined harvester from service providers on cash payment. The input varieties, especially improved seeds, are determined by the lead firm (buyer) based on market preference. Consortium inputs suppliers deliver inputs to farmers and bank pay suppliers through credit advance arrangement. The bank gets refund from farmers after sales of paddy to buyer (lead firm), who off-take paddy from farmers and pay farmers' proceeds to bank. Bank loan is through farmers' group based on stipulated conditionality.

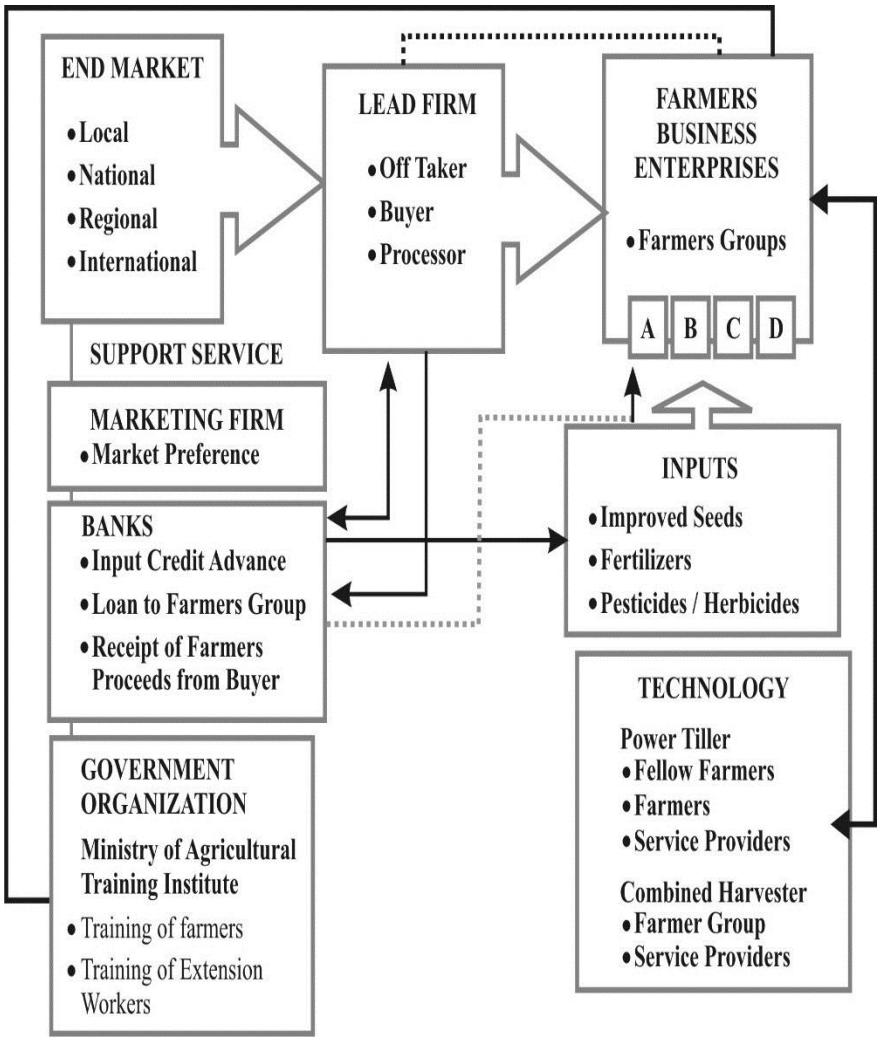

Figure 1.2: Conceptual Framework of the Consortium Approach to Food Value Chain Development
Source: Author – Emmanuel Ejewule (2017)

2. METHODOLOGY AND TECHNICAL APPROACH

2.1 The Study Area

The study was conducted in Mbarali district in Mbeya region located in Southern Highland of Tanzania (SHT). Mbarali district occupies the largest of the land area (16,632 sq. km dry land area (46.9%) and 0.1% sq. km water area) of Mbeya region's 35,954 sq. km. NBS census 2015 estimated Mbarali district population at 329,132 people out of the 2,965,207 Mbeya region's population. Rice is both food and cash crop to farmers in the area. Areas suitable for paddy production are the low altitude areas; below 350 metres above sea level (Ngailo et al., (2016).

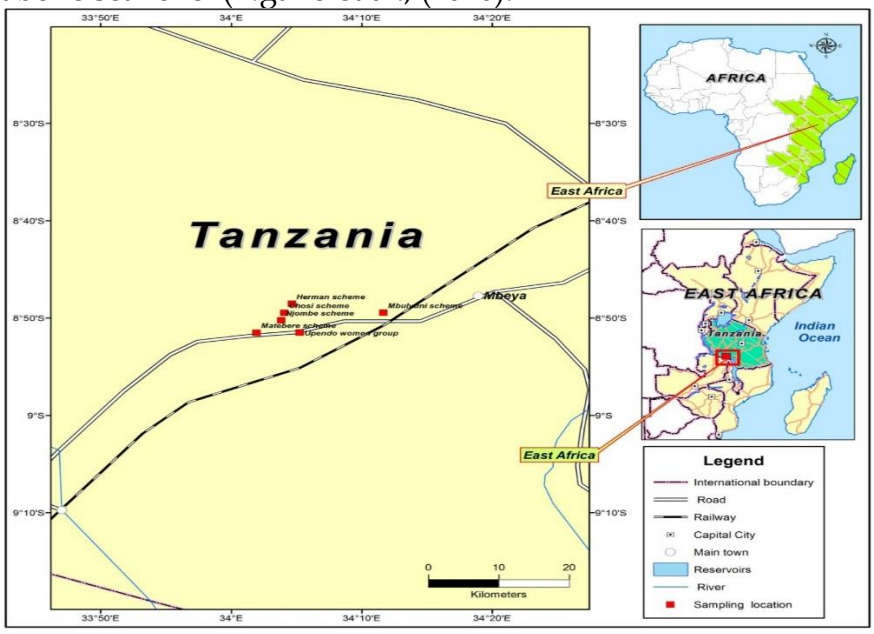

Figure 2.1: Area Map Showing the Survey sites depicting farmers groups
Source: Geographical Information System (GIS), Author (2017)

2.2 Research Design

The study employed survey method under which data were collected from different respondents at different locations

once through survey questionnaires, FGD and interview guides. The design was used in order to minimize the chance of drawing incorrect causal inferences from data, maximize reliability of data and minimize bias. Both primary and secondary data, involving quantitative and qualitative data, were collected. SPSS IBM 20 and MS Excel spreadsheet as well as cost-benefit and SWOT analysis were used to analyse the data.

2.3 Study Population and Sampling Size Procedure

A total of 2,975 smallholder farmers made up of 2,011 male and 964 female are beneficiaries of the CARI project under the Southern Highland Rice Consortium (SHIRCO) in Mbarali district of Mbeya region in Tanzania and serve as population of the study.

Multistage purposive cluster sampling techniques was used in selecting the study area. From the point of selection of consortium farmer group to the study area, purposive selection was used, while random selection was used to select wards, villages, farmer groups and smallholder farmers. Key informants purposively selected and interviewed were 7 top managements of partner firms, 3 Kilimo Trust staff (CEO, CARI program officer and field staff), 1 BDS and 6 community youths, making it 17 key informants for the study.

The sample size of 155 drawn from the population of beneficiaries of SHIRCO Consortium under the CARI project in Tanzania was generated using sample size calculator adapted from Survey System. The sample size drawn from the beneficiary population of 2,975 smallholder farmers in Mbarali district used statistical confidence level of 95 percent

at interval level of 1.96. The sample size derived by the sample size calculator was rescaled at 10 percent to obtain adjusted sample size of 136 smallholder farmers. An excess provision of 19 smallholder farmers was made, resulting to sample size of 155 smallholder farmers for the study. Equally, 17 key informants drawn from lead firm, inputs suppliers, Kilimo Trust and community youths were selected through a non-probability sampling techniques.

Table 2.1: Sample Size Determined for the Study

SHIRCO CONSORTIUM SAMPLE SIZE UNDER CARI PROJECT, TANZANIA								
Districts Selected	**Beneficiaries**							
	Gender		Total Beneficiary (Population)	*Calculated Sample size	10% of Calculated Sample size	Adjusted Sample size	Extra Provision	Adjusted Survey Sample Size
	Male	Female						
Mbarali	2,011	964	2,975	1359	135.9	136	19	155

***CALCULATED SAMPLE SIZE:** http://www.surveysystem.com/sscalc.htm*

2.4 Method of Data Collection and Procedure

The data were collected from both primary and secondary sources. The secondary data were collected from journals, newsletters, baseline survey, reports, published research works and books. Primary data were collected from smallholder paddy farmers in SHIRCO Consortium under the CARI project randomly selected, using pre-tested questionnaire, key informant interview (KII) and focus group discussion (FGD) guides as well as observation. FGD was conducted in Chimala village with selected farmers of Matebete irrigation scheme. FGD was also conducted at Chimala village with 6 motorcyclists (community youths), who are farmers, but nonmembers of the consortium, to assess their awareness of the consortium, youth participation in agribusiness and stimulate their inclusion in the

consortium. Interviews were conducted with key informants that are partners in the consortium.

2.5 Analytical Methods and Techniques

The data collected were analysed using Statistical Package for Social Sciences (SPSS statistics IBM 20) and MS Excel spreadsheet. Data were collated, verified, coded, entered, cleaned and merged in data sheet. Both qualitative and quantitative data were generated and presented through combination of cross tabulation, graphical and pictorial representations. Descriptive (frequencies, percentage, ratio, means, and standard deviation) and inferential statistics (t-test), SWOT analysis and cost-benefit analysis were used to ascertain the distribution of variables in the study to determine the effectiveness of consortium approach.

2.6 Experimental and Randomized Control Variable (RCV)

The study employed randomization in order to demonstrate causal relationship between intervention of consortium approach and outcomes on productivity and income of smallholder farmers before and after in SHIRCO consortium under CARI project in Tanzania. The smallholder farmers were randomly selected as experimental and control group and the outcome of consortium approach on their productivity and income before and after were assessed toward determining effectiveness of the approach. The randomized control variable (RCV) enhanced precision in estimates of effects (reliability) of the study and accounts for selection bias.

RESULTS AND DISCUSSION

3.1 Socio-Economic Characteristics of Farmers

3.1.1 Gender of Respondents in SHIRCO Consortium

Gender plays a key role in agriculture as it reveals the composition of workforce. Results of the study reveal that 66.5% of respondents are male and 33.5% are female. The study found that paddy production is appealing to women. Gender-friendly labour saving technology will not only improve participation, but also reduce workload, save time and enhance decision making and leisure. FAO (2017) indicates that it can improve nutrition by increasing time available for women to take care of children and food preparation. Agriculture will have negative effects on nutrition when it reduces the time that women allocate for child care (Dioula., et al, (2013).

3.1.2 Age of Respondents in SHIRCO Consortium

Respondents' age shows that adults (66.5%) are more, followed by youths (25.8%) and elders (7.7%). Enhancing access to market and improving productivity by addressing the constraints of finance, skills, knowledge and technology will improve retention and enrolment of more youths in agribusiness and then boost employment. Globally, 12 to 18 million youths enter the job market every year. The study encourages targeted intervention that mainstream youths in agriculture.

3.1.3 Marital Status of Respondents in SHIRCO Consortium

Marital status of respondents shows that 82.6% are married, 9.0% are single, 5.8% are widowed, 1.9% are separated and 0.6% are divorced. Male and female farmers who are

married are 68.8% and 31.2% respectively. Farmers, who are married, have the responsibility to cater for their families and that drives them to meet food and other needs of the family, leveraging on agriculture. Opara (2014) asserts that married farmers are likely to be under pressure to produce more for family consumption and sales with incentive of family labour. Oladejo., et al (2011) reports that marital status determines household family size, which dictates availability of labour in agricultural activities.

3.1.4 Educational Attainment of Respondents in SHIRCO Consortium

The majority of the farmers had primary education (78.7%), followed by no formal education (1.9%), adult literacy (0.6%), secondary education (16.8%), advance level (1.3%) and tertiary level education (0.6%). Education attainments in rural areas are low and the majority of people are in agriculture for subsistence. Educational facilities in rural areas in Africa are either inadequate or lacking. Education enhances farmers' ability to seek information and ability to utilize knowledge in a better way to reduce cost of under or overuse of inputs and increase market access. Mwatawala., et al (2016) posit that majority of developing countries population who depends on agricultural activities have low levels of education.

3.1.5 Group Membership of Farmers in SHIRCO Consortium

Farmers in the consortium were organized into farmer groups known as 'scheme' and membership must include men, women and youths. Farmers' groups promote collective action and foster information sharing and learning. Groups attend farmers' field day and share

experience. Some farmers' groups have shown an indication of vertical growth -- Upendo Women Group established a subsidiary farmers' group of 30 members for both men and women and is working toward owning a milling factory to sell milled rice to both local and international markets (see box 4 for details). Mbuyuni irrigation scheme owns a warehouse and milling machines provided by government and 3 combined harvesters provided by the government and Japan International Cooperation Agency (JICA) partnership. The group planned to become a processor to mill and sell branded rice. Tolno et. al. (2015) assert that farmers' group can be an important institution for transformation of smallholder farming to increase productivity and income with impact on reducing poverty. FAO (2014) posits that farmers' group promotes collective action, enabling individual farmers to reach urban, regional and international markets and helping farmers to overcome the challenges of high transportation costs and quality standards associated with access to large markets.

3.1.6 Main Planting Season and Source of Land in SHIRCO Consortium

November to March is the main planting season of paddy in Mbarali district. The majority of the lands used is self-owned (40.6%), followed by leased/borrowed (35.5%) and inherited (23.9%).

Africa has the highest area of arable uncultivated land in the world (202 million hectares), yet most farms occupy less than 2 hectares (WEF on Africa, 2015).

Table 3.1: Socio-economic Characteristics of Respondents in SHIRCO Consortium

Variables	Number of Respondents(Farmers)
Gender (n=155)	
Male	103(66.5)
Female	52(33.5)
Age (n=155)	
Youth	40(25.2)
Adult	103(66.0)
Elder	12(8.7)
Marital Status (n=155)	
Single	14(9.0)
Married	128(82.6)
Divorced	1(0.6)
Separated	3(1.9)
Widow	9(5.8)
Educational Attainment (n=155)	
No Formal	3(1.9)
Adult Literacy	1(0.6)
Primary	122(78.7)
Secondary	26(16.8)
Advance Level	2(1.3)
University/Tertiary	1(0.6)
Group Membership (n=155)	
Mbuyuni Scheme	68(43.9)
Matebete Scheme	65(41.9)
Herman Scheme	13(8.4)
Upendo Women Group	4(2.6)
Chosi Scheme	3(1.9)
Njombe Scheme	2(1.3)
Source of Farm Land (n=155)	
Self-owned	63(40.6)
Inherited	55(35.5)
Leased/Borrowed	37(23.9)

3.2 Effectiveness of Consortium Approach vis-à-vis Conventional Approaches on Productivity and Income of Smallholder Farmers

3.2.1 Skills and Knowledge

Findings of the study reveal that before the consortium, 7.7% of the respondents had training on good agricultural practices (GAP), 7.4% on PHH, 2.6% on farming as business, 4.5% on record keeping, 4.0% on minimizing costs, 2.7% on financial literacy and 4.6% on being profit-minded. After the consortium, 96.1% of farmers were trained on GAP, 92.9% on PHH, 94.7% on farming as business, 93.4% on record keeping, 91.9% on minimizing costs, 92.1% on financial literacy and 93.4% on being profit-minded. Training on farming as business enhanced commercialisation of smallholders and improved productivity and income. Key informant interviews with actors revealed that trainings offered reflect a focus on end-market aimed at improving demand and supply side of the value chain.

3.3 Production Inputs and Technology Accessed by Respondents

The consortium input suppliers are registered companies which provide separate but integrated services of supplying improved seeds, fertilizers and pesticides/herbicides to farmers. Before the consortium, 14.2% of farmers used improved seeds, 78.1% used fertilizers and 69.6% used pesticides/herbicides (average of 187.23kg of fertilizer per hectare) and 85.8% used local seeds of paddy. Equally, 41.9% used power tiller, 23.2% used combined harvester and 1.3% used tractor. The low use was attributed to lack of capital and non-availability of equipment, driven by subsistence farming practice that yields less to mechanization. After the

consortium, 97.4% used improved seeds, 99.4% used fertilizers (average of 359.56kg of fertilizer per hectare) and 100% used pesticides/herbicides. 99.4% of farmers used power tiller, 96.1% used combined harvester and 1.3% used tractor, signifying increased access to technology. The majority of the farmers used tarpaulin to sundry paddy. Pallet, weighing scale and moisture metre were available in the warehouse.

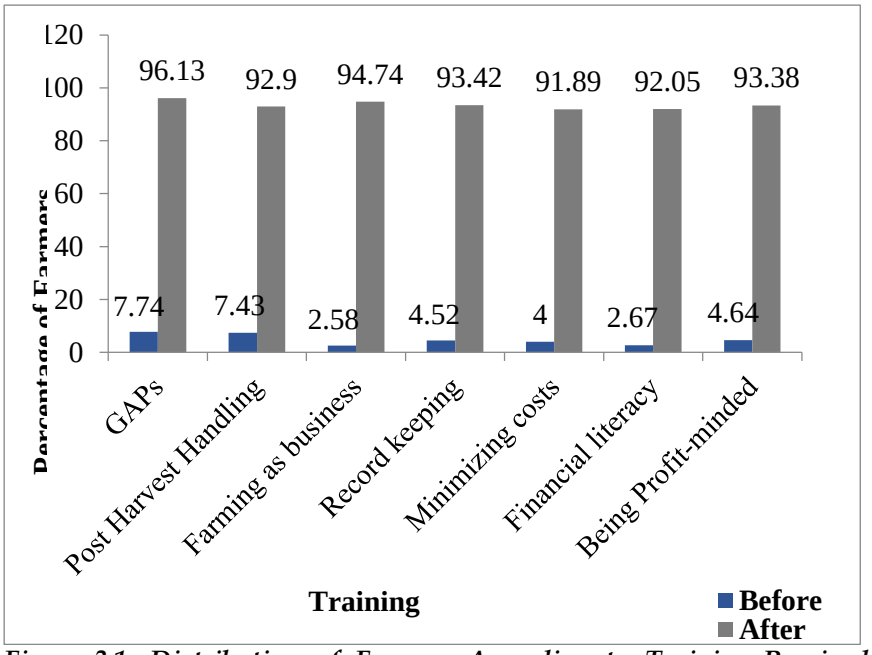

Figure 3.1: Distribution of Farmers According to Training Received Before and After in the Consortium

Table 3.2: Inputs and Technologies Accessed in SHIRCO Consortium by Farmers

	Inputs and Technologies Accessed by Farmers(n=155)						
Period	**Improved Seeds**	**Fertilizers**	**Pesticides/ Herbicides**	**Plough/ Power Tiller**	**Tractor**	**Combine harvester**	**Tarpaulins**
Before	22(14.2)	121(78.1)	108(69.6)	65(41.9)	2(1.3)	36(23.2)	69(44.5)
After	151(97.4)	154(99.4)	155(100)	154(99.4)	2(1.3)	149(96.1)	139(89.6)

Source: Field Survey (2017)

3.3.1 Source of Inputs and Technology Accessed by Farmers

Findings show that 91.4% of respondents got improved seeds from consortium input suppliers, 99.4% got fertilizer and all respondents got pesticides/herbicides from consortium input suppliers. The majority of respondents (90.9%) used power tiller hired from fellow farmers, 7.8% own power tiller and 1.3% from service providers, while. 0.6% hired tractor from service provider. Of the 96.13% of respondents that used combined harvester, 96.9% hired from farmers' group and 3.4% from service providers. Power tiller saves time and reduces workload during ploughing, while combined harvester saves time, reduces workload during harvesting and reduces stone and waste of paddy associated with manual labour. However, power tiller is energy sapping and is mostly operated by youths.

Table 3.3: Source of Inputs and Technologies Accessed by Farmers in SHIRCO Consortium

	SOURCE OF INPUTS & TECHNOLOGY					
Inputs & Technology	Input suppliers	Input Shop	Input suppliers & Input Shop	Fellow Farmer	Own farm	Service providers
Improved seeds (n=151)	138(91.4)	5(3.3)	8(5.3)	0(0.0)	0(0.0)	0(0.0)
Fertilizers (n=154)	153(99.4)	0(0.0)	0(0.0)	1(0.6)	0(0.0)	0(0.0)
Pesticides/herbicides (n=155)	155(100.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)
Power Tiller: Plough (n=154)	0(0.0)	0(0.0)	0(0.0)	140(90.9)	12(7.8)	2(1.3)
Tractor (n=2)	0(0.0)	0(0.0)	0(0.0)	1(50.0)	1(50.0)	0(0.0)
Combined harvester (n=149)	0(0.0)	0(0.0)	0(0.0)	144(96.9)	0(0.0)	5(3.4)
Tarpaulin (n=139)	0(0.0)	0(0.0)	0(0.0)	7(5.0)	132(95.0)	0(0.0)

Source: Field Survey (2017)

3.3.2 Delivery Mechanism and Payment Modality of Inputs and Technology in SHIRCO Consortium

Before the consortium, farmers bought from input shops of their choice and took responsibility for the delivery. After the consortium, 92.1% of the respondents received improved seeds, 93.5% fertilizer and 98.1% pesticides/herbicides delivered by input suppliers through farmers' groups.

Payment for inputs financed by partner bank (National Microfinance Bank – NMB) has enhanced farmers' access to inputs and inputs suppliers' ability to turn credit into cash. Payment for hiring power tiller and tractor was on cash basis, while payment for hiring combined harvester was by cash, part and credit payment. Farmers in other groups hire combined harvesters from service providers on cash basis, but Mbuyuni irrigation scheme has its own combined harvesters and allow members the option of credit hire.

Table 3.4: Payment Modality of Inputs from Inputs Suppliers and Technology Hired

Inputs and Technology	Cash at point of purchase	Advance payment	Credit	Both Cash and Credit
Improved seeds (n=151)	10(6.6)	3(2.0)	132(87.4)	6(4.0)
Fertilizers (n=154)	12(7.8)	3(1.9)	133(86.4)	6(3.9)
Pesticides/herbicides (n=155)	14(9.0)	2(1.3)	135(87.1)	4(2.6)
Power Tiller (Plough) (n=154)	142(92.2)	0(0.0)	12(7.8)	0(0.0)
Tractor (n=2)	2(100.0)	0(0.0)	0(0.0)	0(0.0)
Tarpaulin (n=139)	7(5.0)	0(0.0)	132(95.0)	0(0.0)
Combined harvester (n=149)	127(85.2)	0(0.0)	22(14.8)	0(0.0)

Source: Field Survey (2017)

3.3.4 Farmers Access to Finance in SHIRCO Consortium

Before the consortium, few farmers indicated that they had access to inputs in the required quality (3.2%) and quantity (6.5%), crediting it to ignorance and lack of awareness with lack of capital being the main limitation. After the consortium, 70.3% of respondents accessed bank credit, while 29.7% did not. The loan facility ranged from TZS700000 ($312.64) to TZS4000000 ($1,786.51) disbursed in installments, mostly in 3 installments. 34.2% of the respondents expressed that the interest rate was high and should be reduced. Respondents indicated that the loan helped to increase production.

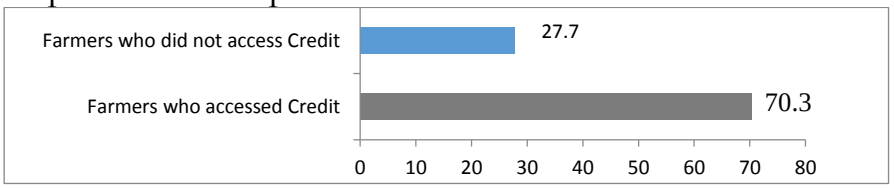

Figure 3.2: Farmers Access to Bank Credit in SHIRCO Consortium (in percentage)
Source: Field Survey (2017)

3.3.5 Marketing of Produce (Paddy) by Farmers in SHIRCO Consortium

Before the consortium, the majority (51%) sold to buyers who aggregate from individual farmers and 31.0% sold to

middlemen. Market was a key challenge farmers faced, making it difficult for them to plan for expansion. Results reveal that 91.6% now sell to the lead firm (buyer) through group aggregation, 4.5% to middlemen, 3.2% to buyers who buy from individual farmers and 0.6% to both middlemen and buyer who buy from individual farmers. The availability of a buyer (lead firm/processor) in the consortium was a game changer and has enabled farmers to have assured market that is helping to drive increased production. The buyer (lead firm) confirmed that the firm recorded increase supply of paddy from farmers that met premium price and market requirement (quantity, quality and timeliness). Payment to farmers is through bank.

Table 3.5: Forms of Marketing by Farmers Before and After in SHIRCO Consortium

Buyers	Before	After
Buyer picks from group aggregation centers	7(4.5)	142(91.6)
Buyer picks from individual farmers	79(51.0)	5(3.2)
Farmers sells to middlemen who takes to buyer	48(31.0)	7(4.5)
Individual buyer and middlemen	21(13.5)	1(0.7)

Source: Field Survey (2017)

3.4 Impacts of Consortium Approach on Mean Harvest, Revenue and Land

Results reveal that before the consortium, outputs recorded by farmers ranged from minimum of 0.60MT per 0.20ha (5 bags on 0.5 acre) to maximum of 26.40MT on 8.90ha (220 bags on 22 acres) and mean harvest per hectare was 3.46MT (28.83 bags) at 1.21MT standard deviation. After the consortium, minimum and maximum outputs were 1.56MT on 0.40ha (13 bags on acre) and 79.20MTon 8.9ha (660 bags on 22 acres) respectively, and mean harvest per hectare was 7.20MT (60 bags) at standard deviation of 1.71MT. Furthermore, mean farmland used before and after the

consortium were 1.36ha (3.37 acres) and 1.44ha (3.55 acres) respectively. Production output and yield increased in the consortium and the changes were significant, indicating strong evidence as shown by P<0.0000** (P<0.05). The increase in production was driven by skills and knowledge, access to inputs, credit, assured market and farmland (farmland increased by 5.40%). Total output of 720.60MT was realised on 211.55ha used before the consortium, while 1,550.04MT was recorded on 222.98ha after the consortium, signifying 749.98MT (on 211.55ha, before output was 720.60MT and after output was 1,470.58MT) increase in yield (104.08% increase). The mean output per hectare for male farmers before the consortium was 3.41MT and after was 6.83MT. For female farmers, mean harvest per hectare recorded before was 3.39MT and 7.29MT was recorded after the consortium. The mean harvest recorded by male farmers by age before the consortium revealed that adult recorded 3.42MT/ha, youth 3.39MT/ha and elder 3.37MT/ha. After the consortium, youth realised 6.91MT/ha, adult 6.69MT/ha and elder 7.89/ha. For female farmers, before the consortium, youth recorded 4.08MT/ha, adult 3.21MT/ha and elder 2.92MT/ha. After the consortium, youth recorded mean harvest of 7.65MT/ha, adult 7.24MT/ha and elder 5.56MT/ha. Generally, outputs increased for both female and male farmers with female farmers recording more mean output. Farmland cultivated in the consortium by male farmers increased by 10.39%, but decreased by 10.97% for female farmers. The study found that 0.40 hectare (1 acre) is enough to pay for loan, but not sufficient for farming as business, thus farmers with 0.40ha or less are subsistence farmers rather than engaging in farming as business.

Table 3.6: Effectiveness of Consortium on Mean Output (Total, Gender, Age)

Variables			Before	After
Production Outputs (n=155)	Mean (per hectare)		3.39MT	7.29MT
	Min. (0.20ha & 0.40ha)		0.60MT	1.56MT
	Max. (8.90ha)		26.40MT	79.20MT
	SD (ha)		1.21MT	1.73MT
Mean Production per hectare by Gender (n=155)	Male (n=103)		3.41MT	6.83MT
	Female (n=52)		3.39MT	7.29MT
Mean Production by Age (n=155)	Male (n=103)	Youth (n=26)	3.39MT	7.65MT
		Adult (n=68)	3.42MT	6.69MT
		Elder (n=9)	3.37MT	7.89MT
	Female (n=52)	Youth (n=14)	4.08MT	7.66MT
		Adult (n=35)	3.21MT	7.24MT
		Elder (n=3)	3.29MT	5.56MT

Table 3.7 reveals that mean revenue per acre before and after SHIRCO consortium were US$443.35 and US$1160.49 respectively, indicating increased changes in income with a strong significance of P<0.0000** (P<0.05). The increase in income was driven by increase in production and yield combined with assured market. Farmers recorded increase in revenue and gross margin.

Table 3.7: Effectiveness of Consortium on Mean Harvest, Revenue, Land

SHIRCO Consortium

VARIABLE	**Before**	**After**	**P-Value**
Mean Harvest per hectare (MT)	3.46	7.20	0.0000**
Mean Revenue per acre (US$)	443.35	1 160.49	0.0000**
Gross Margin per hectare (US$)	228.09	762.19	0.0000**
Mean Land cultivated (hectare)	1.36	1.44	0.6821*

Source: Field Survey (2017)

Table 3.8:T- test Analysis of Difference between Mean Harvests Recorded Farmers

Before and After the Consortium in SHIRCO Consortium

t-Test: Two-Sample Assuming Unequal Variances

	AFTER MT/Ha	***BEFORE MT/Ha***
Mean	7.205225806	3.467355
Variance	3.004788747	1.471975
Observations	155	155
Hypothesized Mean Difference	0	
Df	276	
t Stat	**21.99419372**	
P(T<=t) one-tail	6.17342E-63	
t Critical one-tail	**1.65039322**	
P(T<=t) two-tail	1.23468E-62	
t Critical two-tail	1.968596344	

Source: Field Survey (2017)

3.5 Costs-Benefits Analysis of SHIRCO Consortium

Farmers attributed the low production outputs recorded before the consortium to financial constraints, inadequate knowledge of GAP and PHH as well as low access to quality inputs (improved seeds, fertilizers and herbicides) coupled with market constraints. The majority of respondents indicated inappropriate use of fertilizers and herbicides before the consortium.

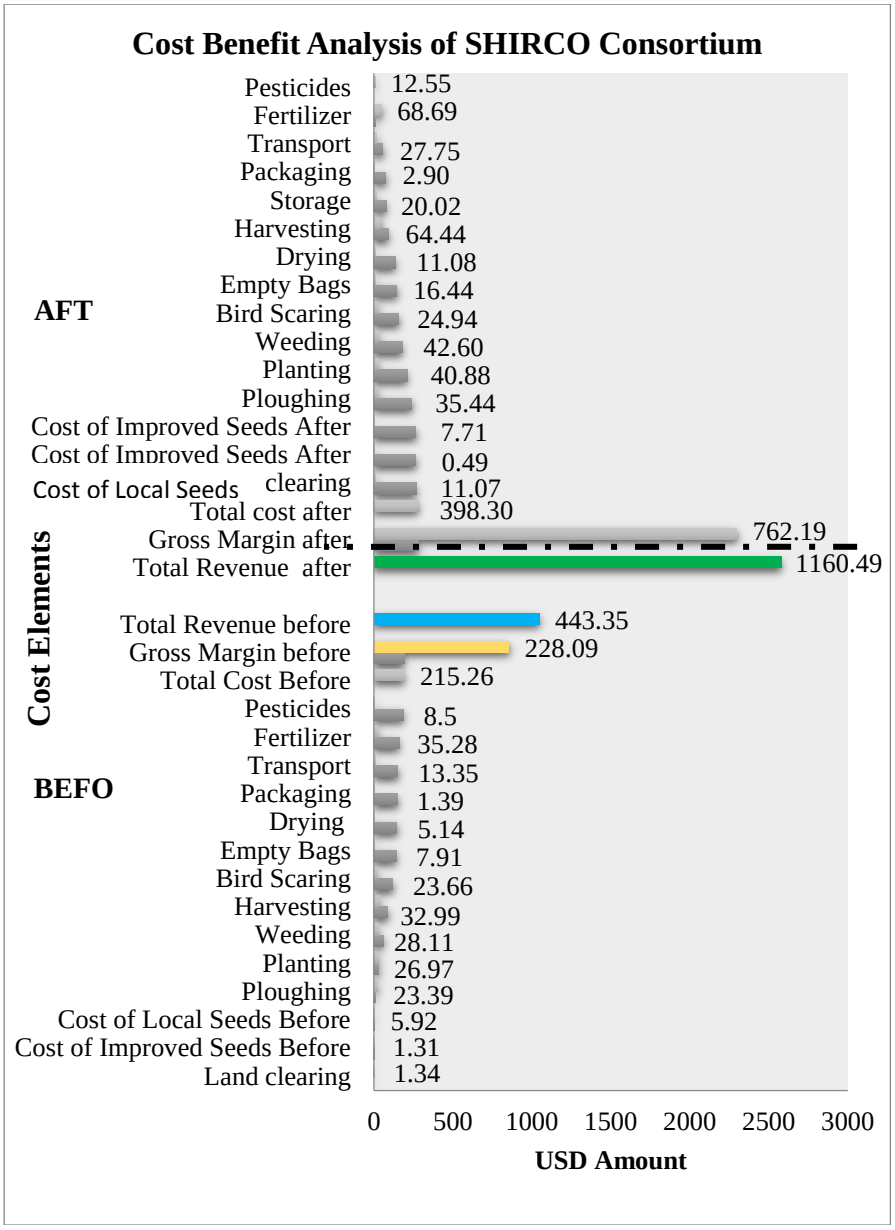

Figure 3.3: Cost- Benefits Analysis of SHIRCO Consortium for Paddy Per Acre

For instance, on 0.40ha (1 acre) of farmland, 150kg (3 bags of 50kg) was the recommended quantity used in the consortium, but farmers reported using 50-100kg. Farmers' gross margins per acre before and after the consortium were $228.09 and $762.19 respectively, indicating a strong significant change. However, the increase in production and income come with incremental costs reflected in purchase of improved seeds, fertilizers, herbicides and use of technology (power tiller and combined harvester). Generally, the results of cost-benefit analysis revealed increase in gross margin.

3.6 Critical Success Factors for Sustainability of Consortium Approach

The consortium is underpinned by critical success factors such as commercialization of smallholder farmers through adoption of farming as business and market orientation (end-user market focus). The consortium intervened on market access by the inclusion of buyer (processor/lead firm), who committed to off-take any quantity of paddy produced by farmers. The assured market motivates farmers to increase production by improving on their farming practice, increasing their farm size and investing in inputs.

Table 3.9: Key Attributes/Success Factor of Conventional Approach (Before) and Consortium Approach (After) in Food Value Chain Development.

Attributes	Conventional Approach (Before)	Consortium Approach (After)
(i) **Business focus**	Support and risk management intervention	Commercialization of smallholder farmers
(ii) **Orientation**	Win-Lose (zero sum game)	Win-Win
(iii) **Organization**	Fragmented, less integrative	Integrative/Inclusive
(iv) **Participants**	Actors in some of the node	Actors in the entire nodes
(v) **Commitment**	Public sector-dependent	Pushes for private sector ownership & commitment
(vi) **Transaction Terms**	Short-term transactions (individually)	Long-term transactions (group)
(vii) Market Decision	Made on price; personal bargaining	Made on value; joint- decision making
(viii) Partnership	Many	Selected
(ix) Interdependence	Low	High
(x) Activities	Separate	Engaged
(xi) Focus	Supply-driven	Demand-driven
(xii) Coordination	Limited	Strong
(xiii) Communication	Limited	Open
(xiv) Information	Proprietary	Shared
(xv) Improvement	Unilateral initiatives	Continuous joint activities
(xvi) Interest	Act only in own interest	Act for mutual benefits

Other success factors include supply of farm inputs by the inclusion of inputs suppliers, bank loan and bank credit advance for inputs by partner banks. The warehouse enhanced PHH, marketing and support inputs delivery to farmers and paddy aggregation by buyer. Trust and collective action among actors helped in joint planning, problem solving and price negotiation.

3.7 Strengths, Weaknesses, Opportunities and Threats of Consortium Approach in Improving Productivity and Income of Smallholder Farmers in Mbarali District

The consortium is underpinned by some strength. However, in opposition to the strengths are some weaknesses. Nonetheless, there are opportunities to spur growth. The adoption of measures to reduce exposure to threats will enhance the consortium. The approach has some strengths to build on, weaknesses to be mindful of, opportunities to harness and threats to mitigate as shown by SWOT Analysis of consortium approach to food value chain of SHIRCO consortium.

Table 3.10: SWOT Analysis of SHIRCO Consortium in Mbarali District, Mbeya Region

STRENGTHS	WEAKNESSES
1. **Market orientation, assured market and demand driven:** The inclusion of buyer (lead firm/processor) in the consortium provides assured market. The buyer commits to off-take any quantity of paddy produced by farmers.	3. **Donor-driven:** the approach was funded by multi-donor institutions and is donor dependent.
4. **Farming as business:** the approach promotes commercialization of smallholders as farming business.	3. **Long loan processing:** time lag in loan processing and disbursement by bank, leading to delay in inputs delivery.
4. **Private sector ownership and commitment:** the approach pushes for private sector ownership. The actors (buyer, inputs suppliers, bank and marketing firm) from production to market are private sector firms.	**5. Lack of gender-friendly labour saving Technology:** power tiller used for plough is energy sapping, thus difficult for women to operate. It was mainly operated by male youths and adults.

4. **Collective action:** actors pursue mutual benefits. Partners undertake joint cooperation. Partners share business opportunities available outside the consortium among themselves. Farmers groups enhance integration rather than competition for a common buyer.

4. **Trust issues:** after meeting the contractual quantity, some farmers prefer selling paddy to buyers, who offer higher prices.

OPPORTUNITIES	THREATS
1. **Replication potentials and attractiveness to financial institutions and input suppliers:** the approach can be used in other commodities and locations. The changes in global agrifood system push for collaborative value chain approach.	1. **Climatic change condition:** drought, flood, shortage of rainfall and adverse weather are issues to mitigate in the value chain.
2. **Demographic development:** growing local demand for aromatic long grain rice and population growth and urbanization. By 2050, Africa will add 1.3 billion people; there will be more mouths to feed.	3. **Politic of food:** Some policies adopted make it difficult for partners to plan investment along range of time. E.g export ban.
4. **Intra-Africa and regional trade:** there is a buoyant market in Africa and in the EAC rice subsector. In 2017, Inter-Africa trade was 13%, very low.	3. **Market dynamics:** The smuggling of imported rice in Tanzania makes local rice costly, affecting actors in rice value chain. Price fluctuation is also a factor.
	4. **Risk of depending on single buyer**

3.8 Challenges Respondents Faced in Paddy Farming in the Consortium

The challenges respondents faced in the consortium include: (i) delay in delivery of inputs by input suppliers attributed to delay in loan processing; (ii) delay in loan processing and disbursement as well as double-digit interest rate; (iii)

conflicts between herders (Sukuma and Maasai tribe) and farmers on grazing areas and water management; (iv) conflict of road demarcation for passage of combined harvester between farms; (v) climate change conditions (drought); (vi) need for more trainings for farmers; (vii) bottleneck in accessing foundation seed from government by improved seed supplier; (viii) time lag in shipment of fertilizer to Tanzania to be accessed by input suppliers; (ix) working capital need for lead firm and farmers.

4.0 Conclusion

Largely, the approach has been effective in increasing productivity and income of smallholder farmers as well as the sales and income of partners (buyer and inputs suppliers) in the consortium. The lessons learnt should apply to strengthen the value chain and scale up of consortium approach to value chain development of SMEs in Tanzania, the EAC and Africa. The commitment of partners and results recorded show strong evidence of sustainability and that would be better appreciated after 1-3 years from the exit of the CARI project in 2018, when a post monitoring and evaluation is conducted to ascertain the sustainability of post impacts of the consortium. The consortium intervened in the area of training, access to inputs, credit, delivery mechanism, payment modality and market. A collaborative value chain that yields to win-win partnership is relevant as a model in value chain development.

Value chain approaches vary with the problem they seek to address, the way they are applied and the actors involved. The exigency and impacts of the environment within which value chain approaches operate should be given attention

based on the fact that no one approach is full-proof of challenges. The challenges facing the consortium in the area of climatic change, delay in input delivery, delay in loan disbursement, high interest rate, poor infrastructure, multiple taxes, trust issue, shortage of training staff and field resources, water management and grazing conflict as well as export ban, local way of drying paddy, lack of gender-friendly labour-saving technology and working capital constraints should be addressed. The consortium approach can be a tool that offers a way out of poverty; improves food security and enhances growth.

4.1 Recommendations

The study recommends targeted and collective actions in strengthening the consortium. The approach should be extended to other farmers, crops and regions. The CARI project should be extended to phase II of the project to consolidate on the gains recorded and address constraints identified in order to accommodate other farmers. Due diligence is required in the selection of partners who are not only competent but committed to keeping to the contract, ensuring that partnership is not a zero-sum game but a win-win relationship that ensures smallholder farmers are well integrated into the chain.

(i) Farmers

Individual farmers should cultivate minimum area of more than 0.40ha (1 acre) in order to achieve farming as business, given that cultivation of 0.40ha or less is only sufficient for loan repayment and subsistence. Farmers' groups should leverage the potential of the consortium to catalyse social programmes (storage, educational & health, etc.) from other institutions. There should be better schedule of water

management to reduce conflicts arising thereto and better demarcation of plots that allows smooth movement of combined harvester between farms to avoid conflict during harvesting. Input suppliers should work with farmers to minimize water contamination from agrochemicals to reduce associated health risk as well as adapt safer ways of fumigation. Farmers should weigh the cost-savings of transportation of inputs by comparing cost of getting delivery direct from input suppliers or bearing the cost of transportation from input suppliers to farmers group. As a result of this, farmers should compare cost of hiring truck from the lead firm or other commercial transporters. Farmers groups should pull paddy together to take advantage of the finance available in warehouse receipt system (WRS).

(ii) Inputs Suppliers

Suppliers should ensure timely delivery of inputs to farmers in line with farming calendar to avoid associated costs of delayed delivery. Timeliness is vital in farming. Farmers should not be at the receiving end of delay in processing of input credit advance from bank, thus input suppliers should provide input credits to farmers and get reimbursement from bank through the existing payment arrangement. Inputs suppliers should give farmers trade discount for bulk purchase of inputs. Training of farmers on better application of inputs as indicated by farmers should be conducted and the training should ensure timeliness, ease and frequency. Suppliers should work with other actors, including farmers, to incorporate drought-tolerant, early-maturing and pest-resistant improved seed variety as a mitigating measure to climate change conditions in line with climate smart agriculture.

(iii) Bank

Banks should ensure timely processing and disbursement of loan to farmers and timely payment for input credit advance to input supplier. Equally, provide concessionary interest rate to the farmers. Special bonus package should be provided to farmers to offset the burden of high interest charge. Banks should work with Bank of Tanzania to provide one-digit interest rate to farmers in line with poverty reduction and growth enhancement of micro, small and medium enterprises (MSMEs) programmes of government. Provide corporate social responsibility to SHIRCO farmers' communities. Furthermore, provide equipment loan facilities for farmers to procure gender-friendly and labour-saving technology to reduce the workload of farmers, especially women. Promotional advertisement contract should be awarded to the best performing farmers as brand ambassadors. Also, support Upendo Women Group with credit facility to enable them acquire milling machine and provide targeted funding to attract more youths in agribusiness.

(iv) Lead Firm

Expand the financial net to attract more banks to be partners in the consortium. Replicate the approach to accommodate other farmers, region and crops. Set up a monitoring and evaluation framework integrated with gender specialist in line with sustainability plan. Institute a revolving fund to provide for training needs, coordination and internal finance strengthening to augment input credit needs of farmers to minimize the delay of loan processing from banks. The firm should adapt better technology in the area of modern equipment for drying of paddy as against using tarpaulin to

sun-dry. Strengthen its competiveness, improve on product standardization and promotion and ensure that price negotiation with farmers reflect market reality. In addition, facilitate improvement on joint planning of partners. Work with CARI project sponsors and implementer (Kilimo Trust) to ensure gradual exit of the project, involving full participation of partners and extension of CARI project into phase II.

4.2 Policy Implication: Creating Enabling Environment

i. Government should benchmark policy impacts on rural areas, especially on smallholders, using concept of rural lens. The outcome of politics of food should not be to the detriment of commercialising smallholders. Efforts should be increased in tackling smuggling of rice into the country with institutional strengthening and citizens' enlightenment.

ii. Government should work out an insurance package for smallholders and also develop PPP on agricultural insurance. Develop and promote crop and rain insurance for smallholders to ameliorate the risk of climate change effect (DRT, 2012).

iii. Government should work with the EAC partner states to operationalise the EAC Climate Change Fund to leverage on the Green Climate Fund and other climate finance mechanisms to mitigate climate change effects.

iv. Improvement of infrastructural facilities (irrigation, canals/drainages, road) and provision of alternative water (down water) sources are important. Government should provide gender-friendly and labour-saving technology. Ensure targeted intervention that increases participation and reduces

workload, especially for women and youths. Women play significant role in agricultural labour force and would increase yields on their farm by 20-30% and reduce undernourishment by 12-17% should they have access to productive resources as men (FAO CFS, 2015). In the consortium, women's yield increased by 104.08% on before outputs.

v. Ensure provision of weather forecast infrastructure to disseminate information through two-way communication to farmers to reduce loss associated with climate change and strengthen resilience and adaptability. Infrastructure should prioritise linking smallholders to market in order to close the gap of low productivity and income (SID, 2016).

4.3 Excerpt of Human Success Story from SHIRCO Consortium

Women play an important role in agriculture in developing countries, but are constrained by limited access to farm inputs, credits, extension services and labour-saving technology. Empowering women is crucial to poverty reduction and economic development. Women empowerment provides women opportunity to expand their capacities to live the kind of life they have reason to value; offers the abilities to make choices on economic activities and participates in governance process. The study shows improvement in production, productivity and income as well as in building, renovation of houses, purchase of motorbikes, acquisition of farmland, payment of children school fees, and food security.

Case Study of Mary Kayanda in SHIRCO Consortium, Mbarali District

Mary Kayanda, a farmer, had lived in her old mud house since 1992 (about 16 years). As a result of the consortium, her farm size moved from 0.40ha to 1.21ha (1 acre to 3 acres) and now 2.43ha (6 acres).The knowledge of GAP,PHH and farming as business helped to increase her yield and production as well as income. She joined SHIRCO consortium two years ago and now has commenced the building of her new home.

Picture 1: Mary building her new home

Picture 2: Mary & her husband. Mary interviewed by Emmanuel Ejewule (Researcher)

Agribusiness Empowerment: Case Study of Upendo Women Group in SHIRCO, Mbeya, Tanzania

Formed in January 2013 by Rural Urban Development Initiative (RUDI), Upendo Women Group is one of the farmers groups in SHIRCO consortium under CARI project in Tanzania. The Group is committed to the well-being of members and is working toward ensuring every member owns a home. The Group is made up of 30 members and membership constitutes solely women. Member must be an entrepreneur in order to join the group. Led by Mrs. Flora Mombeki (chairperson), the group is working to make advancement in achieving a brand name in rice by adding trading to its existing role of producer of paddy. It has proposed buying its own machine costing Tshs 15 million (US$6,702.41) and land to build its factory for milling. License (Brela certificate) that allows for marketing locally and internationally has been secured by the group. The application by the group to raise loan from bank in its name to expand the group farm which is currently 2.83ha to 6.07ha (7 acres to 15 acres) was not successful and this is not unconnected with challenges women face in accessing finance -- gender constraints.

Being in SHIRCO, members' access to factors of production increased with farmland shifting from 0.20ha (0.5 acre) to 2.02ha (5 acres) for each member. The group has a group farm of 2.83ha (7 acres) and each member contributes to the farm. Prior to SHIRCO consortium, yield was 0.72MT per 0.20ha (6 bags per 0.5 acre equivalent of 12 bags of 120kg per acre), but after SHIRCO consortium, the yield is between 3.60MT to 4.20MT (30 to 35 bags of 120kg) on 0.40ha (1 acre) translating to 400% - 483% increase in yield.

By extrapolation on one hectare, 8.89MT to 10.37MT was recorded based on 30-35bags of 120kg per acre. In line with its commitment to poverty reduction and given the notable impacts recorded in the lives of members, the group registered a new group called 'Faraja Upendo Group' (Faraja = Comfort, Upendo = Laugh) for both gender and the membership stands at 30 under the supervision of Upendo Women Group.

While issues such as climatic condition change (drought, seasonal variation), high interest rate, delay in inputs supply, long loan processing and delay in disbursement stood as constraints to advancement for the group; these factors emerged largest: gender-related financial challenge and chiefly among the issues is lack of capital for expansion (acquisition of land, milling machines), fear to entrust women with finance and lack of gender-friendly labour saving technology.

Addressing these issues will provide impetus to the group and help in poverty reduction, women empowerment and economic growth.

Quotes from partners of SHIRCO Consortium under the CARI project, Tanzania

"We now have a clear chain to work with smallholders. We have plans to continue after the end of the project. No one is in need to getting out. Our investments have moved up. Replicate the model to other region. We have much knowledge and skill to continue" -
Lazaro Mwakipesile, GM
Raphael Group Ltd (Lead firm)

"We are working in a win-win situation. This is the best way I have seen. All partners are getting something. We are winning.
Anything goes wrong as a result of weather, all the partners will suffer.
Farmers should be shareholders in the company in future". -
Peter Roosjen, Program Mgr.
Raphael Group Ltd (Lead firm)

"It's efficient, it increase income of farmers. We should go on empowering women on different aspect. Men have seen the impact of women empowerment, they encourage them to involve in livelihood activities". -
Godfrey G. Mwenda, Company Agronomist, Obo Investment Ltd
(Pesticides/Herbicides supplier)

"Consortium Approach (Model) is the Road and the Projects travel on the Road. The Model pushes for Private sector ownership. Consortium is the road that is laid up by KT and all the projects travel on the road. The projects use the approach to achieve their objectives".
Prof. Nuhu Hatibu, CEO Kilimo Trust Ltd

"SHIRCO consortium is unique. First year we made loss, now it's good. All are making profit. It seems to be a model. Produce for market to be secure by farmers, food will be secure. It's efficient, very nice, but not without challenges. Cultural issues define the type of work done by the genders".
Dr. Ambonesigwe M. Mbwaga MD, Agriseed Tech. Ltd
(Improved seeds supplier)

"It's good. We have built close relationship and business. Each of the other partners knows what we want and vis-versa. Sometimes the partners tell us there is a business there, go there".
Dionis D. Tshonde, Region Sales Agronomist, Mbeya East Region
Yara Tanzania Ltd (Fertilizer supplier)

"We have some feedback from farmers and stakeholders that our work has positive impact. The component of training should include gender issues. We should not stop talking about gender issues"
Karantine Mazengo, Agronomist
MATI, Tanzania (Training service provider)

"SHIRCO farmers are organized clusters of farmers. They know where to get inputs, training, sell their produce. Effort on poverty reduction can be undermine by consequences of gender issues because women and youth form majority workforce. Problems in value chain were existing because actors are working in isolation. In SHIRCO, partners come together to become doctor of each other's challenges". -
Peter Sanga, MD of Khebandza Marketing Company
(Marketing service provider)

"Before SHIRCO consortium, members of Upendo Women Group cultivate 0.5 acre (0.20ha), but noweach member has minimum of 5 acres (2.02ha)"
Mrs. Maria Nyoni, Treasurer of Upendo Women Group
under SHIRCO consortium, Tanzania

Agribusiness Empowerment: Case Study of Maria Nyoni, Treasurer of Upendo Women Group, Mbeya, Tanzania

Maria, a farmer, is a 30-year old married lady with a child. Her husband is also a farmer. Maria is the treasurer of Upendo Women Group, one of the Schemes in SHIRCO under CARI project in Tanzania. She hails from Sae village in Mbeya, Mbeya region of Tanzania.

Maria relocated to Chimala in Mbarali district of Mbeya region due to lack of means of livelihood and need for empowerment. Maria was about 26 years old in 2013 when she moved to Chimala village, Mbeya region because of agriculture. While in Chimala, Maria joined Upendo Women Group, an initiative of RUDI (Rural Urban Development Initiative), a non-governmental organization. Upendo Women Group joined SHIRCO in 2013. In the course of practicing agriculture, Maria met Mr. Twalibu who is a farmer and both of them found love and got married in 2013.

Before joining SHIRCO, Maria cultivated 0.20ha (0.5 acre) with output of 0.72MT (6 bags of 120kg) of paddy. As a member of SHIRCO through Upendo Women Group her farmland increased from 0.20ha (0.5 acre) to 0.80ha (2 acres) and now 2.02ha (5 acres) in line with the decision of Upendo Women Group. Evidential data on yield show significant changes from 0.72MT (6 bags of 120kg) per 0.20ha to the range of 3.60MT and 4.20MT (30 – 35 bags of 120kg per 0.20ha - 1 acre) representing 400% - 483% increase in yields. Young Maria is supporting the welfare of the family; basic family needs, improved food security, assisting in education of their child and opened a catering business. She acquired land for building her own house and the building has commenced.

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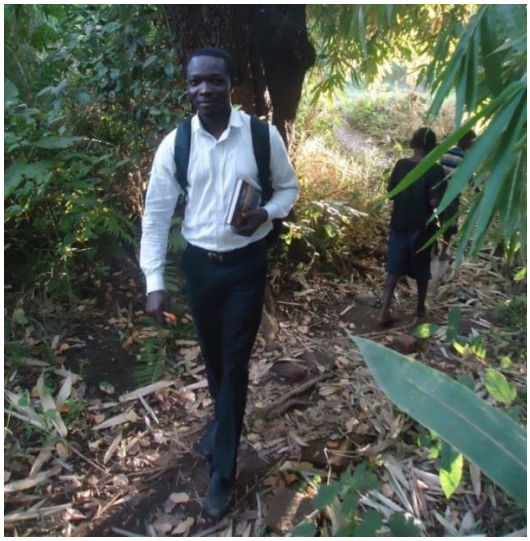

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Centre for Sustainable Development

ABOUT CENTRE FOR SUSTAINABLE DEVELOPMENT (CESDEV)

The Centre for Sustainable Development (CESDEV) was established by the University of Ibadan through Senate paper 5386 in May 2010 as a demonstration of the University's commitment to Sustainable Development. It was based on the need to provide intellectual platform for identification of issues germane to sustainable development, critically analyse them, and provide leadership in finding enduring solutions that will enhance sustainable development.

The establishment of CESDEV was sequel to series of events, paramount among which was the winning of a USD 900,000 grant from the MacArthur Foundation to establish the Master's in Development Practice (MDP) Programme. The University of Ibadan was one of the ten original Universities that won the grant in a global competition involving over 70 Universities. Further brainstorming led to defining the composition of the emerging Centre beyond the MDP Programme. It was resolved that a number of development programmes that were "hanging in the balance" be moved to the Centre. The **Centre for Sustainable Development** (CESDEV) thus became a Teaching and Research Centre with a mandate in multi- and inter-disciplinary approach to Sustainability issues affecting not just our continent but the whole universe. The Centre is designed to be a Teaching, Research and Development unit in the University. Presently, CESDEV has the following academic and outreach programmes:

- Development Practice Programme (DPP)
- Tourism and Development Programme (TODEP)
- Indigenous Knowledge and Development Programme (IKAD)
- Sustainable Integrated Rural Development in Africa Programme (SIRDA)
- Climate and Society Programme (CSP)
- Environmental Protection and Natural Resources Programme (EPNARP)
- Leadership and Governance Programme (LGP)
- Annual Ibadan Sustainable Development Summit (ISDS)

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