AGRICULTURAL

POLICY AND POVERTY REDUCTION IN TANZANIA

Paschal B. Mihyo (Editor)

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Agricultural Policy and Poverty Reduction in Tanzania

Paschal B. Mihyo (Editor)

Addis Ababa University
Sidist Kilo Main campus
Addis Ababa, Ethiopia
P.O. Box: 31971 **Tel:** 251-11-1239484/1239717
Fax: 251-11-1223921
Web: *http://www.ossrea.net*

157 Mgombani/REPOA Streets,
Regent Estate, P.O Box 33223,
Dar Es Salaam, Tanzania
Tel: +255 22 2700083 and +255 22772556
Fax: +255 22 2775738
Web: www.repoa.or.tz

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Organisation for Social Science Research in Eastern and Southern Africa

P. O. Box 31971, Addis Ababa, Ethiopia

Fax: 251-11-1223921

Tel: 251-11-1239484

E-mail: info@ossrea.net

Website: www.ossrea.net

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About the Authors

Paschal B. Mihyo

Prof. Paschal Mihyo is a renown Tanzanian scholar and lawyer; a holder of LL.B., LL.M and a Ph.D. in Public Law from the University of Dar Es Salaam. He is a Professor of Politics and Administrative Studies and a Visiting Professor of Development Studies at the University of Namibia, and at the International University of Management in Namibia. Currently, he is a Senior Visiting Research Fellow at REPOA. Formerly, he was the Executive Director of the Organization for Social Science Research in Eastern and Southern Africa (OSSREA) (June 2008 to December 2014). Between (1998 – 2004) he taught at the International Institute of Social Studies, Erasmus University Rotterdam in The Hague where he was Deputy Rector, Academic Affairs (1992-1995), Convener of the Labour and Development Programme and Deputy Convener of the Human Rights Programme. From April 2004 to September 2005, he served as Director of Research and Programs at the Association of African Universities in Accra, after which he joined the University of Namibia briefly between 2006 and 2008 and between 2015 and September 2017. His recent edited works include: *Thirty Years of Public Sector Reforms in Eastern and Southern Africa, Employment Policies and Strategies in Eastern and Southern Africa, International Land Deals in Sub-Saharan Africa, Election Process Management and Election Based Violence in Eastern and Southern Africa, Urban Youth Unemployment in Eastern and Southern Africa;* and *The Nexus Between Gender and Energy in Eastern and Southern Africa*.

Donald Mmari

Dr. Donald Mmari is an economist with vast experience in policy analysis, socio-economic research and institutional development. He holds a PhD from the International Institute of Social Studies of Erasmus University Rotterdam in the Netherlands, an MBA from University of Oregon, USA and an MA (Economics) from the University of Dar es Salaam, Tanzania. He is actively involved in development policy in Tanzania, ranging from the coordination of national poverty monitoring, including the preparation of Tanzania poverty and human development reports from 2001 to 2011; participation in the preparation of various national development policies, including National Strategy for Growth and Reduction of Poverty in 2004 and 2010, the Natural Gas Policy of Tanzania in 2012 and the Second Five Year Development Plan in 2015/16 to advisory support to various public and private institutions. He has also coordinated many large multi-donor funded research projects over his twenty years of service in the advisory, academic and research industry. He has published articles, working papers, policy briefs, and research reports on the extractives, manufacturing, governance, social protection, and on competitiveness. He has immense management experience accumulated over the years from the various positions within REPOA and outside, including membership to the Governing Boards of public entities. He is currently the Executive Director of REPOA.

Lucas Katera

Dr. Lucas Katera is an economist with practical experience on research and policy analysis particularly in the areas of poverty, public policy, governance and service delivery and rural development. He holds a PhD in economics from the University College of Dublin in Ireland and an MA (Economics) from the University of Dar es Salaam. Dr Katera has led many large research projects, including the Service Delivery Indicators (SDI) survey, a research that benchmarks health and education indicators for future impact assessment conducted in Seven African Countries; a research on the assessment of Agriculture Policy Instruments, focusing on the National Agriculture Input Voucher Scheme (NAIVS) and the National Food Reserve Agency (NFRA); and the Afrobarometer survey, implemented in 36 African countries. He has published papers, articles, policy briefs and book chapters on agriculture, taxation, governance and accountability, and local government reform. He is currently the Director of Commissioned Works at REPOA.

Dr. Blandina Kilama

Blandina Kilama holds a PhD from Leiden University, a Master's (MPAID) from Harvard Kennedy School and her first degree from the University of Dar es Salaam. She is a senior researcher at REPOA, a Tanzanian think tank based in Dar es Salaam with a lot practical experience in research, training and policy analysis. Her engagement in dialogues, publications locally and internationally are derived from her work in economic transformation, financial inclusion, SDGs, women empowerment, value chains in agriculture, nutrition and poverty. Dr. Kilama is a Joint Programme Director of the five years research programme on "Tanzania as a future Petro State" working on the component on Data for Policy Making and Public Engagement. She is a member of different technical working groups in Tanzania including the Household Budget Survey and Child Poverty Technical Working Group. She lectures on Poverty Statistics and Gender Statistics at Institutions of Higher Education in Tanzania.

Dr. Jamal Msami

Jamal Msami holds a Ph.D. in Social Policy from the University of Bristol, England. He is also a holder of MSc (Economics) from the University of Warwick. He has been involved in policy research and design for over ten years. He has published in the fields of public service reforms, industrial and trade policies. His current research work includes youth unemployment; political settlements and revenue bargains; patterns of primitive accumulation in Tanzania; and a review of trade competitiveness and diversification policies and practices in Tanzania. He maintains an active research interest in comparative historical analyses, new institutionalism, and applied social policy. He currently heads REPOA's directorate of strategic research focusing on research around natural

resources; governance and social policy; and industrialization, employment and enterprise development.

Engineer Sylvester Michael Mpanduji

Sylvester Michael Mpanduji is a professional engineer and holds a PhD in engineering from the Technical University Munich in Germany. He has worked at Sokoine University of Agriculture (SUA) in Morogoro, Tanzania for over 20 years where he rose from being a tutorial assistant to senior lecturer teaching engineering courses, undertaking consultancies and conducting research. Dr. Mpanduji has published several papers in peer reviewed journals, held senior leadership positions; deputy dean, faculty of Agriculture, head of department Engineering Sciences and Technology at SUA and chair of the Board of Ardhi Institute in Morogoro from August 2009 to date. He is currently the Director General of Small Industries Organization (SIDO).

Mr. Cornel Jahari

Cornel Jahari holds bachelor's degree in Economics from the University of Dar es Salaam Tanzania, a postgraduate diploma in Policy Analysis and MA in Development Studies specializing in Social Policy for Development (International Institute of Social Studies at Erasmus University Rotterdam in The Netherlands). He has been engaged in various research projects and activities including writing proposals, developing questionnaires, training of enumerators, supervising fieldwork including quality assurance, developing different data template packages, data cleaning and management as well as data analysis and report writing. He has over fifteen years of practical experience in social science surveys and has published in the fields of agriculture, maternal health, children rights and the oil and gas sectors. He is currently a Researcher and Field Manager at REPOA.

Dr. Moses Tekere

Moses Tekere holds a PhD in International Economic Relations (Kiev State University). He is the founding director of TRADES — an independent trade and development research and training institute based in Harare, Zimbabwe. He has extensive experience in working on multilateral and regional trade policy issues having worked in more than 30 African countries as a trade and economic policy advisor. Previously, he was a senior advisor on multilateral trade negotiations for SADC. Dr. Tekere has teaching experience from the University of Zimbabwe (UZ), Keio University in Tokyo, and various other institutions of higher learning in East and Southern Africa. He was the Chief Technical Negotiator for East and Southern Africa (ESA) Group for Economic Partnership Agreements (EPA) with the European Union (EU). He has written and published extensively on international trade, regional trade integration and economic reforms and development. Dr. Tekere co-authored Chapter 5 as a team lead to an EU's Targeted Support to REPOA and Zanzibar Ministry of Trade,

Industry and Marketing to Increase the Competitiveness of Primary Producers and Diversify the Export Base.

Mr. Calvin Manduna

Calvin Manduna holds an LLM in International Law and Legal Studies from Howard University, an MA in International Law and Economics from the University of Bern and an LLM in International Business Transactions from Stellenbosch University. He is an International Trade Expert with over 13 years of experience working in international development organizations in Brussels, Geneva, Africa and the Caribbean region. A trade lawyer by training, Mr. Manduna maintains active interest in value chains development, transport and logistics services, trade facilitation, regional economic integration, and trade policy making. He was previously the Principal Trade Expert in the Regional Integration Department at the African Development Bank. Mr. Manduna co-authored chapter 5 as an EU commissioned Trade Expert who provided Targeted Support to REPOA and Zanzibar Ministry of Trade, Industry and Marketing to Increase the Competitiveness of Primary Producers and Diversify the Export Base. He is currently a Doctoral student in Development Economics and International Trade Law at Howard University, Washington DC.

About This Book

This book focuses on a selected number of policy interventions in the agricultural sector with the view to determining factors that have supported or constrained the success of these interventions in poverty reduction which is the main objective of development initiatives and interventions in Tanzania.

Chapter One has focused on the foundations of rural development policy under the leadership of Mwalimu Nyerere the founder President of independent Tanganyika and the United Republic of Tanzania and it highlights the philosophical beliefs that informed the choice of rural and agricultural development as a priority in Tanzania's transformation strategy and the challenges that its implementation entailed.

Chapter Two is on *'Education and Farm Productivity in Rural Tanzania'*. It focuses on education and its impact on farm productivity and poverty reduction in rural areas. The findings bring to light the importance of primary formal education as an indispensable production input in agriculture, and in the economic development of the nation as a whole. It concludes that achieving self-sufficiency in food production and the much-desired growth in the agriculture sector of the economy will continue to elude Tanzania if problems in accessing formal education among farming communities are not properly addressed.

Chapter Three is on '*Frugal Innovation for Inclusive Development: A Case Study on Power Tillers in Tanzania'*. It discusses the experiences and challenges related to the diffusion of power tiller technology and the interface between technologies developed elsewhere and local ecological and cultural conditions. The main argument is that while modern technologies hold the potential to stimulate rural transformation by increasing production and productivity, for them to be diffused, they have to be relevant and easily adaptable to the local conditions.

Chapter Four which is on '*The Impact of Agricultural Input Subsidies on Poor Smallholder Farmers: Lessons and Challenges for Implementation of National Agricultural Input Voucher Scheme in Tanzania',* assesses the impact of subsidized agricultural inputs on productivity and poverty reduction through three phases of policies supporting such inputs in Tanzania. Focusing on the latest National Agricultural Input Voucher Scheme, the findings show a modest productivity increase at least in the short run but also cast some doubt on the NAIVS's ability to reduce food insecurity and increase substantial income to poor smallholder farmers. It calls for integrated approaches that combine farmer education and increased access to credit as well as technology that can enable farmers to become less dependent on rain fed agriculture.

Chapter Five undertakes an '*Analysis of the competitiveness of the tobacco value chain and exports'*. It raises concerns about the over-dependence of Tanzania on the export earnings for tobacco in spite of Tanzania's

commitments under the WHO Framework Convention on Tobacco Control due to massive environmental damage (deforestation) a high incidence of child labour on tobacco farms and the negative health consequences for growers, smokers and non-smokers. The authors caution that the market for tobacco products is changing and the tobacco value chain facing production, marketing and demand constraints aggravated by bottlenecks in input supply and distribution, formal financing, insufficient land, declining soil quality, poor farm infrastructure, high cost of labour, declining availability of firewood and various pests and diseases. The chapter calls for a rethink of alternatives to tobacco production in order to safeguards the livelihoods of tobacco growers and other actors on the tobacco value chain

Chapter Six provides insights into *Contrasting tales of value chains: Tanzania and Vietnam.* The two countries started as socialist states and later adopted market-oriented development policies. As seen in the previous chapters 1 to 4, the pattern of policy implementation in Tanzania has remained almost the same with the state at the centre of planning, marketing, pricing and input distribution. Focusing on the management of the cashew value chains in Tanzania and Vietnam, the chapter introduces dynamic strategies that the latter has used to promote production, productivity and competitiveness of the cashew sub-sector. It shows that state centred approaches led to stagnation of this subsector and Vietnam turned it around by liberalizing purchase and marketing of cashew and agricultural inputs and providing support to processors to enable their products to meet international standards and remain competitive. The chapter recommends that some lessons from Vietnam could help Tanzania make the cashew sub-sector more productive and competitive than it currently is.

Chapter Seven titled *Successful Collaboration between Government and CSOs for Poverty Alleviation in Tanzania* introduces the issue of the impact of collaboration between state and non-state actors in implementing government policies on agriculture and the environment. It uses one case studies one from Tanzania Mainland and another from Zanzibar to show factors that make this collaboration possible. It advocates increased collaboration between the two actors and gives evidence of successful implementation of government policies in two cases where the two worked together. The concluding chapter proposes an integrated approach to rural development that strikes a favourable balance between production, extraction and human development and takes a holistic approach in rural development combining land reforms with community technology learning and various forms of insurance against environmental and other hazards.

CHAPTER ONE

INTRODUCTION: MWALIMU JULIUS NYERERE AND FOUNDATIONS OF RURAL DEVELOPMENT POLICY IN TANZANIA

Paschal B. Mihyo

'Agricultural progress is the basis of Tanzania's development. This truth is said so often that people forget it. They almost don't listen. The words become part of the atmosphere, have no impact anymore. To talk about the impact of agriculture is like playing a record which has been heard too often' (Julius K. Nyerere, 'Agriculture the Basis of Development', A Speech Delivered at the laying of the foundation stone of the Morogoro Agricultural College on 18 November 1965).

1.1 Mwalimu Nyerere and Rural Transformation in Tanzania

The First President of Tanzania Mwalimu Julius Kambarage Nyerere through the Tanganyika African National Union (TANU); the ruling party between 1961 and 1977 made rural development and poverty eradication the main pillars of his vision and mission. In this chapter the late Julius K. Nyerere will be referred to as Mwalimu. Even before independence he had declared war on poverty, ignorance and disease which he considered the three main obstacles to development in Africa in general and Tanzania in particular. Mwalimu's main focus was rural development; emancipating the rural poor from abject poverty and deprivation by utilizing the vast natural resources that were abound in the rural areas. The first measure that the independence government took under Nyerere's leadership was the abolition of the chieftainship system and its feudal land tenure. Feudal land tenure was common among many communities that had chiefdoms. Chieftainships were part of the pre-colonial systems of governance and had their own positive dynamics that will not be covered here. But the British colonial government noting that chiefs were highly accepted and respected as legitimate leaders, usurped the system and used it to entrench ethnic identity and tribalism, thereby undermining the possibility of national unity. In 1924 the colonial Governor Donald Cameron introduced indirect rule in several colonies. It was used to administer justice based on colonial and customary laws (Morris and Read, 1972). In addition, it was used to supervise colonial production and mainly to reduce the burden of colonial administration on the colonial system and ensure African people paid for their own colonization. Aware of the negative role played by the chiefs during the colonial period and the possibility of perpetuating exclusive land tenure systems if they retained power, the independence government

abolished chieftainships altogether in 1962. This was followed in 1965 with the abolition of feudal land tenure through the Nyarubanja Tenure Enfranchisement Act. *Nyarubanja* was a land tenure system that legitimised serfdom in Kagera Region and was practiced at a smaller scale in other communities of the then West Lake Region and Kigoma. These measures laid the foundation for broader land reforms aimed at enhancing equality and equitable ownership of productive resources including land.

The main policy of the Tanganyika African National Union (TANU) for rural transformation was promulgated in the famous Arusha Declaration of 1967 which declared socialism as the official policy of the nation. The main principles of this declaration were: total eradication of systems that promoted economic and social exclusion; state ownership of all major means of production; social democracy; reliance on human rather than finance capital for development; agriculture and the emancipation of the peasants as the basis of development; hard work, intelligence and collective self-reliance (Nyerere, 1968: 231-250). The policy reflected Mwalimu Nyerere's belief that in order to promote rural development that would be inclusive and beneficial to all there was a need for a rural transformation policy focused on, among others, four principles: inclusive land ownership as a mechanism for peace; people centred and driven rural development; democracy from below as a foundation for national level democracy; and rural development as a bridgehead between rural people and intellectuals (the elite). In the next section we expand on the principles that reflect Mwalimu's thinking on rural transformation and Ujamaa socialism.

1.2 Inclusive Land Ownership, Peace and Human Rights

Prior to the abolition of chieftainships and feudal tenure, there had been serious tension in Bukoba District of the then West Lake Region. The author was a youngster at that time and witnessed clashes between serfs known locally as *'abahangoma'* (literally meaning servants of the chief*)* and landlords known *'abahinda'* meaning nobles. The serfs through organized groups went around destroying the farms of landlords at night especially in Kamachumu area of Muleba District. In 1962 the government was forced to establish a permanent police force at Kamachumu. This, however, did not stop the tensions as the African National Congress ((ANC) that had lost to TANU in the elections before independence still had underground operations . ANC was still well organized in many areas of the District including in Kiziba where houses of landlords were being torched. This led the government to act very quickly by abolishing chiefdoms and the feudal tenure system. For a few years after this intervention, the ANC continued operating underground, causing problems time to time. This and other experiences elsewhere had a very big influence on Mwalimu's thinking on land as a possible catalyst to violent conflicts or a harbinger to peace.

While addressing foreign diplomats on January 1, 1968 in Dar Es Salaam, he asserted that peace was not confined to absence of conflict because

confining peace to a mere absence of conflict was meaningless especially if the absence of conflict is used as a pretext for gross injustices that deprive the majority of people their rights and dignity (Nyerere, 1973: 2, Nyerere, 1972:1-5). He expressed fear that injustices that violate human rights could easily lead to bloodshed. He used the example of the minority regimes in Southern Africa and elsewhere where violation of human rights had led to armed struggle. He reiterated that the role of the state was not only to keep peace but to ensure conflicts did not arise. While addressing the Uganda Peoples' Congress on 7 June 1968 he said there was a time when the view of the state as merely a keeper of peace made sense, but that time was gone and in Africa it was the duty of the state to coordinate the provision of services in trade, education, health and the economy as a whole. As regards the role of the state in the modernization of agriculture, he cautioned that,

> *'In the search for ways of modernizing agriculture, governments may lose their way- they can forget what the purpose of all their activity is! Seeking for the most efficient agricultural system, it is very easy to forget that the purpose of efficiency is to serve the people. Seeking for development they can forget that the people may have some things they are not willing to sacrifice for material benefit' (Nyerere, 1973:32).*

1.3 Voluntary Village Settlement Schemes

In order to preserve the things and institutions that the people valued most, the first phase of the rural transformation was based on voluntary formation of village settlements. In 1962, the government encouraged the merging of villages for ease of provision of equipment and services in education, health, infrastructure, water and other essentials. Youth were encouraged to establish multipurpose youth production centres with agriculture, livestock and youth training centres. This was the first phase of rural transformation and in launching these settlements Mwalimu believed land was a crucial factor of production and at the same an important factor in building a cohesive peaceful society. He believed that a voluntary approach was necessary in order to ensure ownership of the programme and projects and he considered village settlements and youth centres as shortcuts to rapid rural development (Nyerere, 1968: 38-44).

Several voluntary village settlements were established under this policy between 1962 and 1969, majority by enthusiastic youth who were devoted to Mwalimu Nyerere's approach and ideology of socialism. Out of those we would like to document the experience of two; the Upper Kitete Village Settlement in Arusha and the Ruvuma Development Association (RDA). The Upper Kitete Village Settlement was set up in 1962 local experts and a foreign adviser known as Anthony Ellman who wrote a book and other publications on the settlement from which this account is drawn (Ellman, 1967, 2015). Farmers from six villages who had suffered from similar shortages of water, inputs and skills, most of whom were semi-illiterate, or

illiterate started the Upper Kitete village. The settlement was established on 6500 acres of fertile land and settled over hundred landless families. Each household was allocated three acres on which they began growing wheat and maize. A cooperative society was formed to coordinate production, marketing and the distribution of inputs. As the settlement began getting income, the livelihoods of the farmers improved. The government built a school, a hospital and a community centre. Mwalimu Nyerere was very much impressed by the progress because it gave him grounds for believing that his voluntary approach villagization was working. However, according to Ellman (ibid.), the rapid success of the settlement was not celebrated by all especially the leaders within the ruling party TANU who saw this autonomous development eroding their power, influence and control over the peasantry. The village committees were viewed by such leaders as becoming too powerful. In 1966 a commission was formed to assess the feasibility of the settlements (Government of Tanzania, 1966). Following its report to the Central Committee of the ruling party, the village committee and the cooperative society were dissolved, and the settlement ordered to take 500 hundred more families. It became a state managed Ujamaa (collective) village with a village manager appointed by the Office of the Prime Minister.

The same fate befell the Ruvuma Development Association. This association had been formed by a group of young professionals who were enthused by the ideology of socialist rural development. They were led by Ntimubanjo John Milinga. The settlement comprised of sixteen villages in Litowa Ruvuma Region. They formed the Ruvuma Development Association to coordinate their activities and as a legal entity through which inputs and credit would be channelled. Ralph Ibbot a British citizen came to support them as their adviser and he published a book and articles on the scheme. The farmers under the leadership of Ntimubanjo Milinga established a farm implements workshop, acquired some farm implements and secured volunteer experts to work with the farmers through training and extension support to the sixteen villages. Mwalimu Nyerere was very encouraged by this development and even contributed his own money to support the programme of the RDA. The villagers asked the Regional Commissioner to be the chairperson of the RDA. He accepted but never called nor attended any of their meetings. This was the first signal that support from the party and government establishment for the RDA was weak. But Mwalimu remained enthusiastic about their activities. He advised them to draft a constitution under which they could have an independent chairperson and did not have to depend on outside agencies for leadership. They also found that the education curriculum used in schools was not suitable for farmers' activities and therefore asked the government to allow them to develop their own post- primary school curriculum. This was accepted under Mwalimu's influence.

Encouraged by the RDA as a model for people centred rural development, Mwalimu ensured their experiences were shared across the whole country.

Seminars were organized at national level for Members of the TANU Central Committee and all national, regional and district leaders and the RDA leaders were invited as instructors to these nationwide seminars. Most of the experiences of the RDA underlined the importance of development from below and the futility of top-down approaches (Putterman, 1980a, 1980b, 1980c; Chimoto, 1975). However, these settlements had their own shortcomings. Researchers such as Cunningham (1966) noted that in spite of the positive elements of voluntarism and self-governance in settlements such as the one by RDA at Litowa, the farmers were mostly illiterate and their capacity to absorb new techniques was limited. He noted further that the exposure of the leadership on how to organize agricultural production in collective farming activities was low. Kates, McKay and Berry (1968) assessed twelve settlement schemes and were highly appreciative of the enthusiasm of the farmers and leaders but noted that they were operating within a framework of governance. This is because apart from the institutions for governing the settlements, there were parallel systems such as cooperative societies and party leadership structures. and vice versa. This was noted as an area of conflict between the settlement schemes and the government structures of power and resources distribution. Similar views were expressed by McKay (1968) and Newiger (1966) who pointed out the operational competition between village settlements and the already established cooperative societies that were a strong power base of the rural elite who were not very enthusiastic about sharing power with settlement scheme leaders or losing power to these schemes. Institutionally, cooperative societies were organized to cater for individual members who farmed on individually owned plots and sold their produce as individuals through cooperative societies. The produce and proceeds belonged to individual members of these societies. The emergence of collective farms under the settlement schemes caused a conflict of identity and roles for cooperative societies putting their leaders and those in government on the defensive. They also created confusion about shares in the ownership of produce and proceeds. These were areas that needed clarification.

Unknown to Mwalimu Nyerere and his small group of enthusiasts, these developments were raising concerns within the ruling party with the majority of members of the Central Committee of TANU considering this approach of self-management by villagers as contrary to the concept of guided democracy. Many other settlements began springing up. Most of them were started by the TANU Youth League activists based on the experience and success of the RDA and Kitete (Mwansasu, 1966). But the majority of them were struggling. The weaknesses of those that were struggling, and the threat caused by those that were flourishing were captured by the party and government leaders who did not want to lose control of the development process. In 1966 the Prime Minister Mr. Rashid Kawawa called for a new approach which he suggested should be based on centrally organized and systematically harmonized approaches and avoid conflicts between rural institutions such as cooperatives, local

administration and village development committees (Kawawa, 1966) Following this call the Tanzania Rural Settlement Commission mentioned earlier was formed and following its report and recommendations, the settlement schemes based on voluntarism were disbanded. In 1970 *Operation Vijiji* was launched and peasants were mobilized to either move voluntarily or by force into designated villages.

1.4 Villages as Bridgeheads between Peasants and Intellectuals

Ellman has observed that the failure of voluntarism in the formation of village settlements was not reflective of Mwalimu Nyerere's poor economic strategy. On the contrary he was convinced that the economic strategy of people centred, and people driven development was poised to deliver high returns in the long term. He however blamed the failure on Mwalimu's political strategy because according to him Mwalimu assumed the party leadership and government bureaucrats were all on his side when most of them were not and even those that made him believe they were on his side were only paying lip service. Another principle on which Mwalimu was mistaken was his belief that Ujamaa villages would provide intellectuals with an opportunity to pay back to the rural communities for the sacrifice they had made to foot the cost of their then free education. He banked on intellectuals to go back to the villages and help peasants to acquire and utilize new knowledge that would help to transform their livelihoods. He believed that they would be aware of the debt they owed those who had invested in their human capital formation. Addressing the staff and students at the University of Liberia on 29 February 1968 he said,

> *We are investing in a man's brain in just the same way as we invest in a tractor; and just as we expect the tractor to do many times as much work for us as a hand hoe, we expect the student we have trained to make many times as great as a contribution as the man who has not had the good fortune. We have the right to expect things from the university graduates and others who have had higher education of any kind. We do not only have a hope, but expectation. (Nyerere, 1968: 23)*

Mwalimu believed that intellectuals who would be sent to the villages would be society conscious and peasant friendly and would transfer and share skills with them without trying to dominate them.

His vision was that Ujamaa villages would be governed by members on the basis of equality. In his essay on 'Implementing Socialism' he said:

> *Indeed, I hope the Agricultural Field Workers and other skilled and trained people will be offering their advice freely, and doing all they can to encourage Ujamaa villages to adopt modern methods from the start. But decisions must be made by the members, not by anyone else*

> *– even Area Commissioners or visiting Presidents. (Nyerere, 1968d)*

In explaining how intellectuals could pay back, he pointed out that they could design projects and programmes that could transform the lives of people from abject poverty, relieve women of the burden of carrying water on their heads and relieve children of ill-health and malnutrition, emphasizing that they had to live in the communities they were working with and, 'not try to descend like ancient gods, do something and disappear again' (ibid: 25). To prepare intellectuals to perform those roles and in that spirit, some graduates were selected and taken for training at the party Kivukoni Ideological College in Dar Es Salaam. After the short but intensive training they were sent to the villages. However, at Kivukoni College most of them were trained in Marxist ideology of class struggle and the examples of villagization that they were exposed to were those from the Soviet and Chinese experience. Some of them had become convinced that private property was evil, and it had to be uprooted and production in rural areas organized on collective lines. This outlook led to one very unfortunate confrontation between farmers and intellectuals in Ismani area in Iringa Region in 1970.

Ismani is one of the most fertile areas of Iringa in Southern Tanzania. After the government decided in 1969 that all peasants should move to villages either voluntarily or by force after Operation Vijiji in 1970, leaders who had socialist orientation were sent to the regions as heads of regional or district administration. One of these leaders was Dr. Wilbert Kleruu an economist who was initially stationed in Mtwara Region and then moved to Iringa. He found that in Ismani area there were big farms owned by private commercial farmers of Tanzanian origins. In Marxist parlance these were 'kulaks' and therefore an obstacle to socialist development in Iringa. Perturbed by this he asked Mwalimu Nyerere to visit Iringa and see for himself this 'problem'. When the president visited the area, he was shocked to see that there were such big and independent farmers and he agreed with Dr. Kleruu that those farms should be nationalized and distributed among the several Ujamaa villages and the owners should be allowed to retain only three acres each.

One of these farmers known as Saidi Mwamwindi had about 400 acres of corn maize. On the 22 December 1970, Dr. Kleruu went to Ismani and ordered all the big farmers to surrender their farms to the ujamaa villages and start working on the Ujamaa farms. Said Mwamwindi and his family refused to comply. On 25 December 1970 Dr. Kleruu went to the village and found this farmer working on his farm and asked him why he was still working on his farm instead of the ujamaa one. Mwamwindi told him he was never going to surrender his farm or work on the Ujamaa one. Then a quarrel ensued and Dr. Kleruu insulted him and used derogatory terms about his mother. The farmer protested saying he had no right to insult his mother. At this point the official went to the grave of the farmer's mother

climbed on it and stamping on it continued insulting the farmer. The farmer was terribly enraged by this, ran to his house took his rifle shot and killed Dr. Kleruu. After that he put his body in the government car in which he had come and took him to the police station and reported that he had killed him telling them, 'pick your pig from the car'. He surrendered himself and the gun was taken from him. In 1972 he was arraigned, judged and sentenced to die by hanging (Saidi Mwamwindi, 1972). There are many versions of the story of Mwamwindi. Some close family members contend that the conflict between Dr. Kleruu and Mr. Mwamwindi had nothing to do with Ujamaa but personal conflicts between the two and that there were many farmers in Ismani who owned farms as big as or even bigger than that of Mwamwindi, but they were not targeted by Dr. Kleruu. Whatever the truth is, the episode shocked Mwalimu and the entire nation.

1.5 Ujamaa - From an Idea to an Ideological Project

The change from voluntarism in the formation of village settlements to the forceful mobilization of people to move to Ujamaa villages gave three faces of the Ujamaa project. Settlements were based on the idea that putting people together was beneficial to the people themselves and to the government because economies of size and scale would enable the people to access services and resources and for the government it would make it cheaper and easier to deliver services and secure resources that would be available to all. As an idea, the settlements attracted even the support of international financial institutions. Putterman (1995:461-464) has argued that the *villagization* idea was initiated by foreign advisers in 1962 and accepted by Nyerere, but the idea was limited to settlement schemes meant to create a model for rural transformation and commercialization of agriculture in Africa. According to him, the concept of ujamma villages was a modification of the idea of village settlements by Mwalimu and TANU. This is notable in the shift from voluntarism that characterized the formation of village settlements to *operation vijiji* which was based on coercive transfer of peasants designated areas. This was part of the shift of governance strategy from participatory to what became known in Tanzania as 'guided democracy'. According to Townsend (2010), this strategy was an adoption of corporatism and the incorporation of all interest groups under the umbrella of the state. In the process, all organized groups such as cooperatives, mass movements, trade unions and association of producers outside the cooperative movement were all turned into appendages of the ruling party. The establishment of village shops accompanied by the outlawing of privately-owned shops under the programme code named 'operation maduka' was part of this strategy of overall state control of all activities in the country (Mwakisyaobe 1976). The rise of corporatism changed the villagization strategy from an idea into a project. As an idea as indicated in the 1968 Guidelines to leaders cited earlier, it was going to be initiated and run on its own dynamics, managed and directed by the people themselves and developing capacity through incorporation of members and acquisition of inputs and technology. It was meant to be gradual and steady.

As a project it was designed from the top, planned by government and administered by government functionaries. In order to legitimize this transition, the change had to be backed up by a strong ideology. This was the third aspect.

In explaining the shift from village settlements Mwalimu argued that the former was based on false promises. Although there is no evidence for this, he said that there were promises that if people moved to these settlements, they would become very rich in a very short time and this did not happen. He also said that they expected to get modern equipment, but they were not trained on the use of such equipment and that in some cases such equipment was inappropriate. He also said that the settlement schemes were aimed at developing material things and institutions rather than developing both the institutional and human capacity. Ideologically his position was that human development had to come before material development. In the booklet on Guidelines for Leaders published in Freedom and Development (Nyerere, 1968d: 38-44) he said,

> *In fact, what we were doing was to think of material development before we considered human development. What it meant was that we thought money and equipment would lead to economic growth and wealth would transform the lives of the people involved. We put the economy first and human development second. As a result, there are many areas where the money invested did not lead to the expected results and money was lost. And in almost all these settlements money was lost and people who had moved there were disappointed and left' (ibid: 39)*

Of course, being at the helm of government, the President was more informed than the research community. However, from the accounts on village settlements, most of them were either disbanded before they lost members or acquired the necessary resources such as inputs, funds or equipment. Members had not left in disappointment. On the contrary it seemed most of them stayed and for example the RDA and the Kitete settlements were ordered to take on more villages and abandon the theories of voluntarism and self-management. What is important for this discussion however is that the shift was backed by the ideology which sought to play down material development and contrast it with human development as if the two were necessarily incompatible? The transformation of the idea into a project led to ideological differences between the state and the peasants on one hand and within the party and government leadership on the other.

The story of Ismani and the forceful introduction of collective farming in a burgeoning capitalist enclave attracted a lot of research interest in the early seventies. Some authors saw Ismani as the epicentre of the struggle between capitalism and socialist principles of Mwalimu concluding that the roots of private capitalist production were so entrenched that it was difficult to change the mind sets of the people by mere use of force. (Feldman,

1970; Awiti, 1972). Ujamaa enthusiasts who saw in the project a possibility of rural transformation and the establishment of a classless society, projected peasant resistance to villagization as part of class struggles in rural society on the one hand and struggles between the peasantry and state-based bureaucrats on the other (Mapunda, 1968; Mwapachu, 1976; Shivji, 1975:102-120). In spite of divergences in opinion, the Ujamaa villages project did not achieve its main objective of rural transformation. It uprooted many households, some who had occupied their land for generations taking them to new and often barren land to start new lives and create new forms of collective livelihoods. In his review of Scott (1998), J.C. Scott, 1998, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*, James C. Scott, Yale University Press, 1998, 445 pages, Reid (2011) has observed that:

> *Beyond the direct effects of this dislocation, villagization resulted in massive crop failures, destruction of farmland, losses of livestock, widespread hunger, and cholera epidemics. Unsurprisingly, many people simply fled back to their old homes as soon as they could escape. But on paper, for the state agents, villagization made Tanzanian society look much more orderly. All the farmers were collected together in neat little villages, usually located along all-weather roads so inspectors and policemen could easily access them. Thus, bureaucrats sitting in offices in the capital city could collect production numbers and distribute agricultural orders to the whole countryside.*

It is very attractive to all bureaucracies to create order. No bureaucracy can tolerate disorder and any inclination towards self-management is suspiciously considered anarchist. Therefore, whether it a socialist or capitalist state, order is necessary and as Andrew Coulson has observed in the case of Tanzania, the basis aim of villagization was to provide social services such as health, education, markets and infrastructure. Not much attention was given to the creation of a buoyant economy to support the provision of these essential services.

This was noted by Mwalimu ten years after he had dismissed the importance of material development in 1968. In his 1977 report to the Ruling Party and through it to the nation titled, *The Arusha Declaration Ten Years After*, Mwalimu admitted three major omissions in his rural development policy. The first one was that the implementers of Ujamaa villages were party enthusiasts who had never lived in villages and were not familiar with farming in the areas where they were sent and that they also failed to draw on the knowledge of farmers and local experts. The second admission was that a lot of efforts went into the provision of social services without producing enough wealth to support their provision. Third he admitted that the villagization programme had failed to stimulate technological change because in his own words, 'The majority of our

traditional crops are still being grown by the same methods as our forefathers used'. It is very rare for leaders such as Mwalimu who was highly respected and enjoyed a lot of power which he could have used any way he wanted, to admit mistakes in the implementation of his own policy. What is common in Africa in general and Tanzania in particular is that leaders become critical of their own systems and approaches to development after they have left government. Mwalimu set the precedent of always being critical of himself and calling for criticism within his own party. His book *Tujisahihishe* (1970) was a blue print for self-criticism and within the ruling party he introduced the concept of *'jeuri ya chama ndani ya chama'* meaning, 'the daring spirit of the party, within the party' which was used as a basis of self-criticism within TANU and its successor CCM during Nyerere's time. However, there are some factors which neither the party nor Mwalimu recognized as major stumbling blocks to the success of Ujamaa as a policy for rural transformation and development. These include absence of a change management and leadership strategy; the bureaucratic approach to social problems and false assumptions about African culture.

1.6 The Change Management and Leadership Deficit

The Arusha Declaration was a policy that was very meticulously crafted reflecting the ills of foreign domination and the aspirations of the people to live a prosperous life. It was developed with a lot of secrecy within a small group of like-minded members of the ruling party. It was so secret that most of the leaders within the ruling party heard about it when it was made public at the General Conference of the party in Arusha in 1967. Some of them tendered their resignation and one of them Mr. Oscar Kambona who was the Secretary General of the Party fled the country. Lack of consultation even within the party itself greatly undermined its acceptability right from the start. In addition, the policy was not followed by a strategy document. It remained the policy and strategy document at the same time. The seminars that were organized for its implementation were aimed at creating awareness about it and not to discuss and reach a consensus on its implementation. Due to these two factors, the document was too general and was not based on a situational analysis which could have identified the needs at each local level and base interventions on stakeholder suggestions on how to overcome those needs.

Change of even a smaller unit than a country such as a company requires a lot of strategic planning based on stakeholder and situational analysis, the preparation of financial, human, IT and other resources maps before such strategic plans are launched. The Arusha Declaration as a policy document was not followed by the second component of developing a strategic plan. It assumed all communities were at the same level, had the same needs and had to follow the same pattern in this rural transformation drive. The following factors seem to have been ignored:

- Peasants were very familiar with their own systems of farming, but they had no idea what collective farming entailed in terms of systems of power, production, reproduction and distribution. They were not consulted or given a chance to ask and get answers on how collective farms would address these issues.
- Their systems of farming were assumed to be unproductive, backward and based on the wrong values of individualism and material development which were assumed to be wrong. However, these are systems that had sustained them even through the extractive policies of colonial regimes. They had ensured their subsistence and food security. Moving them to a new unknown system would have been more meaningful if they had been given a chance to see how the new system would take them to a higher level of income, social and other human development levels.
- Indigenous technology which had sustained these communities for ages was played down and promises were made to provide them with advanced technology over which they had no idea, the skills for which they were not provided with, and, in the end, the promised technology never came their way.
- Decisions were made to move the peasants to what were considered fertile areas such as marshes and swamps which the peasants had for ages avoided because their soil culture was incompatible with their crops or because they were not suitable for human habitat. Some who were moved to the wetlands contracted malaria and bilharzia in big numbers and these are the hazards they had avoided. Indigenous knowledge was ignored in the process and this contributed a lot to the failure of the project.
- Changing habitats and abandoning traditional homesteads led to new needs for which provision was not made. Those who were forced to abandon their homes had to construct new inferior types of housing exposing them to new challenges of space, security and privacy. As for those who remained in their homesteads but had to travel to the Ujamaa farms regularly, new needs arose on child care, management of reproductive needs and household security.
- Change of production systems required change of rhythm, pace and techniques of work. It also involved change in the allocation of time between activities such as farming, taking care of animals, fetching firewood and water etc. These were traditionally based on household decisions. With collective farming they were now centralized thereby diminishing individual agency and disrupting individual time management.
- Collectivization assumed that peasants were producing goods only for cooperatives as their primary markets. In real life situations, the peasants produced for the formal and informal markets with some time spent on farm and off farm activities for some and services within communities for others. The assumption that they would produce together for sale of produce to the cooperative societies or

crop authorities after the cooperatives were abolished ignored non-farm and other activities.

- Social capital structures that had been built up over the years such as mutual aid, kinship circles, merry-go-rounds; informal credit systems and associations etc., were all of a sudden subsumed by the new collectivism which did not offer them alternative systems.
- The positive aspects in the household division of labour based on age, gender and other factors were disrupted as production was managed by village managers and leaders at the community level performed the role of supervisors. For many communities this was a very disruptive development.
- Finally, there was failure to realize that change of this kind was a journey. It required careful understanding of the desired route and destination, proper assessment of quantities of resources that will be needed, a clear map of how to reach the desired destination, indicators and milestones by which to measure success or failure and an independent system for monitoring and providing feedback on progress made and areas requiring change of plans. In the implementation of the Arusha Declaration, most of these elements were missing. The approach was simply that, *'mbinu za mapambano zitapatikana kwenye mapambano yenyewe',* meaning, 'the tactics for the struggle will be developed during the struggle itself'. This unfortunately is not the most scientific way to go about initiating and managing change.

There was therefore a serious technical deficit about the lack of clear strategic planning and preparation for change management and leadership. It was because of this deficit that it was easy for opponents of village settlements to convince Mwalimu to abandon his earlier approaches hinged upon voluntary, people driven and led villagization to the corporatization of ujamaa villages and institutionalization of leadership from the top. Explicit policy which is not backed by a clear explicit strategy stands a chance of being driven by ever changing implicit policies and strategies. In this case it is clear that because there was no strategy document, the opponents of voluntarism and people driven villagization managed to change the implementation strategy without openly attacking the Arusha Declaration (Coulson, 1978). The anti-ujamaa elite waited until Mwalimu stepped down and then managed to abandon the Arusha Declaration altogether. However even before that, all the principles of the policy had been completely side-lined and Mwalimu had been overruled by his own followers through their exploitation of the absence of a blue print on how to implement the declaration (Ibbot, 2015). On Mwalimu's failure to preserve his initial stance on village settlements based on the Ruvuma Development Association model, Jappie (2017) has concluded that Ujamaa policy was implemented in a two track process and it suffered from the vices of power hungry bureaucrats who saw the success of voluntarism as a threat to their power and adds that in the case of Ruvuma, 'In reality, TANU's leaders

wanted large scale tobacco plantations instead of maize for local consumption and to be calling all the shots'. If there had been a strategy map based on consultative processes; chances are that the voluntary approach would have remained. In the absence of a road map everything became possible including as we shall see later the triumph of scientific management in planning. As Lewis Carroll reminds us, 'if you don't know where you are going, any road will get you there'. For the peasant, the dilemma was even worse because in the absence of consultation and participation in the design of the whole project, they were in the dark as regards what their destination looks like and in the words of Leigh Ashton, 'If you don't know where you are going, how will you know when you've got there?'.

1.7 Cultural Variables and Their Impact on Ujamaa and Villagization

Ujamaa philosophy was based on the assumption that production and consumption in most African societies was communal and that capitalist relations of production and exchange were imposed on an otherwise egalitarian, communalistic African society by colonialism. It was also based on the assumption that individualism in production and consumption were alien to African society. In an interview with the New York Times (1960) Mwalimu said, "The African is not 'Communistic' in his thinking; he is -- if I may coin an expression - 'communitary'." He believed Africans were socialist and democratic by nature as indicated in his famous dictum that, "We, in Africa, have no more need of being 'converted' to socialism than we have of being 'taught' democracy. Both are rooted in our past -- in the traditional society which produced us." (Nyerere 1967). These assumptions were aimed at mobilizing support for the Ujamaa policy but were not reflective of the actual nature of African society in general or Tanzanian society in particular before or after independence. In Tanzanian society three concepts apply almost across all communities as regards relations of power, production, distribution and consumption. These are: 'undungu, (familial or kinship relations), 'umoja' (solidarity) and 'ushirika' which relates to informal and formal cooperation. Kinship and household relations determine property ownership and control and strategies for production and coping based on family or household labour. These relations are permanent and continuous except for marriage. People are born into kinship groups and except for marriage they have no power to disengage from such groups.

'Umoja' or solidarity is more about the pooling of human and other resources between individuals and households either to address a temporary problem through mutual help, community work or in confronting common problems such as environmental or security threats or fundraising for a common goal and similar, mainly temporary or occasional purposes. Cooperation is between individuals who decide to form a group aimed at achieving a common goal in production, marketing or similar activity. This relationship is between individuals and is based on individual membership

which cannot be inherited or easily transferred even where it involves share ownership. In all these relationships, individuals put together their efforts and at the time of distribution they get a share according to their entitlement or contribution. Entitlement arises in the case of familial or household relations where status determines who gets what share in the process of distribution. Children, the elderly and the physically challenged get entitlements determined by their status in the family or household. The rest get their share in accordance to their *ascribed* or *achieved* status. Ascribed status is determined by customs and cultural norms of power and distribution and achieved status is determined by what entitles a person to a certain quantum of the share of proceeds out of production according to norms determined by power structures at the family or household level.

It is important to note that in production as well as distribution individual contribution or status is the norm. In a typical African household whether of agrarian or pastoralist nature, each member of the household including children has a designated place and owns certain means of production. In agrarian societies livestock and exchange crops (nowadays known as cash crops) belong to the head of the household while means of subsistence (food crops, small stock, milk, ghee, blood products etc.) traditionally belong to the female subhead of the household. Men and women have designated places where they sit, and exercise control and their spouses cannot enter or control them especially if there are visitors from the opposite gender. In some communities' hoes belong to women and machetes and axes to men. Of course, with changes in structures of housing and production, these phenomena are changing especially in suburban or urban areas. They however still subsist in many rural areas subject to changes within the bargaining power of age and gender groups as incomes and other factors change (Dito, 2011). Education status, resources shortage and structural adjustment programmes have led to major shifts in gender and age relations at the household level in both urban and rural areas (Wamuthenya, 2010). In some communities the retrenchment of men following structural adjustment programmes and the processes of globalization have led to significant shifts in the gendering of space. Specialization in production and distribution and reform processes have also restructured rights and entitlements based on age and gender (Goebel, A. 2010; Awumbila, M. and D. Tsikata, 2010). In spite of these rapid and far reaching changes, customary practices and systems of ascribed status related to land and resources rights have remained intact in Tanzania and most of the countries in Africa (Tsikata, D., 2003; Whitehead, and Tsikata, 2003).

In the context of the above discussion, it is both possible and defendable that the 'ujamaa' concept, appealing as it was, did not reflect the actual situation on the ground in Africa as regards collectivism versus individualism. It is clear that in most African communities' production and distribution were individualistic while consumption was collectivist. In many such communities, production was organized on individual basis

except for common resources set aside for general welfare. Tt was primarily at the level of consumption that there was a lot of sharing or collectivism. It was in this domain that food and produce was shared, and some surplus was set aside for welfare. Preparation of food or beverages collectively was not an everyday occurrence but was for festivals, funerals and other collective functions. It is no wonder therefore that the generalization of collectivism in production, distribution and even consumption as initially envisaged in the Ujamaa doctrine, created serious problems not only in the cognitive interpretation of its objectives but also in the implementation of collective production and distribution leading to institutional opposition from various communities right from the onset.

Even among the communities that shared a lot of common amenities such as water, grazing grounds and forest-based sources of energy, individualism was the norm in production and distribution. While grazing together, heads of cattle belonged to individual families or persons and while fetching water or firewood from a common source, the water or firewood fetched belonged to individuals or their households and were not pooled together. That is why institutionalization of collectivism among pastoralist and semi-pastoralist communities was as problematic as it was in agrarian communities (Matango 1970; Missana 1975; Ole-Saibul, 1974).

Where cooperatives existed, the concept of 'ushirika' was functioning very well in spite of managerial challenges. Members of such organizations were individuals who produced individually and sold their individual products to cooperative societies. The introduction of Ujamaa required them to pool their tools and implements together and sell only to state crop and commodity bodies. Cooperatives were abolished. It was difficult for fishing communities, for example, to see how they would pool their fishing tools and gear and share proceeds because their activities were specialized and various fishing communities shared fishing waters according to seasons and their own arrangements. Among such community's opposition to collectivism was immediate and undisguised (Landberg, 1973). In sedentary communities where farms with permanent or perennial crops had been established and transferred across generations, it was difficult for the peasants to understand let alone accept the rationale of abandoning such farms organized along well-established villages, to move to new mostly fallow land to establish new villages. In places such as Kilimanjaro peasants resisted the move and it became difficult to force them to abandon their villages (Mushi and Sangale, 1972; Lyimo, 1975; Kayombo, 1973; Mboya, 1970). What may have been ignored in the Kilimanjaro and other areas where commercial crop farming was very advanced and cooperative societies were grassroots based, is that exchange relations were very much along capitalist lines and they viewed socialism as an interference with their systems of production and marketing. Commenting on coffee farmers of Kilimanjaro, Robert Calderisi a former World Bank official in Tanzania from 1997 to 2000 and ardent supporter of Mwalimu's efforts has observed

that, 'coffee farmers in Kilimanjaro were proud to be capitalist and were chafing at checks on their enterprises' (Claderisi, 2007:108-9).

Similar problems were experienced in Kagera Region (by then known as West Lake Region extending to areas such as Geita) where customs of land ownership intertwined with remnants of feudal tenure made collectivisation virtually impossible (Rald, 1970; Bugengo and Mutangira 1975; Bugengo, Mutangira and Rwelengera, 1976; Ntirukigwa, 1971; Dabana, 1970). In Mbeya and Iringa regions very few villages were started and fewer survived for the same reasons as in other areas where communities were sedentary (Konter, 1978).These few accounts give strength to argument that although Ujamaa sought to build on African culture, the culture on which it was predicated was the culture of communalism which most societies had gone through and surpassed at the time of colonial invasions. At the time Ujamaa was introduced, African communities were either in the transition from feudal to capitalist exchange relations or were already in the early stages of capitalist development. Webster and Ogot (1992:897) have observed that in East, Central and West Africa, trade was blooming before it was disrupted by Dutch, Portuguese and Spanish intruders; it was controlled by individuals and the private sector was emerging and growing. Therefore, by the time of colonial invasion, African societies were in the process of transition from communalism to capitalist relations punctuated by feudal systems of land ownership in some places such as West Lake Region and Kilimanjaro areas and trade in was flourishing among Coastal, Shambaa, Zigua (Known as Zigula then) Chagga Kingdoms before the intensification of slave trade by colonial invaders. Kimambo gives examples of rulers such as Ngalewa and Mirambo of Unyanyembe, Mtinginya of Isongo and Isike who were powerful traders in non-human commodities and became powerful leaders capable of repelling German and Arab domination (Kimambo, 1989:249). Cohen has also indicated that in The Great Lakes trade was in foodstuffs mainly produced in Bukerebe, while Buzinza specialized in metal ware and Usukuma in cattle. The Basubi traders became main trading brokers between these communities transporting salt and metal ware to the island of Bukerebe and bringing back foodstuff which was traded for cattle with Wasukuma etc. (Cohen, 1989: 286-7). All these historical accounts indicate that trade was becoming a norm and it was driven by the private sector before the advent of colonial invasions.

1.8 The Modernization Drive in the Villagization Programme

Apart from a few research reports that came out at the beginning of the programme which gave a positive assessment (Mwapachu, 1976; Mapunda, 1968; Buliga and Kimola, 1975), most analysts of Ujamaa and Mwalimu have reached a conclusion that it was not as successful as it was intended. In explaining this failure many theories and assumptions have been advanced. According to Lappe and Beccar-Varela (1980), development policies in Tanzania were based on a patriarchal approach with the

leadership believing that the people have to be led by both a carrot and a stick and this was causing problems in policy implementation. Seidlite (1975) attributed it to lack of persuasion and participation by peasants made them unaware of the benefits of moving to new villages. Similar observations were made by foreign researchers who had been initially enthusiastic about the idea of Ujamaa and studied the villagization processes which they thought could have delivered better results if persuasion rather than coercion had been the norm (Van Velzen 1973; Boesen, 1976; Boesen, Madsen and Moody, 1977). Some dismissed the whole experiment as an exercise in utopia. Hannold (1976) was of the view that it was bound to fail because it was based on utopian ideologies of Fabianism and the moral economy which were already out of place. This view was also echoed by Mueller (1980) who considered it misplaced as it emphasized equality more than development instead of focusing on both. She even likened Ujamaa with the populist ideas of the Narodniks in Russia before the Bolshevik revolution who believed in taking power to the peasants and getting rid of the Tzar and the landowners. Issa Shivji using a Marxist approach characterized the whole process as part of the class struggle in which the bureaucratic bourgeoisie was trying to subordinate the peasantry in order to extract surplus from them (Shivji, 1975).

There is some element of truth in these various assessments and theories but we need to look at the villagization project from the perspective of what Scott has termed 'authoritarian high modernization' which according to him started with the industrial revolution, was adopted to the extreme by the Bolsheviks in Russia under Lenin and Stalin and has been practiced in urban and rural planning all over the world for over two centuries. It has nothing specifically to do with socialism, Ujamaa or capitalism. Scott has described it as 'a strong (muscle bound) version of the beliefs in scientific and technical progress that were associated with the industrialization in Western Europe and North America from 1830 to the first world war' (Scott, 1998:91-92). Scott has given an extensive analysis of programmes in rural and urban development that were started with good intentions of enhancing human development but failed because they were upper-handed, developed by experts without consulting the intended beneficiaries, based on the supremacy of scientific and technical knowledge and guided by the assumption that experts have been equipped with the requisite skills to analyse and provide solutions to all human needs and conditions. According to Scott these beliefs have been the driving force behind western industrialization and the development of scientific management by Frederick Taylor and Ford.

Within this modernization approach, the state is seen as the vehicle of fundamental change, transformation and improvement of the human condition. In order for the state to perform this role, it needs to design plans that make most aspects of society capable of being scientifically described or in Scott's words 'legible'. Legibility comes through carefully designing all human activities including habitats in a manner that they are easily

accessible for tax collection, service delivery, population census, procurement and of course general administration. According to Scott the radical part of this 'authority of high modernization' has led to what he calls 'total city planning' defined by geometry and standardization citing various examples of cities that have been designed with this kind of precision guided by geometry and standardization such as Moscow and Brasilia. The conviction and devotion to which the design of such cities is done turns these planned cities into what Scott calls 'utopia cities' (p. 114) citing Brasilia and Moscow. It should be noted that when planning Dodoma as a capital of Tanzania in the mid-seventies experts from Brasilia came to Tanzania as technical advisers to the Capital Development Authority and had an input in the design although resources at that time did not allow the programme to be implemented as fast as was the case in Brazil. Scott (1998) devotes several chapters on collectivization in Russia which was also based on what he calls, 'The rule of the plan' under which the 'wisdom of the plan sweeps through all the obstacles' leaving no room for ambiguity and as a result of such planning 'each village was unique, it could be mapped and mobility of people and forces is made easy'.

In his chapter on Tanzania, Scott describes how in the 19th Century peasants lived in scattered homesteads or in small established villages in which they responded to their environment and produced enough for their subsistence. According Scott, Mwalimu found these settlements backward, inefficient and costly to reach and service. He therefore decided in good faith that farmers would be better off, and development delivered to them faster if agriculture was centralized, villages better organized, and farming made communal. This idea was picked by planners who applied principles of authoritarian high modernization and in planning villages there were instances where an existing home could be destroyed if it did not fall within the 'surveyor's line' quoting DeVries and Fortmann (1979:135) in their account of 'Operation sogeza' in Iringa Region. Scott's broad conclusion is that most of these mechanical programmes and projects that sought to raise science over society have ended up failing and Ujamaa was not an exception. He views them as exercises in social engineering which though not achieving their initial objective leaves a lot of valuable elements destroyed. He has observed, 'That the social engineer failed to create a world after his own image should not blind us to the fact that it at the very least damages many of the earlier structures and practice that were essential to its mėtes' (p.349). For Tanzania, post-Mwalimu rural development efforts have picked from where Ujamaa left and the process of modernization will continue because it is unavoidable. The real challenge is to identify the best path to modernization that does not destroy the fundamental principles that were laid by Mwalimu Nyerere: equity in land ownership, equality of opportunity, unity within diversity, land ownership systems conducive to peace, human rights and human dignity, people focused development and rural development as a bridgehead between farmers and intellectuals. Most important of all, is poverty eradication and

linkages between the rural and the urban sectors and industry and agriculture. This book seeks to assess the extent to which these ideals have been preserved in rural development initiatives after the historical phase of Ujamaa led by Mwalimu Nyerere.

CHAPTER TWO
EDUCATION AND FARM PRODUCTIVITY IN RURAL TANZANIA

Lucas Katera

2.1 Introduction

It is widely accepted in contemporary development that the growth of many developing countries, particularly those in Sub-Saharan Africa, will only be realized with a well-developed agriculture sector (Verschoor, A. – J. 2009). This is because agricultural growth has powerful leverage effects on the rest of the economy, especially in the early stages of development and economic transformation, when agriculture accounts for large shares of national income, employment and foreign trade. Tanzania is not an exception in this aspect. Recent statistics show that 80% of its population depends on agriculture for livelihood, and agriculture contributes 95% of its food consumption. Furthermore, agriculture contributes more than 25% of the GDP, 30% of the total exports and 65% of the raw materials for its industries (URT, 2016). The development of the Tanzanian economy cannot be isolated from the development of the agriculture sector. Within this context, researching agriculture remains an important aspect of development. In his Nobel Prize lecture, Schultz (1979) summarized the motivation for his research as:[1]

> *Most of the people in the world are poor, so if we knew the economics of being poor, we would know much of the economics that really matters. Most of the world's poor people earn their living from agriculture, so if we knew the economics of agriculture, we would know much of the economics of being poor.*

Public investment in agriculture is an important driver of agricultural growth and has a significant bearing on poverty outcomes. However, because of budget constraints, countries find themselves in an increasingly difficult situation of having to meet the rising costs of social services to mitigate the immediate impact of poverty and, at the same time, raise investments to boost and broaden growth in the agriculture sector so as to reduce the prevalence of poverty especially in rural areas. Under such conditions of trade-off between social and growth sectors, it is important to understand, acknowledge and take advantage of synergies existing between them.

[1] The lecture is available through http://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/1979/schultz-lecture.html

Education is one of the social sectors that have a bearing on productivity. Specifically, education may enhance farm productivity directly by improving the quality of labour, increasing the ability to adjust to disequilibria, and through its effect upon the propensity to successfully adopt innovations. Education is thought to be most important to farm production in a rapidly changing technological or economic environment (Alene and Manyong, 2007). Since farming methods in Tanzania are largely traditional, there appears to be little economic justification for households to invest in education. However, with the recent initiatives like *Kilimo Kwanza,* Big Results now (BRN), Southern Agriculture Growth Corridor of Tanzania (SAGCOT) and those outline in the Agriculture Sector Development Programme II (ASDP II), the government is focusing attention on a modernized agriculture (URT, 2016)[2]. As technological innovations spread more widely within the country, the importance of formal schooling to farm production ought to become more apparent.

In Tanzania, however, formal education seems not to have been viewed as an input to agriculture productivity but rather as a channel though which formal employment in urban areas van be obtained. As a result, parents only attach importance in the primary education system if it will lead their children to higher education and eventually assure them formal employment as they graduate. Agriculture is the main economic activity for many Tanzanians, particularly those living in rural areas. Unemployment is a serious problem among youths in the country (URT, 2015).[3] Thus, even when formal unemployment is high among youths, farmers should still consider primary education as an important input to agriculture, thus send their children to school. More important, the "Primary school (compulsory enrolment and attendance) Rule 2002" makes it a criminal offence for parents/guardians to fail to enrol seven- year olds in a primary school or allow a pupil to drop out before completion of the full primary cycle (URT, 2003d). Despite imposed penalties, including cash payment and jail sentences, the efficiency of primary education measured in terms of cohort wastage raises a number of concerns. The average survival rate to Std. VII between 2005 and 2010 was 69% (URT, 2011). This suggests a low level

[2] *Kilimo Kwanza* are Kiswahili words meaning *Agriculture First*, which is a new green revolution initiative. On the other hand, BRN is an initiative which was borrowed from Malaysia, which is a comprehensive system of development implementation, described as a "fast-track people-cantered growth 'marathon'" focused on six priority areas articulated in the Tanzania National Development Vision 2025, with agriculture being one of them. Finally, SAGCOT is an initiative, whose goal is to expand investment in agribusiness so as to increase income growth among smallholder farmers, but also to generate employment across agribusiness value chains in the Southern Corridor

[3] Integrated labour force survey, National Bureau of Statistics

of acknowledgement of the importance of primary education, especially if parents saw limited chances for their children to excel to higher education levels for formal employment in urban areas.

The purpose of this paper is two-fold: first, to challenge the hypothesis that demand for schooling in rural Tanzania is constrained by lack of visible benefits of schooling in terms of farmer productivity; and second, to understand better the possible consequences of low levels of demand for schooling in terms of missed opportunities to improve agricultural productivity in rural Tanzania by raising farmer efficiency through adoption of innovations. The first objective is to work out the importance of schooling to the rural economy. Parents are likely to recognize the importance of primary education to their children if they consider it as a channel to higher education, which will enable such children to access formal employment after graduation. Even when they do not see the chances of their children excelling to higher education and formal employment, parents may also see the importance of primary education to their children if they perceive the contributions towards farming efficiency. If this is not the case in Tanzania, it may partly explain why there is such a high level of drop-out before completing Std. VII (BEST, 2013).[4] The second objective is important for policy-makers concerned about high drop-out rates despite the free provision of education. Recent agriculture development initiatives focus on mechanizing agriculture with emphasis on inputs like machinery, chemical fertilizers, improved seeds, etc. If education is found to have a significant impact on the adoption of agricultural mechanization, this will provide a rationale for agriculture policies to integrate issues of formal education.

There are several avenues by which schooling may create economic benefits in rural areas. Households receive income in cash and in kind from farming and off-farm activities, wage employment, and remittances from migrants. Education may increase the probability of success in each of these endeavors and, in so doing, diversify household income sources to reduce risk and improve economic security. Since farming is the primary activity of most households in rural Tanzania, this paper will focus on the part played by schooling in agricultural production.

2.2 Experience of Education and Farm Productivity

2.2.1 Introduction

All governments around the world have been advocating investment in education because of its perceived importance in the labour market success of individuals (World Bank, 2018). However, a majority of the population in developing countries depend on agriculture for their livelihoods. Knowledge of market returns to education is less useful as a guide to

[4] Basic Education Statistics, 2013

increase educational investment in such agrarian societies. Theoretically, education is expected to improve productivity in all spheres of activities, including agriculture. Improvements in human capital should influence how an individual acquires, assimilates and applies information and technology. A positive return to education arises, for example, because educated farmers organize well their labour force, apply current improved seeds and other industrial fertilizers and can even engage in high risky (but with high-return) production technologies. Despite such common beliefs regarding the benefits of schooling in farm activities, there is weak empirical evidence to advocate educational investment in agrarian societies. The existing studies on the determinants of farm productivity and efficiency are largely inconclusive on the question of a positive return to education.

2.2.2 Importance of Education on Farm Productivity

From the human capital theory perspective, the role of education on returns to investment has been estimated for over 50 years now. Education, particularly formal education, acquired during primary and secondary schooling, has been shown to result in higher incomes and improve overall economic development and growth (Becker, 1964). Many studies in the relationship between education and agriculture productivity used production function (see Griliches, 1964; Lockheed et al., 1980; Phillips, 1994; Appleton & Balihuta, 1996; Weir, 1999; Alene & Manyong, 2007; and Ajani & Ugwu, 2008). Preference to use production function in estimating the relationship between agriculture productivity and investment in education is the absence of wage data in agriculture sector, especially in developing countries. Production function, thus, estimates addition additional outputs from a labour as a resulting of additional unit of human capital in the form on one more year of schooling. A major weakness of this approach, which is a point of departure of the current study, is that of treating education as a direct input to farm outputs. More likely, education contributes to increased farm output if educated farmers decide to make on-farm innovations that transform agriculture from traditional to modernized form. Thus, education may not likely affect agricultural outputs directly, but does so through its impact on the decision to make on-farm innovations.

Griliche (1964) made one of the earliest attempts to study the relationship between farm productivity and farmer education. The study used a Cobb-Douglas production function, to study 39 states in America, with three cross sectional data sets which covered three years, 1949, 1954 and 1959. The study found out that, human capital in the form of education contributed to 41% increase in average farm productivity, and it had substantial economies of scale in agriculture. Many other studies that followed provided mixed results on the role of education on farm productivity. In certain cases, the relationships are negative whereas in others they are positive. However, there is great variation in the strength of association even in cases where studies show consistent relationships.

Ali and Flinn (1989), studied profit efficiency of small-scale basmati rice producers in Punjab and found that lower level of farmer education contributed high level of inefficiency at farm resources and price levels amounting to 28%. A number of other studies that analyzed the association of education of the farmer and productivity include Wang et al. (1996), Appleton and Balihuta (1996), Seyoum et al. (1998) and Asadulla and Rahma (2005) in China, Uganda, Ethiopia and Bangladesh, respectively. Nevertheless, other studies support the importance of education but combined with other factors. Studying education in production, Finis Welch (1970) uses a human capital approach combining education and other human capital factors and found that this combination has even a bearing on innovation, meaning education alone does not necessarily deliver enough capacity for innovation. On the other hand, other studies do not show any significant contribution of farmers' education on farming efficiency. For example, Llewelyn and Williams (1996) did not establish any significant contribution of farmers' lower junior high school education on farming efficiency in Java, Indonesia. Appleton (2000) reviewed previous studies in Africa which investigated the relationship between education and farm productivity. This review revealed mixed results in which, providing insignificant association between education and farm level efficiency. On the other hand, Hasnah et al. (2004) reported a significantly negative impact of education on technical efficiency in West Sumatra-Indonesia. Nevertheless, there is some consensus among scholars that education significantly influences the adoption of technological innovations in agriculture (see, e.g., Hossain et al., 1990; Weir & Knight, 2004; Asfaw & Admassie, 2004; Klasen & Raimers, 2013).

The lack of the significance association between education and farm efficiently in some studies in many African countries has been associated by statistical approach problems employed. Such problems are mainly the use of a small sample that cannot allow generalization of results or measurement of errors in agricultural production (Appleton & Balihuta, 1996; Appleton, 2000). Furthermore, differences in the agriculture technology used in different countries have also contributed to differences in the extent to which education contributes to farm productivity. For instance, education might have a bigger impact on farm productivity in areas where modern agriculture is practiced than where traditional agriculture is practiced (Lockheed et al., 1980). To put it differently, those studies that show an insignificant relationship between education and farm productivity do so because they assume that technology used on the farm is homogeneous across countries. Consequently, they have failed to account for the fact that education plays a greater role in modern environments than in traditional environments. This is because farmers with higher education are more flexible to adjust to modern technological advancement than those who are less educated. Studying the effects of schooling and extension on cowpea production under both traditional and modern/improved technology in northern Nigeria, Alene and Manyong

(2007) found that farmer education had a positive and significant effect on adopters of improved cowpea varieties as opposed to non-adopters or traditional cowpea farmers.

Definition of farmers' education level is another area in which those studies reporting unexpected negative or even insignificant relationships between farmer education and farm productivity have been challenged. Klasen and Raimers (2013) have applied advanced panel econometric techniques to study a sample of 95 developing and emerging countries from 1961 to 2002. Their findings show that, insignificant or even surprisingly negative effects of schooling on agricultural productivity are due to a problematic reliance on enrolment and literacy indicators rather than education attainment.

Just as Appleton (2000) did to review previous studies on the relationship between education and farm productivity in Africa, Lockheed et al. (1980) reviewed previous studies with the purpose of examining the information they contained concerning the correctness of three hypotheses: (i) higher levels of formal education increase farmers' efficiency; (ii) education has a higher payoff for farmers in a changing and modernizing environment than in a static and traditional one; and (iii) exposure to extension services improves farmers' productivity. Their review showed positive and significant relationship between education of the farmer and farm productivity in 31 data sets. Their review also showed a negative but statistically insignificant effect in the other 6 data sets. Most important is that, this review supported the assertion that education effects are more pronounced where modern agriculture is practiced than where traditional agriculture is practiced.

Lockheed et al. (1980) work was extended by Phillips (1994) who performed a meta-analysis of 30 studies and 59 data sets to study association between farmer education and farm productivity. This approach used an individual study as a data point. To allow comparison, Philips (1994) followed Lockheed et al. (1980) to weigh the percentage gain of four years' schooling by the reciprocals of their standard error. The results of this study confirmed and reinforced Lockheed et al.'s results as they both showed positive gain in farm productivity from increased years of schooling of a farmer. Furthermore, the role of education in modern agriculture was higher than in traditional agriculture (See also Arega et al., 2007). In supporting the findings that education has a stronger impact on modern than traditional agriculture, cross-regional comparison found that the effect of education on farm productivity was stronger in Asia than in Latin America and Africa (Philips, 1994). This is because Asian agriculture is more technologically advanced than that of Latin America and Africa.

2.2.3 Desired Level of Education

The level of education that matters for it to have an impact on farm productivity is an important area in the literature of education and farm

efficiency. The literature has shown a general consensus on the important role that education plays in farm efficiency. However, different studies have shown that different levels of education lead to different impacts on farm productivity. In their study which reviews literature on studies that investigated the relationship between education and farm productivity, Lockheed et al. (1980) concluded that farm productivity increases, on weighted average, by 7% (10% and 1% in the modern and non-modern environments, respectively). The increase is for farmers who have completed 4 years of elementary education rather than those with no formal education. However, results for other countries and states showed that the impact is higher for the education threshold of 4 to 6 years. In the extension of Lockheed et al. (1980), which was done by Philips (1994) showed that the weighted gain of 4 years of schooling is 6%. As shown in the footnote 11, Philips (1994) believes that a weighted average of 7% obtained by Lockheed et al (1980) was a mistake, as his calculations based on Lockheed et al.'s figures and assumptions produces only 6%. The threshold of 4 years of schooling is also supported by Appleton and Balihuta (1996) in their study on education and agricultural productivity in rural Uganda.

One important topic that needs consideration in the literature of farmers' education threshold that may have an impact on farm productivity is the whole issue of different farming technologies. Most of the literature discussed earlier in this paper has shown almost a general consensus that formal schooling is most useful in an innovative environment where farmers face rapid technology changes, and hence can catch up faster with new technologies than their counterparts (Lockheed et al., 1980; Phillips, 1994; Appleton & Balihuta, 1996; Weir, 1999; Asadulla & Rahma, 2005; Alene & Manyong, 2007; Arega et al., 2007; Ajani & Ugwu, 2008; Klasen & Raimers, 2013). If this is true, formal education threshold may be associated with the nature of farming technology in place. That is, higher formal education threshold may be needed in a rapidly changing environment.

2.2.4 Appropriate Household Member to Access Education

The farming household may have many members engage in the farming activities. The question that arises in such household is that, whose education level among household members who engage in agriculture matters for farm productivity? Some studies (See, for example, (Nguyen & Cheng, 1997; Weir, 1999; Alene & Manyong, 2007) have used the education level of the household head, arguing that most of the farming decision are made by head. Under this argument, it is the education level of the head of the household that matters for farm productivity than other members of the household. Other studies (see Weir, 1999; Alene & Manyong, 2007) use the average years of schooling of adult members of the household. The argument behind this is that, in the farming households all adult members have a contribution to farming practices. The challenge here might arise if all household members are not engaged in farming. A similar problem is likely to arise in those studies using average years of

schooling attained by all household members. It is almost impossible that all members will have the same level of engagement in farming activities. While actual production may be mainly dominated by energetic youths, decision making may be dominated by elders, who spend less time in actual farming. Also, children may be attending schools or stay at home, thus they have no role to play in farming, although their ages were used to calculate average household age. In trying to address these seeming shortcomings, some studies are considering that much of the farm work in agrarian societies is household- (instead of individual-) specific, and thus take that into account when determining levels of education of household members (Asadulla & Rahma, 2005).

Basu and Foster (1998) argue that only one-person education in the household is okay for whole household to benefit in the agriculture productivity using this person's skills. In this case, if the education of the most educated person in the household can determine farm productivity then the average education levels of all members. (Foster & Rosenzweig, 1996). The knowledge of this person in applying new technology and modern inputs can easily be adopted by other members of the household who engage in farming (Green et al., 1985). Thus, even if the household head has not attained any level of formal school, the household will benefit if one of its members who practices agriculture has some levels of formal schooling which enables this person to practice modern agriculture. However, within the rural Tanzanian context, key farming decisions regarding practices as well as the final use of agriculture products are made by the household head (URT, 2012). It, therefore, makes sense to use the education level of the household head in our analysis of the relationship of farmer education and farm productivity.

Equally important in the literature regarding whose education matters is the role of external effect of education in improving productivity and efficiency. Educational externalities arise through learning from a neighbourhood who has education and applies modern agriculture methods in farming. This means that, uneducated farmers simply access the basic literacy and numeracy skills of their educated neighbours. A similar case is when educated farmers are early innovators and are copied by those with less schooling (Knight et al., 2003). In contributing to this debate, Appleton and Balihuta (1996) examined the role of externalities for farmers in the same enumeration area where some are more educated than others. Their conclusion supports the important role of the neighbouring education to farm productivity. Their study found that, education of a household increases neighbouring household farm productivity by 4.3%, compared to 2.8% of own household productivity. Gille (2011) confirms Appleton and Balihuta (1996) findings when studying the role of education externality on farm productivity in India in which the study concluded that one additional year in the mean level of education of neighbours increases farm productivity by 3%. Weir (1999) found even more pronouncing results in Ethiopia.

Similar education externalities could prevail in farm production in Tanzania. In rural Tanzania, which is characterized by an extremely low level of literacy, educational externality could serve as an important non-market determinant of farm level productivity and efficiency. This is possible especially for maize producers whose farms border to each other, as they use the same inputs and cultivate in the same season. Such social proximity could improve knowledge- sharing and generate positive externalities.

While many studies seem to support the importance of farmer education in farm productivity, such results cannot be generalized (See also Larsen and Lilleor, 2014; and Ahmed Diab, 2015). There are some cases where education is positively related to farm productivity, in others it is negative, while in others such relationship is insignificant. Some studies have gone to the extent of showing that it is the neighbour's education that matters more in terms of farm productivity than own farm education. These results call for specific location analysis to determine such a relationship. The current study attempts to cover that knowledge gap within the Tanzanian context. If it is found that education plays an important role in improving farm productivity, the low demand for formal schooling in rural Tanzania may partly explain the current low level of farm productivity.

2.3. Analytical Framework

2.3.1 Model

This paper seeks to understand the role of education in farm productivity. This relationship can be expressed by the following equation:

$$Y_i = X_i\beta + \varepsilon_i \qquad (1)$$

Where

Y_i = farmer i^{th} output

X_i = factors affecting output including farmer i^{th} education level

The major problem in this relationship is that, what is observes is only the contribution of education in productivity if educated farmers decide to make on-farm innovations that lead to increased farm outputs. The main assumption in this relationship is that educated farmers are smarter than their non-educated counterparts and may be more likely to make on-farm innovations in the form of investment or adoption of modern farming practices. The 'selection equation' for making on-farm innovations is:

$$U_i = w_i\gamma + u_i \qquad (2)$$

Where,

U_i = utility to farmer i of making on-farm innovations

w_i = vector of factors known to influence farmer's decision to make on-farm innovations such as education level.

u_i = an error term assumed to be jointly normally distributed with ε_i and contains any unmeasured characteristics in the selection equation.

From the selection equation (2) above, we do not actually observe U_i. What we observe is a dichotomous variable D_i which takes a value of 1 if the farmer makes on-farm innovation ($U_i > 0$), and 0 otherwise. The relationships in equations (1) and (2) lead to a selection problem as a result of two effects: (i) farmers with higher levels of education will be more likely to make on-farm innovations and so we will have a sample of educated farmers; and (ii) some uneducated farmers will make on-farm innovations, and so also come into the sample. This is due to the fact that these farmers decide that on-farm innovation is worthwhile because they have a high value on some unmeasured variable that is captured in U_i in equation (2). To put it differently, these farmers enter our sample not because they have high education but because they have large error terms. In contrast, those farmers who get into our sample because they have high education will have a more normal range of errors.

The problem is that whether or not education (or independent variables of interest in the outcome equation) is correlated with the unmeasured intelligence (our unmeasured variable) in the overall population, these two variables will be correlated in the selected sample. If intelligence does lead to on-farm innovation, then we will underestimate the effect of education on innovation because in the selected sample farmers with little education are unusually smart. Estimating the above equations using OLS will result in biased estimates because the error term in the outcome equation is correlated with the error term in the selection equation. This means that the error term in the outcome equation will not have a mean zero and will be correlated with the explanatory variables. This, in turn, leads to inconsistent estimates. Taking expected value of the output given derived utility from investing in on-farm, adopting Heckman (1979), we get:

$$E\{Y_i \mid U_i > 0\} = X_i\beta + \theta\left[\frac{\phi(w_i\gamma)}{\Phi(w_i)}\right] \qquad (3)$$

qWhere $U_i > 0$ means that the observation was selected into the sample. In other words, this is the expected value of a farmer's output given that the farmer actually made on-farm investment. If we use OLS on the outcome equation in (1), we would be omitting $\theta[\phi(w_i\gamma)/\Phi(w_i)$. According to Heckman (1979), $\theta[\phi(w_i\gamma)/\Phi(w_i)$ is the inverse Mill's ratio. To get consistent results, Heckman (1979) comes out with more assumptions on

the error terms of both basic outcome and selection equations. To see this, let us start with the basic selection equation:

$$Z_i^* = w_i\gamma u_i$$
$$Z_i = \begin{cases} 1 \text{ if } Z_i^* > 0 \\ 0 \text{ if } Z_i^* \leq 0 \end{cases} \quad (4)$$

and a basic outcome equation:

$$Y_i = \begin{cases} X_i\beta + \varepsilon_i & \text{if } Z_i^* > 0 \\ - & \text{if } Z_i^* \leq 0 \end{cases}$$

With

$$u_i \sim N(0,1)$$
$$\varepsilon_i \sim N(0, \sigma^2) \quad (5)$$
$$corr(u_i, \varepsilon_i) = \rho$$

In equation (5), we typically assume a bivariate normal distribution with zero means and correlationρ. Thus, we can compute conditional means in the Heckman's model as follows:

$$\begin{aligned} E[Y_i \mid Y_i \text{ is observed}] &= E[Y_i \mid Z_i^* > 0] \\ &= E[X_i\beta + \varepsilon_i \mid w_i\gamma + u_i > 0] \\ &= X_i\beta + E[\varepsilon_i \mid w_i\gamma + u_i > 0] \\ &= X_i\beta + E[\varepsilon_i \mid u_i > w_i\gamma] \end{aligned} \quad (6)$$

However, any correlation between the two errors means that the truncated mean is no longer $X_i\beta$ and we need to take account of selection. Thus, we need to obtain $E[\varepsilon_i \mid u_i > w_i\gamma]$ when ε_i and u_i are correlated. As Greene (2003) notes,

$$E[\varepsilon_i \mid u_i > -w_i\gamma] = \rho\sigma_\varepsilon\lambda_i(\alpha_u) \quad (7)$$

where

$$\alpha_u = \frac{-w_i\gamma}{\sigma_u}, \lambda(\alpha_u) = \frac{\phi\frac{-w_i\gamma}{\alpha_u}}{1-\Phi\left(\frac{-w_i\gamma}{\sigma_u}\right)} = \frac{\phi\frac{w_i\gamma}{\alpha_u}}{\Phi\left(\frac{w_i\gamma}{\sigma_u}\right)}$$

Thus, substituting equation (7) into equation (6), the conditional mean in the Heckman model (bivariate selection model) is:

$$\begin{aligned} E[Y_i \mid Y_i \text{ is observed}] &= X_i\beta + \rho\sigma_\varepsilon\left[\frac{\phi\left(\frac{w_i\gamma}{\sigma_u}\right)}{\Phi\left(\frac{w_i\gamma}{\sigma_u}\right)}\right] \\ &= X_i\beta + \rho\sigma_\varepsilon\lambda_I(\alpha_u) \\ &= X_i\beta + \beta_\lambda\lambda_i(\alpha_u) \end{aligned} \quad (8)$$

Thus, we now have,

$$\begin{aligned} Y_i \mid Z_i^* > 0 &= E[Y_i \mid Z_i^* > 0] + v_i \\ &= X_i\beta + \beta_\lambda\lambda_i(\alpha_u) + v_i \end{aligned} \quad (9)$$

Note that using OLS on just the outcome equation would lead to biased and inconsistent estimates because $\beta_\lambda(\alpha_u)$ is omitted. Note also that even if $\lambda_i(\alpha_u)$ were included in the model, OLS would be inefficient since v_i is heteroskedastic. In estimating Heckman's model, the two-step procedure is the most common method, given the assumptions in equation (5). First, we estimate the profit equation (selection equation) by MLE to obtain estimates of γ. For each observation in the selected sample, we compute $\hat{\lambda}_i = \phi(w_i\hat{\gamma})/\Phi(w_i\hat{\gamma})$ (the inverse Mills ratio) and $\hat{\delta}_i = \hat{\lambda}_i(\hat{\lambda}_i - w_i\hat{\gamma})$. The $\hat{\delta}_i$ bit is useful for obtaining correct standard errors in the second stage. Secondly, we estimate β and $\beta_\lambda = \rho\sigma_\varepsilon$ by OLS of Y on X and $\hat{\lambda}_i$. The estimators from this two-step procedure are consistent and asymptotically normal. This procedure is often called a 'Heckit model'.

2.3.2 Variables Used in the Analysis

Our basic outcome equation is a production function whose dependent variable is natural logarithm of the total harvest of maize in kilogram harvested by the i^{th} farmer in the long rain farming season of the agricultural year 2008/9. The explanatory variables are a set of factors of production which are land, labour, capital, raw materials and other inputs. The variable for land is represented by actual planted area, whereas the variable for labour is total number of

household members who are involved in farming (between the age of 15 and 66). Capital is represented by the use of machine (tractors, power tillers or draft animals, which are animals used to pull heavy loads, in our case plough disks) as well as the application of irrigation. Each of these variables takes the value of 1 if the household used them and 0 otherwise. Raw materials are basically input in farming, which include the use of modern seeds, application of chemical or organic fertilizer, application of pesticides, application of herbicides and application of fungicides. Just like the variables for capital discussed earlier, each of these variables takes the value of 1 if a farmer used it and 0 otherwise. All of these explanatory variables in the production function are hypothesized to have yield-increasing effects.

For the basic selection equation, our dependent variables are three farm innovations: erosion control or water harvest facility; planted trees in the field; and use of extension services at various stages of farming.[5] While erosion control and/or water harvest facility and planted trees in the field are purely farm innovations, extension service is not purely an innovation. However, we have included it here to represent 'openness to innovation'. This is because a household with access to extension services has relatively higher exposure to innovations, even beyond those analyzed in this study. These variables take the value of 1 if the i^{th} farmer adopted them in the field in the agriculture year 2008/9, and the value of 0 otherwise.

Explanatory variables are those that are expected to have a bearing effect on the decision to make on-farm innovations. The first in this category are human capital variables, which include formal and informal educations. The formal education variables are number of years of schooling, as well as various education thresholds attained by the i^{th} farmer. The education thresholds have five categories: no formal schooling; up to 4 years of formal schooling; above 4 years up to six years of formal schooling; above 6 years up to 8 years of formal schooling; and above 8 years of formal schooling. While years of schooling represent actual number of years of schooling completed by a farmer, the five categories are dummies taking the value of 1 if the i^{th} farmer belongs to a given category and the value of 0 otherwise. The years of schooling aims to capture the impact of an additional year of schooling on decision to make on-farm innovation. The categorical variables aim to capture the education level threshold that has highest impact on decision to make on-farm innovation. The second set of the human capital variable, which is informal education, is a community tree planting programme. This variable takes a value of 1 if a farmer lives in a place with a community tree planting programme and 0 otherwise. It is

[5]Extension services are agricultural consultations offered by trained agricultural officers called extension officers. Extension officers operate as facilitators and communicators, helping farmer on best farming practices so as to improve productivity

expected that this environmental conservation programme has positive relationship with the decision to make on-farm innovations.

Other explanatory variables in the selection equation include access to credit for farming, having off-farm income generating activities, livestock wealth and household wealth index. Farmers who accessed credit and have off-farm economic activities take the value of 1 in each of the two variables and 0 otherwise. Likewise, farmers with livestock wealth take the value of 1 for each category of a livestock type owned and 0 otherwise. The household wealth index was created using household assets in which different assets owned by households were attached to some weights, which were then added.[6] Other things being equal, these four variables were expected to free households from cash constraints in order to make on-farm innovations, especially when such innovations require cash up-front. Another explanatory variable in the selection equation is the farmer's perception if s/he has sufficient land. This variable takes the value of 1 if a farmer perceived that s/he has sufficient land and 0 otherwise. Having bigger land among smallholder farmers may be a disincentive to make on-farm innovation, especially if such farmers perceive that they can get enough harvest from their big farms even without any on-farm innovations. Thus, this variable is hypothesized to have a negative relationship with the decision to make on-farm innovations.

Included also as explanatory variables in our selection equation are presence of permanent crop/fruit tree in the field, distance of a farmer's residence from a nearby township (remoteness) and farmer's age. The permanent crop in the field variable takes the value of 1 if a farmer has such crops in the field and 0 otherwise. It is hoped that if the field has permanent crops a farmer is spending more time on those fields, hence more value is attached to the farm. Thus, this variable is expected to have a positive relationship with the decision to make on-farm innovations. On the other hand, distance of a farmer's residence from a nearby township measure distance in kilometre of a household residence from a nearby town where farmers get their daily needs. It is expected that the more remote farmers are from townships, the less exposure to and interactions with the local community, which reduces access to 'informal learning' and makes them less likely to make on-farm innovations. The final variable in our selection equation is age, which measures number of years of a farmer. This variable is expected to have a negative relationship with on-farm innovations because older farmers have less energy and incentive to make

[6]Assets that were used to create wealth index are dwelling type include, roofing material, type of wall, source of drinking water, type of toilet; ownership of other assets including mobile phones, radio, television, wheelbarrow, vehicle, disc plough; main source of energy for lighting and cooking

innovations compared to young farmers. Table 1 gives details of variables and their definitions.

2.3.3 Data

The Agriculture Sample Survey was conducted by the National Bureau of Statistics (NBS) in collaboration with the sector ministries of agriculture.[7] The survey was conducted at the end of the 2008/09 agriculture year.[8] It collected data by interviewing a sample of 48,315 small-scale farming households and 1,206 large-scale farming households. The survey covered agriculture in detail as well as many other aspects of rural development and was conducted using three different questionnaires: small-scale farm questionnaire; community-level questionnaire; and large-scale farm questionnaire. The small-scale farm questionnaire was the main census instrument and included questions related to crop and livestock production and practices; population demographics; access to services, resources and infrastructures; and issues on poverty, gender and subsistence versus profit-making production units. Given the scope of the small-scale farm questionnaire, data were collected at household/holding level, allowing for sex disaggregation of most variables at the head of household level.

The sample consisted of 3,221 villages. These villages were drawn from the National Master Sample (NMS) developed by the NBS to serve as a national framework for the conduct of household-based surveys in the country. The NMS was developed from the 2002 population and housing census. Nationwide, all regions and districts were sampled with the exception of two urban districts. A stratified two-stage sample was used. The number of villages/EAs (Enumeration Areas) selected for the first stage was based on a probability proportional to the number of villages in each district. In the second stage, 15 households were selected from a list of farming households in each selected village/EA, using systematic random sampling, with the village chairpersons assisting to locate the selected households.

2.4. Results and Discussion

2.4.1 Summary Statistics

Table 1 describes the data used in the production and selection functions to estimate the relationship between output and inputs, and the decision to make on-farm innovations and farmer's education attainment. The table shows clearly that Tanzanian agriculture system is still a small-hold with limited use

[7] Ministry of Agriculture and Food Security, Ministry of Water and Livestock Development, Ministry of Cooperative and Marketing and the President Office-Regional Administration and Local Government

[8] This is so far the most current Agriculture Sample Census Survey to date as no other survey has been conducted yet. Plans are in place to conduct a new survey in the near future.

of modern technology. The land holding averages only 2 acres per household. The higher value of standard deviation than the mean implies that many farmers have land holding below this level. Furthermore, we see that hardly 30% of farmers practice modern farming; almost 70% of farmers do not use sophisticated machines like tractors, power tillers or even draft animals in farming and about the same parentage do not have access to the extension services. Modern inputs like fertilizers, improved seeds, pesticides and herbicides are used by hardly 10% of farmers.

Table 1 – Definitions and summary statistics of variables used in Heckman selection model

Variable	Definition	Mean	Std Dev
Harvest	Household total maize harvest in kilograms	644.14	949.23
Planted area	The actual land size (in acre) planted maize by a household in the 2007/8 agricultural season	2.17	2.63
Labour force size	Total number of household members between 15 and 66 in the farming household	2.57	1.47
Raised cattle	Household raising of cattle (=1 if the household raised cattle)	0.26	0.44
Raised goat	Household raising of goats (=1 if the household raised goats)	0.28	0.45
Raised sheep	Household raising of sheep (=1 if the household raised sheep)	0.11	0.32
Raised pig	Household raising of pigs (=1 if the household raised pigs)	0.08	0.27
Used improved seeds	Use of improved seeds (=1 if the household used)	0.16	0.37
Applied organic or chemical fertilizer	Application of either chemical or organic fertilizer (=1 if the household applied)	0.33	0.47
Applied pesticides	Application of pesticides (=1 if the household applied)	0.11	0.31

Variable	Definition	Mean	Std Dev
Applied herbicides	Application of herbicides (=1 if the household applied)	0.01	0.11
Applied fungicides	Application of fungicides (=1 if the household applied)	0.01	0.12
Applied irrigation	Application of irrigation (=1 if the household applied)	0.03	0.17
Use of machine	The use of draft animal, power tiller or tractor in farming (=1 if a household used either or all)	0.27	0.44
Literacy	If a famer can read and/or write at least one language	0.70	0.46
Years of schooling	Farmer's number of years of formal schooling	4.44	3.65
No formal education	The farmer has no formal education (=1 if the farmer has no formal education)	0.31	0.46
Four years of schooling	The farmer has up to up to four years of formal education (=1 if the farmer has up to four years of schooling)	0.15	0.36
Six years of schooling	The farmer has above four up to six years of formal schooling (=1 if the farmer has above four up to six years of schooling)	0.03	0.18
Eight years of schooling	The farmer has above six up to eight years of formal schooling (=1 if the farmer has above six up to eight years of formal schooling)	0.45	0.50

Variable	Definition	Mean	Std Dev
Above eight years of schooling	The farmer has above eight years of formal schooling (=1 if the farmer has above eight years of formal schooling)	0.04	0.21
Community tree scheme	Village having tree planting programme (=1 if the village has such a programme)	0.15	0.35
Credit	Access to credit for farming (=1 if the household accessed and used)	0.04	0.19
Sufficient land	Household perception that it has sufficient land size for cultivation (=1 if the household perceived to have enough land)	0.57	0.49
Permanent crops	Ownership of permanent/perennial crop or fruit tree (=1 if the household has)	0.41	0.49
Off-farm employment	Household with members in off-farm income activities (=1 if the household has at least one member in the off-farm activities)	0.73	0.44
Remoteness	Distance of the household residence to the nearest township	1.40	1.84
Household wealth index	Household wealth index created using household assets ownership	18.18	2.58
Age	Age of the farmer in years	45.01	15.46
Erosion control/water harvest facility	On-farm investment of erosion control/water harvest facility (=1 if the household has invested)	0.10	0.30

Variable	Definition	Mean	Std Dev
Planted trees	Household planting trees on its land (=1 if the household planted trees)	0.13	0.34
Use of extension service	Access to extension service at various stages of farming (=1 if the household accessed)	0.36	0.48
Northern Zone	Farmers in Northern Zone (=1 if the farmer is from Northern Zone)	0.21	0.41
Southern Zone	Farmers in Southern Zone (=1 if the farmer is from Southern Zone)	0.10	0.30
Eastern Zone	Farmers in Eastern Zone (=1 if the farmer is from Eastern Zone)	0.07	0.26
Western Zone	Farmers in Western Zone (=1 if the farmer is from Western Zone)	0.08	0.27
Central Zone	Farmers in Central Zone (=1 if the farmer is from Central Zone)	0.10	0.29
Lake Zone	Farmers in Lake Zone (=1 if the farmer is from Lake Zone)	0.14	0.35
Southern Highlands Zone	Farmers in Southern Highlands Zone (=1 if the farmer is from Southern Highlands Zone)	0.29	0.45

Note: Means are based on the 31,665 households producing maize out of 48,315 farming households surveyed by the National Bureau of Statistics.

Another important feature of rural Tanzanian agriculture is that very few farmers are practicing both crop production and livestock keeping. Less than 30% of crop producers are keeping cattle and goats and about 10% keep sheep and pigs. The percentage of farmers applying irrigation is also very low (3%), although this may partly be because the data were collected during a long rainy season.

What is also very obvious in Table 1 is a relatively high level of illiteracy among farmers. On average, 30% of farmers cannot read and/or write any language. The table further shows similarity between the figure for illiterate and that of farmers with no formal schooling. This means that there are very little chances for farmers who have not attended formal schooling to access informal education that can enable them to read and/write at least one language. In terms of formal schooling, an average farmer has only 4 years of formal schooling. The majority of farmers who accessed formal schooling ended at the primary level (60%). Those who have attained a level above primary school covers 4%, implying that agriculture in Tanzania is an activity that assimilates those who cannot climb the upper ladder in education. Within the same context, even when people have not gone higher in education levels, they do not join agriculture until they are old. Table 1 shows that the average age of household heads in the sector is 45 years.

Regarding actual field environment, the table shows that 41% of farmers have permanent crops or fruit trees in their farms, and 15% are living in villages that have environmental conservation schemes like tree planting programmes. Another important issue in the context of on-field practices is that very few farmers are able to access credit for farming (4%). It has been argued that credit institutions are not interested in small-scale farmers because they depend on nature in farming, thus it is very difficult to predict their incomes. Interestingly, however, while credit institutions find it difficult to extend credit to farmers, the majority of rural farmers (73%) have at least one member from their households in off-farm employments. This means that diversification of income sources in rural areas is high. As more and more off-farm employments become integrated into the rural economy, it may be important to study its dynamics and actual contribution to rural economy to contribute to the debates on rural growth. This is because discussions on rural economy in developing countries have tended to centre on on-farm development while forgetting or giving little attention to off-farm activities.

In terms of on-farm innovation, very few farmers are making investments, a fact that may have a bearing on farm productivity. While there are many on-farm innovations that can potentially increase farm productivity, this study has focused on three, namely, building erosion control and/or water harvest facility, planting trees in the field, and the use of extension services at various stages of farming. Table 1 shows that only 10% of the farmers have built erosion control and/or have water harvest facility. Another innovation that also has fewer farmers is planting trees in the field, which

covers 13% of the farmers. Though still at the lower level, but relatively better than the previous two innovations, is the exposure to innovations through the use of extension services, which has 36% of farmers. The choice of these three innovation variables, despite the fact that fewer farmers have adopted them, is because of the impact they have on farm output. Table 2 distinguishes average outputs between farmers who adopted innovations and those who did not.

Table 2 shows that the average yield of maize for farmers who adopted erosion control and/or had water harvest facility was 886kg compared to 618kg for those who did not have such a facility on their farms. Similarly, the average yield was 880kg for those who had planted trees on their field compared with 608kg for those without trees on the field. Finally, the average yield was 747kg for farmers who had accessed extension services at various stages of cultivation compared to 586kg for those who did not use extension advices.

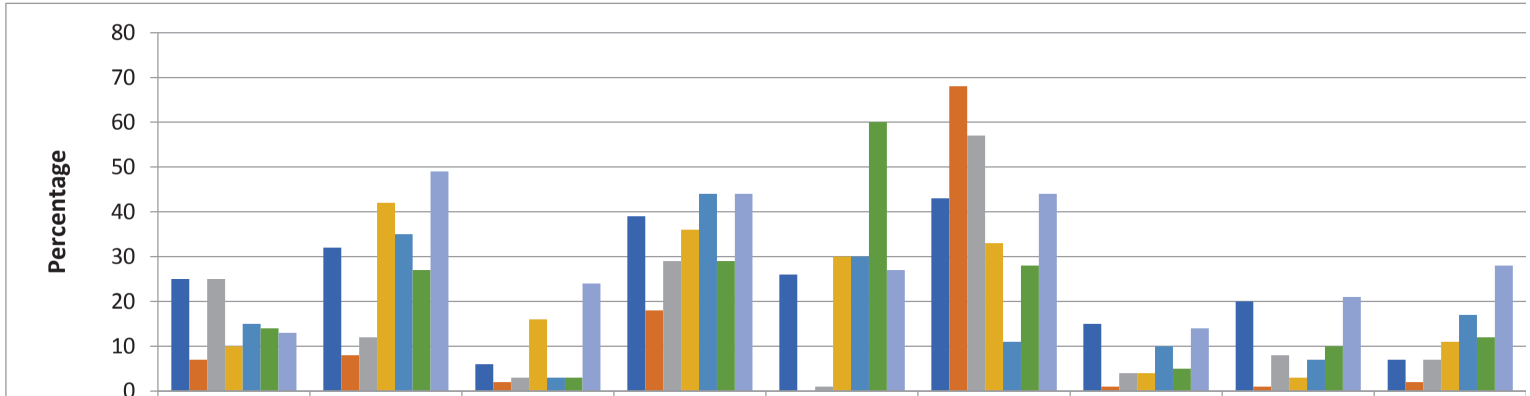
Table 2: Average Harvest for Each Innovation (kg of maize yield)

	Yes	**No**
Have erosion control/water harvest facility	886.4	617.8
Have planted trees on the field	880.3	608.4
Use of extension services	747.0	586.0

Source: Survey data

Another important feature in the summary statistics is the sample distribution by zones, which ranges from 7% in the Eastern zone to 29% in the Southern Highlands zone. Generally, what we see is that those zones that are typically known for farming have relatively higher sample. The Southern Highlands zone is comprised of what is known as the 'Big Five', which is 5 regions that are agriculture intensive. On the other hand, the Eastern zone with a smallest sample includes Dar es Salaam, which is typically a commercial region.

While the use of inputs and innovations is recognized in increased farm productivity, disaggregating such use by zones gives very interesting results that are worth informing policy makers. Fig 1 summarizes the use of selected inputs and on-farm innovations by 7 zones. What is very clear is that there exist disparities in the use of modern agriculture inputs as well as on-farm innovations between one zone and another.



	Improved seeds	Chemical fertilizer	Pesticides	Extension	Draft	Permanent tree	Erosion control	Planted tree	Community tree
North	25	32	6	39	26	43	15	20	7
South	7	8	2	18	0	68	1	1	2
East	25	12	3	29	1	57	4	8	7
West	10	42	16	36	30	33	4	3	11
Central	15	35	3	44	30	11	10	7	17
Lake	14	27	3	29	60	28	5	10	12
S. High	13	49	24	44	27	44	14	21	28

Inputs and innovations

Figure 1: On-farm Inputs and Innovation by Zone

Source: Author's computation using HBS (2008/09)

The Southern Highlands zone is leading in adopting inputs and innovations in almost every selected item. It leads over other zones in adoption of inputs like chemical fertilizers, pesticides; and is also leading in having tree community planting programmes. It also leads in the adoption of on-farm innovation for the three selected farm innovations, namely, having erosion control/water harvest facility, use of extension services, and having trees planted in the field. Consequently, land productivity is highest in the Southern Highlands zone, which is about 475kg of maize per acre (see Table 3). On the other hand, Southern zone is lagging behind all other zones in the use of inputs as well as in making on-farm innovations. Consistently, its land productivity is 145kg of maize per acre, which is the lowest figure when compared to other zones.

Table 3: Land Productivity by Zones

	Average Planted area (acre)	Harvest (maize in kg)	Land productivity
Northern	**2.4**	**711**	**296**
Southern	**1.3**	**188**	**145**
Eastern	**1.8**	**333**	**185**
Western	**2.4**	**611**	**255**
Central	**3.1**	**525**	**169**
Lake	**2.3**	**504**	**219**
Southern Highlands	**2.0**	**950**	**475**

Again, the importance of our selected three innovations in increasing land productivity is clearly seen here. We have seen that, of the three selected innovations, extension services are adopted by relatively many farmers than the other two. This is also the case when we disaggregate the use of these innovations by zones. Although these innovations are not very commonly implemented by many farmers, their impact in land productivity is substantive. In all of the three innovations, the Southern Highlands zone appears at the top, and the Northern zone appears at the second position. Looking at the land productivity figures in Table 3, the same trend is observed, that is, the Southern Highlands is leading followed by the Northern zone. The seeming strong correlation between these three innovations and land productivity is important to policy makers. Knowledge about their actual contribution to outputs, their relative importance, as well as which factors determine their adoption is limited, though. This paper is an attempt

to bridge that knowledge gap by providing empirical evidence of the role played by education in the adoption of such innovations.

2.4.2 Regression Results

2.4.2.1 General results

Tables 4 through 6 present results from the Heckman model which show the relationship between output of maize and factors affecting production through production function on one hand and relationship between adoption of three farming innovations and factors affecting innovation including farmer's education on the other.

Table 4 shows that farmers' outputs are affected both directly by traditional inputs and indirectly through adoption of farm innovations. Specifically, we see from the production function that farmers' outputs are affected by traditional inputs variables, namely, land, labour capital and raw materials. We also see from the selection equation that farmers' outputs are indirectly affected by other variables that influence the decision to make on-farm innovations. Results from the production function show that the coefficients of most of the conventional production factors that are significant in explaining output have expected signs. Thus, elasticity of planted area (*Ln* of planted area), use of either chemical or organic fertilizer (Applied chemical/organic fertilizer), use of pesticides (Applied pesticides), application of irrigation and use of modern machine-like tractor, power tiller or draft animal (Used machine) have positive and significant influence on production of maize.

Table 4: Regression Results from the Heckman Selection Model

Explanatory variable	**Dependant variables**		
	Ln of Total maize production in Kilograms		
Production function			
Ln of planted area	0.769***	0.787***	0.669***
Ln of labour force size	-0.014	-0.095**	-0.032
Used improved seeds	-0.018	-0.129	0.005
Applied chemical/organic fertilizer	0.032**	0.148***	0.161***
Applied pesticides	0.117*	0.159***	0.201***

Explanatory variable	Dependant variables		
Applied herbicides	0.005	-0.179	0.153
Applied fungicides	0.194	-0.019	-0.007
Applied irrigation	0.016	0.176**	0.057*
Used machine (draft, power tiller or tractor)	0.104*	0.187***	0.089***
Constant	9.497***	8.454***	7.636***
	Erosion control/water harvest facility	***Planted trees in the field***	***Use of Extension services***
Selection equation			
Ln if years of schooling	0.033***	0.057***	0.036***
Have community tree planting programme	0.164***	0.268***	0.095***
Male	0.048*	0.001	0.023
Accessed credit for farming	0.036	0.048	0.127***
Perceives to have sufficient land	-0.022	-0.046***	-0.004
Has permanent crop/fruit tree in the field	0.152***	0.337***	0.030***
The household has off-farm employment	-0.004	-0.044**	0.001
Raised cattle	0.107***	0.079***	0.037***
Raised goat	-0.012	0.037*	0.003
Raised Sheep	0.059**	-0.005	0.003
Raised pig	0.091***	0.164***	0.030*

Explanatory variable	Dependant variables		
Ln of remoteness	-0.005*	-0.014***	-0.012*
Ln of household wealth index	0.580***	0.939***	0.692***
Ln of age of household head	-0.004	0.065**	0.049***
Northern Zone	0.042**	0.041**	0.032
Southern Zone	-0.004	-0.051	-0.066
Eastern Zone	0.007	0.038	0.019
Western Zone	0.005	-0.005	0.058
Central Zone	0.011*	0.011	0.036*
Lake Zone	0.009	0.040	0.039*
Southern Highlands Zone	0.036**	0.049***	0.056***
Constant	-2.974***	-4.139***	-2.555***
/athrho	-2.163***	-1.791***	-2.489***
Lnsigma	0.894***	0.740***	0.957***
ρ	-0.974	-0.949	-0.986
σ	2.445	2.096	2.604
λ	-2.381	-1.983	-2.568

Note: *** p<0.01, ** p<0.05, * p<0.1

***Source**: Survey data*

This implies that increasing the quantity of any of these inputs will increase the quantity of maize production. Actual planted area has the largest coefficient (elasticity ranging from 0.67 in the function in which use of extension service is a dependant variable in the selection equation to 0.79 in the equation in which dependant variable in the selection equation is

planted tree in the field); meaning that maize production will increase appreciably if more land is cultivated. These results are not surprising: farm outputs have been associated with increased use of capital and inputs (see Appleton & Balihuta, 1996; Wear, 1999; Asadulla & Rahma, 2005; Alene & Manyong, 2007; Ajani & Ugwu, 2008; Gille, 2011). However, this study has shown negative relationships between farm outputs and labour force. This means that production of maize decreases with increased labour force in farming. This is contrary to many similar studies (see, for example, Allene & Manyong, 2007; Gille, 2011). Our results are perhaps due to small land holding among smallholder farmers, which is consistent with the law of diminishing marginal returns when more of the variable factor (in our case labour) is added to a fixed factor (in our case land).

Our selected equations give different results in terms of magnitudes, signs and significance of coefficients depending on the innovation under investigation. Education (defined as the number of years of formal schooling) is positively and significantly ($p<0.001$) related to all three innovations, namely, having erosion control/water harvest facility, planted tree on the field, and the use of extension services. Consequently, our findings support the hypothesis that formal education increases adoption of farm innovations, thus increasing farm productivity. Allene and Manyongo (2007) found that the adoption of cowpea technology in Nigeria was positively related to education. Similarly, Klasen and Raimers (2013) support the hypothesis for a positive relationship between education and adoption of innovations in farming. Few studies show insignificant (Battese & Coelli, 1995; Llewelyn & Williams, 1996) or even negative relationship (Hasnah et al., 2004) between education and farm productivity.

While formal education seems to be significant in affecting the adoption of farm innovation, informal education seems to be even more significant for adopting innovations in rural Tanzania. The coefficient of a variable on having community tree planning programme (a very good proxy for informal education) is very significant ($p<0.001$) and has higher magnitudes in all three innovations under investigation. This means that farmers living in communities where they have environmental conservation programmes have higher probability of adopting innovations than their counterparts in areas with no such programmes. As would be expected, the coefficient of this variable is highest in the adoption of planting trees in the field than in building erosion/water harvesting facility, as well as in the use of extension services. A number of studies have shown positive relationship on adoption of best farming practices among farmers with conservation programmes (Allene & Manyong, 2007; Odendo et al., 2011). Asafu-Adjaye (2008) also shows higher probability of adopting soil conservation among farmers who had previous contact to extension services than their counterparts with no contact to extension services. Of interest in our findings is that informal education has higher magnitude in all three innovations than formal education, implying that the impact of informal education in the adoption of innovation is higher than that of formal education. This may imply that

formal education gives general knowledge of literacy and numeracy, which is necessary to make a farmer able to appreciate the importance of innovations and to be able to adopt such innovations quickly especially if they are sophisticated. On the other hand, informal education provides location-specific needs, hence it can easily be assimilated by farmers. This seems to work well when it is done in a participatory way and farmers can benefit from demonstration effects (Asafu-Adjaye, 2008). These findings are consistent with the innovation-diffusion theory (Rogers, 1995), which postulates that innovation, if communicated through certain channels over time among members of a social system, speeds up technology adoption.

Being a male head is positively related to the adoption of all the three innovations. However, this variable is only significant in the adoption of erosion control/water harvest facility, but insignificant in the other two innovations. This means that other household characteristics are more important in the adoption of most of the farm innovations than gender.

The variable for access to credit is insignificant in explaining erosion control/water harvest facility and also in explaining planted trees in the field. However, it is positively significant in explaining the use of extension services, implying that access to credit for farming increases the probability of using extension services in various stages of farming. Access to credit is expected to relax a farming household from cash constraints, hence would be expected to have a positive relationship with the adoption of most of these innovations since they mostly require capital upfront. However, the Poverty and Human Development Report of 2011 shows that credit to small-scale farmers has remained low because banks and other financial institutions are reluctant to extend credit to them because of the unpredictable nature of farming (URT, 2011). The report further states that even when some microfinance institutions are ready to extend credit to farmers, they attach the credit with very high interest rates because of perceived high default rates (URT, 2011). Given this trend, it is possible that even when farmers access credit for farming, they end up using it on other off-farm activities with predictable incomes that can assure them timely repayment. Consequently, one should not be surprised to see access to credit for farming having no impact on the adoption of erosion control or planted trees in the field, especially because these innovations may take longer time to repay back. However, the positive and significant relationship between credit and use of extension services may mean that those that devote such credits to farming may be compelled to make regular contacts with extension services to increase productivity in the short term to enable them to repay their loans.

Though significant on only planted trees in the field out of the three farm innovations investigated by this study, household perceptions to have sufficient land tend to reduce adoption. Usually, small-scale farmers are mostly concerned with producing sufficient food with the lowest possible costs and at the shortest possible time. While planting of trees would increase income and maintain soil structure, small-scale farmers would be concerned

with measures that increase income now, thus opting for increasing land size. Findings that small-scale farmers tend to increase farm outputs through increased land sizes than through innovations are not typical to Tanzania alone. Asadulla and Rahma (2005), Allene and Manyong (2007) and Gille (2011) found that while traditional farming relies heavily on land and labour for increasing farm outputs, modern farming tends to depend on modern farm technologies.

Having permanent crop/fruit trees in the field increases the adoption of all three farming innovations, of course, with differences in magnitudes. The magnitude of the coefficient is highest in farming innovation of planted tree in the field. This should not be surprising because farmers with permanent crops/fruit trees in the field are more likely to appreciate the importance of trees in the field. However, the fact that having permanent crop/fruit trees in the field increases the adoption of all three farming innovations may be due to the value attached to the land. If the land has permanent crops, farmers are likely to attend those fields throughout the year, hence, more values are attached to them, and this may explain this positive relationship.

Just as the case with access to credit, having off-farm employment is expected to complement household farm incomes, hence enable them to adopt innovations (Ervin & Ervin, 1982; Shiferaw & Holden, 1998; Odendo, et al., 2011). This study, however, shows that having off-farm employment reduces the probability of adopting farm innovations. Specifically, having off-farm employment is negatively significant with planted trees in the field ($p < 0.05$), and negative but insignificant related to having erosion control/water harvest facility. Although off-farm employment is positively related to the use of extension services, the relationship is insignificant. The negative relationship between off-farm employment and the adoption of innovation may imply that having off-farm employment leaves little time available to attend fully in the adoption of farm innovations. Typically, this is the case with farm innovations that are time intensive like erosion control/water harvest facility, but even more with planting of trees, which require continuous maintenance until trees are old enough. Hua et al, (2004) found a negative and significant relationship between off-farm employment and participation in a formal conservation program but explained their results with high opportunity costs for the time that is required to participate in a conservation program. This may imply that off-farm employment would increase the adoption of farming innovations if such innovations require less time. This seems to be the same with our case because off-farm employment, though insignificant, is positively related to the use of extension services, an innovation that needs less time. Consistently, Cornejo et al. (2005) found positive and significant relationship between off-farm employment and the adoption of herbicide-tolerant soybeans and explained their results with the time-saving nature of this technology.

As would be expected, livestock wealth is positively and significantly related to the adoption of all the innovations. Unlike credit, livestock wealth is unconditional capital, hence farmers can even use it to try innovation, even when they are not certain about the actual returns of the innovation. To put it differently, with their own livestock wealth, farmers can even opt to be risk takers compared to credit which will need repayment with interests regardless of the outcome of farm production.

Similar to livestock ownership, household wealth is positively and significantly related to the adoption of all the three innovations ($p < 0.01$). The magnitude of elasticity of this coefficient is also very large in all the three innovations, but the highest in planted trees in the field. This is because of the capital-intensive nature of this innovation from planting, pruning and maintaining until the trees are old enough to harvest. The use of extension services may not necessarily require that a household be very wealthy, especially if extension officers are provided by local government authorities. However, still this variable is positively correlated with household wealth because of the possible high on-farm investment that wealthier households may have made, which in turn necessitates the need of extension services. The positive relationship between household wealth and adoption of innovation is consistent with Abdulai and Huffman (2005) who found that households headed by elderly persons adopted dairy cattle faster than those headed by younger ones. This was because the adoption of dairy cattle required a significant capital investment, and because elderly household heads were more likely to have accumulated capital and also likely to be preferred by credit institutions, both of which made them more prepared to adopt technology faster than younger ones.

On the other hand, distance from a household residence to the nearest township (remoteness) is negatively and significantly related to the adoption of all the three innovations, indicating that farmers who are far from major clustered settlements, and hence have less exposure and interactions, are less likely to adopt farm innovations. Remoteness is probably denying these farmers from learning the importance of farming innovations, but also, they find it very expensive to access important inputs necessary to adopt innovations. Also, because of being away from markets, it is possible that they also face difficulties in marketing their farm outputs, which is a disincentive to increase outputs (See also Fischer and Qaim, 2012). Kristjanson et al. (2002) and Allene and Manyong (2007) also found negative relationship between access to markets and the adoption of intensifying cowpea production in Nigeria. Similarly, Odendo et al. (2011) found a negative relationship between distance to market and adoption decisions of mineral fertilizer (see also Obare et al., 2003; and Dadi et al., 2004).

Age of a farmer is negatively related to erosion control/water harvest facility, but positively related to planted trees in the field as well as the use of extension services. The negative, though insignificant, relationship

between age and erosion control/water harvest facility may be due to the labour-intensive nature of erosion control, thus the ability for the older farmers to participate in such strenuous manual activities decline. Matuschke and Qaim (2008) and Adendo et al. (2010) also found that old age was associated with the adoption of less labour-intensive farming innovations. On the other hand, the positive relationship between old age and planting trees in the field may have to do with historical perspective in which most of the important resources—including building materials and energy sources—came from trees. Hence, it is the old farmers that can put importance on plant trees than young ones. Also, having trees on the field is seen as an asset since they can be sold as timber. Chang and Boisvert (2009) found a positive relationship between age and participation in conservation reserve programme (CRP), and argued that as farmers get older, committing some land to CRP may be one way of reducing operator labour requirements on the farm. This may also be a way of holding onto farmland assets until they are needed for retirement years, or so that they can be passed on through an estate (ibid.). Similarly, the positive relationship between old age and the use of extension services may also be because old farmers are more likely to appreciate the importance of extension services because of their long-time experiences in farming, which also remains their sole activity unlike young farmers who can migrate to urban areas for casual employment. The importance of experience in the adoption of better farming practices is acknowledged by other studies. Edmeades et al. (2008), for instance, concluded that relative farming experience increased the likelihood of the adoption of different banana varieties in Uganda.

Zonal dummies yield results that are consistent with the descriptive statistics explained earlier. Being a farmer in Southern Highlands zone increases the probability of adopting all of the three innovations. Also, being in the Northern and Central zones increases the probability of adopting two of the three innovations. On the other hand, being a farmer from the Southern zone reduces the adoption of all the three innovations. The Northern and Southern Highlands zones have large parts that are mountainous, making land scarcity a serious problem. Thus, it is possible that the adoption of innovation is the main way of increasing farm outputs in those zones. On the other hand, those zones with abundant land may increase outputs by increasing land size. For the Southern zone, the low level of adoption of innovation may be accounted for by the type of crop that is dominant, i.e., cashew-nuts. This is a tree crop that may not necessarily need a lot of investments apart from clearing and spraying pesticides.

While all the three selected innovations have yield-increasing effects, their relative importance differs. Table 5 summarises the impact of individual innovation on the production of maize.

Table 5: Relative Importance of Selected Innovations

Dependent variable: Ln of harvest	*Coefficient*	*t-ratio*	*p-value*
Erosion control/water harvest facility	0.439 (0.034)	12.95	0.000
Planted trees on the field	0.470 (0.030)	15.50	0.000
Extension services	0.272 (0.023)	11.68	0.000
Constant	5.197 (0.015)	351.47	0.000

Note: Figures in parenthesis are standard errors

Source: Survey data

Table 5 shows that all three innovations are positively significant ($p < 0.01$) in explaining maize yield. The variable on planted trees on the field has the highest coefficient, implying that it has the biggest impact in increasing yield. It is followed by having erosion control/water harvest facility, and then contact to extension services. This analysis says that conservation programmes are relatively more important to increase farm yield.

2.4.2.2 Cut-off Point of the Education Level

Table 6 summarises results on the impact of different education level thresholds on adoption of farm innovations. Of all the three innovations under investigation, the lack of formal education reduces their adoption, meaning that best farming practices are highly negatively affected by the lack of formal education. Results from summary statistics in our study show that 30% of farmers have no formal education, thus a large proportion of farmers has a high probability of reducing the adoption of best farming practices. Consequently, the lack of formal schooling may significantly contribute to the current level of low productivity in the agriculture sector in Tanzania. This means that improving access to formal education among farming communities will improve farmer efficiency greatly in the future.

On the other hand, having 1 to 8 years of formal schooling has a positive impact on the adoption of innovations.[9] However, the degree of the impact,

[9] Eight years of formal schooling is a number of years for primary education in Tanzania

as well as the significance, differs from one level of formal school to another; and between one innovation and another. Having completed 4 years of schooling is positive and significant in adopting all the three innovations. The impact is highest in the adoption of erosion control/water harvest facility (8%) and lowest in planted trees in the field (1%). Similarly, having completed 6 years of formal schooling is positive and significant in the adoption of all the three innovations.

More interesting is that the coefficients at this level of formal schooling are higher than those of the threshold of 4 years of schooling. What these findings say is that, while up to 6 years of schooling increases the adoption of best farming practices, the intensity of adoption increases with the number of years of formal schooling. These results contradict those of Appleton and Balihuta (1996), which showed that in many African countries formal schooling has not shown any significant effect on agricultural output. However, they confirm those of Alene and Manyong (2007) who found that 4 years of schooling or more are more likely to adopt improved cowpea varieties. Likewise, Phillips (1994) found that while 4 years of schooling was enough to increase farm efficiency in some states, the threshold of 4 to 6 years of schooling becomes more pronounced in increasing farm productivity in other states.

What is also clear in our findings is that while eight years of schooling has a positive impact on the adoption of innovations, the impact is only significant in the use of extension services. Adoption studies have associated prior contact to extension services with increased adoption of inputs and innovations, including those that farmers were uncertain on their potential productivity impact.

Table 6: Regression Model with Sample Selection on Different Education Level Thresholds

Explanatory variable	**Dependant variables**		
	Ln of Total maize production in Kg		
Production function			
Ln of planted area	0.767***	0.787***	0.670***
Ln of labour force size	-0.015	-0.098***	0.031
Used improved seeds	-0.016	-0.099***	0.006
Applied chemical/organic fertilizer	0.029*	0.149***	0.162***

Explanatory variable	**Dependant variables**		
Applied pesticides	0.118**	0.155***	0.198***
Applied herbicides	-0.011	-0.175	0.160
Applied fungicides	0..199	-0.009	0.006
Applied irrigation	0.019	0.176**	0.057*
Used machine (draft, power tiller or tractor)	0.099*	0.182***	0.087***
Constant	9.487***	8.444***	7.736***
	Erosion control/water harvest facility	***Planted trees in the field***	***Use of Extension services***
Selection equation			
No formal education	-0.120*	-0.126**	-0.061
Up to four years of schooling	0.082*	0.016*	0.038*
Above 4 up to 6 years of schooling	0.095**	0.028**	0.042***
Above 6 up to 8 years of schooling	0.031	0.026	0.026**
Above 8 years of schooling	-0.011	-0.013	0.014
Have community tree planting programme	0.163***	0.268***	0.094***
Male	0.044*	-0.009	0.018
Accessed credit for farming	0.036	0.048	0.128***
Perceives to have sufficient land	-0.023	-0.047***	-0.004

Explanatory variable	Dependant variables		
Has permanent crop/fruit tree in the field	0.151***	0.338***	0.029
The household has off-farm employment	-0.004	-0.041**	0.001
Raised cattle	0.109***	0.082***	0.040***
Raised goat	-0.010	0.038*	0.002
Raised sheep	0.059**	-0.004	0.001
Raised pig	0.087***	0.162***	0.031*
Ln of remoteness	-0.017**	-0.014***	-0.014*
Ln of household wealth index	0.555***	0.937***	0.690***
Ln of age of household head	0.007	0.076***	0.053***
Northern Zone	0.051**	0.039**	0.048
Southern Zone	0.009	-0.060	-0.059
Eastern Zone	0.010	0.032	0.022
Western Zone	0.015	-0.014	0.071
Central Zone	0.009*	0.019	0.028*
Lake Zone	0.005	0.029	0.043*
Southern Highlands Zone	0.041**	0.051***	0.064***
Constant	-2.830***	-4.076***	-2.512***
/athrho	-2.156***	-1.781***	-2.491***
lnsigma	0.892***	0.738***	0.957***
ρ	-0.974	-0.945	-0.986

Explanatory variable	Dependant variables		
σ	2.439	2.091	2.603
λ	-2.375	-1.976	-2.567

Note: *** p<0.01, ** p<0.05, * p<0.1

Source: Survey data

For instance, Chilot et al. (1996) found that prior contact with extension services increased the adoption of improved wheat in Central Ethiopia. Similarly, Kaliba et al. (1998) and Feleke and Zegeye (2006) found that such contacts increased the adoption of improved maize seeds in Central Tanzania and Southern Ethiopia, respectively. This means that with higher formal education, farmers adopt innovations that can even make them risk-takers. However, after 8 years of schooling, though insignificant, education becomes negatively related to the adoption of farm innovations, except again for the use of extension services.

A clear interpretation of these results is that up to 6 years of formal schooling, increases farmers' possibility of the adoption of farm innovations. However, such innovations must be those traditionally known to contribute to farmers' incomes. However, at higher levels of up to 8 years of schooling, farmers can engage to those innovations that may be risky but with higher expected returns. Beyond 8 years of schooling, which include secondary and tertiary education, farmers adoption to innovation again decreases. Perhaps such higher education levels drive households away from farm production, allowing them to engage in off-farm and non-agricultural activities, which presumably provides higher income compared to farm outputs. These findings are also shared by Asadullah and Rahman (2005).

2.5. Conclusions and Recommendations for Policy Implications

This paper is an empirical investigation on the impact of formal education on agriculture productivity. The findings bring to light the importance of primary formal education as an indispensable production input in agriculture, and in rural economic development of the nation as a whole. Specifically, our analysis supports the relative importance of basic education in farm productivity. Household head's education, when decomposed by levels of education, shows that having over and above zero and up to 6 years of formal schooling has a significant impact on the adoption of farm innovations. The top-end of this level of education can turn farmers into risk-takers and make them adopt risk innovations that have higher returns. This suggests that basic literacy skill, usually attained during primary schooling, is very relevant in farm productivity through its impact on the adoption of innovations.

CHAPTER THREE

FRUGAL INNOVATION FOR INCLUSIVE DEVELOPMENT: A CASE STUDY ON POWER TILLERS IN TANZANIA

Donald Mmari and Sylvester Mpanduji

3.1. Introduction

The Leiden-Delft-Erasmus (LDE) consortium, in collaboration with REPOA, developed a research project aiming to understand the role of innovation, technology transfer, and technology networks in Africa's economic transformation. This role is articulated via the notion of frugal innovation. In its literal meaning, the term frugal is related to scarcity of resources, be it financial, technical capability, or institutional. The application of this notion in this project is along the same broad lines. Frugal innovation is viewed as a process of transforming a product's technical complexities while retaining their basic functionality. This process is mainly targeted at reducing product costs or making them adaptive to operating conditions of marginal populations or relatively poorer consumers. Frugal innovation, or frugal engineering as is sometimes referred to, can apply to any product or service. For example, General Electric Company developed a hand-held electrocardiogram (ECG), which reduced the costs ECG tests to about one dollar per patient (The Economist, 2012). Important considerations in understanding the process of frugal innovation include both technological dimensions and institutional dimensions, which together affect the process of technology (or products and services) transfer, adaptation, and its social and economic impacts. Thus, it concerns value-sensitive design and marketing strategies that bring sophisticated products within the reach of relatively poor consumers, referred to in this project as the Bottom of the Pyramid (BoP).

Most of the BoP live in Africa and mainly in rural areas. In Tanzania, for example, the integrated labour force survey of 2014 showed more than 66% of the labour force is engaged in agriculture, and poverty in rural areas is quite pervasive. According to the Household Budget Survey of 2012, 33% of rural households live below the poverty line (United Republic of Tanzania, 2013). Since the majority of rural households are predominantly smallholder farmers engaged in labour intensive agriculture, designing interventions for improving productivity is considered critical if earnings are to be raised and poverty reduced. One important element to address in this respect is production technology, which includes mechanization of farming activities. It is no wonder therefore that the project's pilot phase focused on examining the introduction and utilization of power tillers among smallholder farmers, with particular reference to Tanzania, despite the fact that frugal

innovation is applicable to many other types of products.

From the early years of experimentation in Tanzania, power tillers were viewed as an appropriate technology for most smallholder farmers. The use of power tillers was accelerated following the announcement of the "Kilimo Kwanza" initiative, meaning "Agriculture First", in 2009. This case study provides an analysis of the institutional processes underlying their introduction and adoption, and the design features reflecting the suitability of the power tiller innovation in relation to their expected contribution.

This chapter is organized as follows. Section two discusses the study's objectives, underlying hypothesis, and research questions. The applied methodology is discussed in section three, while section four presents the findings. Section five discusses the study's overall contribution to the research theme on frugal innovation, and section six contains the conclusions.

3.2. Research Objectives, Hypothesis, and Research Questions

The research programme on frugal innovation is intended to inquire on the conditions under which frugal innovations can be more likely to stimulate development in the African context. While there is a general consensus that frugal innovation can be beneficial to businesses and the poor, there is a knowledge gap on what can really be considered frugal innovation/engineering, its institutional processes, and how and when the benefits can accrue to firms and the majority of those in the BoP, or the majority of the people in sub-Saharan Africa (SSA).

This kind of research involves analyses of consumer preferences and how re-engineered products suit their needs or otherwise in terms of the design features, and the process by which the products are introduced, marketed, and institutionalized. The process of reengineering and the institutional process are not necessarily mutually exclusive and are often interlinked for the innovation process to translate into a viable business model. The objective of this case study was to provide a brief analysis of frugal innovation with respect to the introduction of small, hand-operated tractors, commonly known as power tillers, as a solution to low output and productivity of smallholder farmers. It focused on innovation in terms of the product's key design features and the institutional platform underlying it, and the results it has generated. The study is anchored on the broader hypothesis of the research programme, that is, locally embedded knowledge and technology networks are important elements in successfully re-engineering high-value products for low-value but high-volume markets. The interpretation here is that while some manufacturing firms have moved into more modern and sophisticated agricultural machines, they have at the same time re-engineered those products and technologies to produce simpler and cheaper machines that are affordable and applicable by low-income and unsophisticated smallholder farmers.

The operationalization of this hypothesis was as follows: the introduction of power tillers as means to help smallholder farmers improve their output and productivity had not succeeded because of both limitations on technical design and neglect of institutional dimensions. The technical design limitations relate to the efficacy of these machines under different soil types, terrain, and climatic conditions. The institutional dimensions relate more to the process by which the power tillers were introduced in Tanzania, mechanisms by which they reach the intended targets, and how they are utilized by recipients. Like any generic innovation, it is difficult for frugal innovation to occur under normal conditions, where firms and entrepreneurs take risks in new areas and where the target markets are those in the BoP, in the absence of institutional mechanisms to offset those risks. Some institutional actions, however, can also become counterproductive if the interests of various institutional actors are not aligned. Hence, understanding the broader institutional settings surrounding this particular frugal innovation and its outcome is as important as understanding its technical dimensions.

This hypothesis was explored by an attempt to answer the following research questions:

1. How were the powers tillers introduced and adopted by the smallholder farmers in Tanzania?
2. What elements in the design of power tillers make them suitable (or unsuitable) for smallholder farmers under different agro-ecological conditions?

3.3. Research Methodology

The first question led to exploring the institutional aspects of this innovation, including the processes by which this technology was evaluated and why it was considered relevant for Tanzania. The decision-making process and incentives of different actors in the process were investigated. Specifically, the following aspects were pursued:

a) The process of identifying the technology and the decision to import vis-à-vis customization by local firms;
b) How the initiative was financed (role of the government, private importing agent, local government authorities/district councils, farmer organizations, and individual farmers);
c) Institutional coordination through the chains – from acquisition to knowledge on power tiller maintenance and utilization.

To obtain relevant information for this kind of institutional analysis, interviews were carried out with key informants at different levels of government departments responsible for policy decisions and implementation and those from the private sector. These included the Ministry of Agriculture, Food Security and Cooperatives (MAFSC),

National Service Business Unit (SUMA), the Ministry of Regional Administration and Local Government Authorities, selected district councils, and the importing agents and power tiller suppliers.

The second question focused on examining key power tiller design features in relation to their intended functions. Thus, technical information was obtained from key suppliers where key design attributes were identified. These attributes were accounted for when examining the on-the-ground performance of key functions under different agro-ecological conditions. Semi-structured interviews (Appendix 1) were held with officials working in target districts and with farmers selected randomly in those districts. District selection was based on the distribution of the estimated 4,571 power tillers supplied in Tanzania, as shown in Table 7, where a significant number was supplied in six out of the 21 regions in Tanzania mainland.

Table 7: Distribution of power tillers by region

S/No	Region	No. of units	% of total
1	Mbeya	1073	23.47
2	Morogoro	327	7.15
3	Iringa	306	6.69
4	Shinyanga	246	5.38
5	Rukwa	242	5.29
6	Mtwara	217	4.75
7	All others	2160	47.25
Total		**4,571**	**100.00**

Source: Ministry of Agriculture Food and Cooperatives

While the study robustness could have been improved by selecting a sample from all regions, budgetary limitations and time constraints made it prudent to select fewer areas. Two districts were selected from two regions with the highest number of power tillers, namely Mbeya and Morogoro. This selection was helpful because it increased the likelihood of reaching a high number of well-experienced farmers at reasonably low logistical costs. One district was selected from each of the two regions, based primarily on the same criterion, that is, a district with the largest number of power tillers. For Mbeya, this was straightforward, as Mbarali district represented 97% of the region's 1073 power tillers. In Morogoro region, Ulanga, Kilosa, and Kilombero districts accounted for 27%, 23%, and 19% of the 327 power

tillers in the region, respectively. However, farmers in Kilombero district engage in paddy production, just as farmers in Mbarali, but the difference in power tiller supply is significant. This led to the choice of Kilombero district.

The objective of the field survey in the districts was to obtain information relating to:

a) Key design parameters and how they relate to expected and current use;

b) Support mechanisms related to knowledge of use, maintenance, and operating costs;

c) How the power tillers contributed to changing livelihoods of the smallholder farmers – i.e. productivity increases, reduced transport costs, improved acreage under cultivation, increased income – or the reasons for a lack of change.

In Mbarali district respondents were drawn from two divisions, namely Rujewa and Ilongo. In Rujewa 45 farmers were interviewed, whereas only 15 farmers were interviewed in Ilongo. All respondents in Mbarali owned power tillers as individuals. Table 8 shows the distribution of the sample in Mbarali.

Table 8: Respondents in Mbarali district

S/No	Division	Ward	Respondents
1	Rujewa	Madibira	30
		Mapogoro	15
2	Ilongo	Hambolelo	5
		Chimala	5
		Itambolelo	5
Total			**60**

Source: Survey data

In Kilombero district data was collected from 47 respondents owning power tillers. The respondents were drawn from three divisions, namely Ifakara (15 farmers), Mang'ula (16 farmers), and Mngeta (16 farmers), as shown in Table 9, Six respondents were farmers owning power tillers under farmer group management, whereas 41 respondents owned their power tillers under individual ownership management. The farmer groups have individual members ranging between 15 and 22 farmers each.

Table 9: Respondents in Kilombero district

S/No	Division	Ward	Respondents
1	Ifakara	Kibaoni	9
		Ifakara	5
		Lumemo	1
2	Mang'ula	Kiberege	2
		Mang'ula	7
		Kisawasawa	4
		Mwaya	3
3	Mngeta	Mngeta	16
Total			**47**

Source: Survey data

3.4. Findings of the Study

The study reveals a number of institutional and design aspects of power tillers hitherto unknown to the policy development fields or at least not documented in a systematic manner. These findings are discussed in turn.

3.4.1 Institutional Processes of Product Introduction: Top-Down, State-Induced Innovation

Tractor mechanization for cultivation, farm transport, and processing took off in Tanzania since around the 1950s. Initially these tractors were used on foreign-owned estates growing tea, coffee, sisal, tobacco, and wheat. By the early 1960s the number of tractors rapidly increased to around 1600 units because of the emergence of private commercial Tanzanian farmers with medium- to large-scale farms. The Tanzanian farmers used tractors mainly for production of maize in Iringa, wheat in Arusha, and cotton in Shinyanga, and by 1970 there were about 17,000 tractors (Kjaerby, 1986).

The evolution of hand hoe use in agriculture in East Asia in the 1960s was mainly driven by land tenure considerations. Due to the small sizes of farms, Japan and India invented small, hand-operated tractors initially designed for use in rice paddling, gradually replacing hand hoes. The focus of mechanization in Tanzania, however, was mainly on four-wheeled tractors. The modernization approach, adopted as part of the First Five Year Plan in 1964, aimed at opening up new areas for modern and

mechanized farming, through supply of tractors and machinery. However, the scheme implementation under this approach failed for various reasons, including the lack of sufficient preparation and overcapitalization relative to returns (Mmari, 2012). The reliance on manual power has continued to dominate agriculture in Tanzania and in other SAA countries (FAO, 2008). While the use of engine power increased by 500% between 1961 and 2000 in Asia, it increased by only 28% in SSA during the same period (ibid).

In Tanzania, partially due to the earlier tractor failure, the Second Five Year Plan from 1969 stressed on the use of draft animals instead of tractors in efforts to transform farming from manual or human-power dependency to animal power, with the establishment of an animal breeding centre in Mwanza region for producing bulls that could endure longer working hours and produce greater power. Animal power, however, was confined to pockets around the country and became insufficient as the population grew and the area under cultivation increased. Although the use of tractors continued to expand on the large-scale state-owned farms, on the whole the population of tractors decreased from 17,000 units in 1970 to less than 6,000 in 1990s due to a variety of reasons (FAO, 1997).

Experimentation with alternative forms of mechanization started in 1965 via a hand-operated garden tractor imported from the Netherlands for training purposes, but no additional efforts were made to introduce the technology into farmers' fields. The first trial runs were initiated in the 1990s, when ten power tillers were acquired from Japan by the Mechanization Department of the Ministry of Agriculture, under the Food Security for the Underprivileged Farmers project, commonly known as the "2KR" project. The ministry's staff had to rely on the user's manual as they had no formal orientation. The trials and promotional activities were first undertaken in Morogoro region, which led to the request for twenty additional power tillers from Japan. This marked the beginning of the use of power tillers in Tanzania, albeit on a very small scale. The ministry sold these power tillers at a subsidized price equivalent to two-thirds the CIF value in Dar es Salaam.

In 2002, the Ministry of Agriculture targeted additional districts for power tiller promotion, including Mbarali district. More power tillers were requested, for which 120 units were delivered under the same project. The ministry required all regions to indicate their need for power tillers, but the response was very low. Subsequently, the ministry decided to allocate six units to each region, and then organized a heavy campaign to promote power tillers in the regions, working with regional leaders and local government authorities. Mbarali district responded well. The agricultural training institute located in Igurusi village in Mbarali took up the challenge to support farmers, particularly in setting up irrigation schemes for rice production. The institute offers diploma programmes in irrigation and land use planning. The initiation of these irrigation schemes sparked

the demand for power tillers in Mbarali district, which partly explains the prevalence in their use their compared to other districts.

The increase in the number of power tillers in many other districts came in the wake of a 2010 directive from the Prime Minister to all district councils following the adoption of the Kilimo Kwanza initiative. The directive required each district to procure 50 power tillers each year. In turn, the councils would distribute these machines to small-scale farmers and farmer groups. Under this arrangement, farmers were to contribute 20% of costs while councils, under the District Agricultural Development Plans (DADPs), ere to subsidize 80% of the cost. Many district councils responded, although most procured them in phases due to budgetary constraints.

Clearly, the supply of power tillers was driven by the government, although demand in Mbarali district was complimented by the introduction of irrigation farming schemes. The initiatives from the agriculture training institute at Igurusi were also a catalyst for the irrigation scheme development. As will be seen below, agro-ecological conditions and farming practices had an influence on differential demand. The decision to promote the use of power tillers country wide in the late 2000s, in the context of Kilimo Kwanza, did not consider the technical characteristics of power tillers and the differences in agro-ecological conditions as determinants of their effectiveness. Political and administrative dexterity prevailed over technical considerations.

3.4.2 Response of Private Sector to Changing Demand for Power Tillers

Initial supply of power tillers by private traders was pioneered by Auto Sokoni Limited, operating in Dar es Salaam and other urban centres in Tanzania as an importer of various agricultural machinery. Auto Sokoni stocked a few power tiller units made by AMEC group of China, to whom they had been agents. Soon after the demand in Mbarali district surged, Auto Sokoni responded by importing more units and opening supply branches in Mbeya and Iringa regions, from where they could serve rice farmers and others in the neighbouring districts.

More and more traders began importing power tillers from China, while others dealt with spare parts. At the same time, the parts supply for the previous ministry-supplied Kubota power tillers from Japan was running out. The coordinators of the project had a previous agreement with International Motors, an agent of Toyota, to provide dealership for spare parts, but because the market segment was small relative to their main segment, they opted to pull out of the agreement. So, the supply of parts for Kubota machines became problematic. This problem made the Chinese-made machines more popular, because spare parts were readily available. New problems, however, emerged in the supply of parts. As is the case for other types of machines, genuine parts are often more expensive than generic ones, making consumers prefer cheaper ones.

Unaware of the significant quality differences, some power tiller owners purchased cheaper, lower quality parts, resulting in frequent malfunctioning. In addition, many other power tiller brands were introduced to the market, including those from India, Korea, and Thailand. For most smallholder farmers who bought power tillers, the main driver behind the choice of type was the price, although the experience of existing power tiller owners also dictated those choices.

3.4.3 Power Tiller Ownership by Groups or Individuals

There are three categories of power tiller owners: individuals who purchased these machines on their own from suppliers, individuals who benefited from the loan or the subsidy scheme, and farmer groups who acquired their machines through a subsidy scheme from the District Council. The first category was influenced more by needs arising from their agricultural activities, while the rest were more supply driven. As the data and the institutional process of introducing power tillers suggested, owners in Mbarali district acquired their machines mainly by purchasing them on their own or through their already established Savings and Credit Cooperative Societies (SACCOS). Survey data shows that the majority of power tillers in Kilombero district were acquired through support from the District Council, and were thus owned by farmer groups, a condition preferred by the District Council as a way of reaching many farmers. Under this system, farmer groups paid 20% of the machine cost, while 80% was subsidized by the District Council. It was not possible to establish directly whether ownership type mattered for the outcome, although it appeared that individual ownership was most likely influenced by owner demand rather than supply driven, and so individual ownership was also more likely to be associated with more positive outcomes.

3.4.4 Embeddedness of Local Knowledge in Product Design and Adaptation to Local Needs

Power tiller effectiveness is influenced in part by the design, but also by knowledge among those operating them. Conventionally, these machines are known as two-wheeled, hand-operated tractors. Three features determine their effectiveness. First is the ease of control, so that more engine power is used for tilling or any other intended use rather than for operation. Thus, a usable power-to-weight ratio is achieved when engines do not exceed 14 horsepower.

The second is convenience to the operator, such as the ease of reaching the controls, while the third is operator comfort. If conditions for the correct application of these machines are not met, it is likely to discourage their use or lead to modification by users and perhaps suboptimal use.

In terms of functions, power tillers derive their name essentially from engine-driven tilling, but tilling is just one component, albeit the main component. The rotovator, also known as rotary hoe, is the key implement that was designed for tilling light soils, applied for functional time and

energy that human power could not produce. Other power tiller operations include ploughing, harrowing, ridging, and water pumping, but additional equipment must be acquired for these purposes. Another operation, the only operation that provides a seat for the operator, is trailing.

Survey results reveal that all farmers in Kilombero and Mbarali districts owned ploughs (disc/mouldboard). However, farmers in Kilombero also owned trailers (93%), rotovators (80%), cage wheels (59%), and harrows (56%), whereas farmers in Mbarali district owned cage wheels (92%), trailers (82%), and rotovators (72%). Water pumps and transplanters were not as common and would seem to play a minor role in agricultural production in both districts. Farmers and power tiller owners had made various modifications to suit some local needs – i.e. locally driven re-engineering – which suggests that the products were not initially engineered or designed for adaptations in different agro-ecological conditions. Most significant modifications were done on implements, as reported by 74% of respondents in Kilombero. In fact, most modifications were reported in Kilombero, versus Mbarali, and were more prominent on the trailers, with the aim of increasing carrying capacity, thus reflecting a desire to use these machines for transportation. The implements' hitching system, used for attaching them to the tiller, was also subject to some modifications. In Kilombero 35% of owners reported modifying implements, versus 12% in Mbarali. Some of these modifications were done without regard to power generation or intended designs, contributing to failures, frequent breakdowns, or even injuries.

3.4.5 Effectiveness of Power Tillers

While power tillers were introduced in many districts through administrative directives, it is clear that they fitted in certain production situations but not in others, a fact that was not keenly considered in this decision process. As a result, applications in each district are different, as are the outcomes. The striking differences in the rate and type of power tiller use in Mbarali and Kilombero districts underscore this point. While both districts produce paddy, farmers in Mbarali district practice irrigation via runoff water and water from rivers. Irrigation schemes were gradually developed and formalized under the supervision of district authorities in the 1990s. The schemes were managed through irrigation organizations composed of small-scale farmers, organized on issues of water rights and credit access. The key agro-ecological feature is that when dry, clay soil is usually hard to till by hand hoe or power tiller. Thus, power tillers have been used more extensively for field activities in Mbarali district, where irrigation provides for wetter soil, compared to Kilombero district, and outcomes are different. By 2013, Mbarali district had about 44,000 acres under 80 smallholder irrigation schemes. The schemes varied in size, but an average of 3,000 smallholder farmers cultivated approximately 2,000 hectares of land.

Farmers in Kilombero district, by contrast, had continued to rely on rain-fed farming, so that the use of power tillers for ploughing was limited to a short period between the beginning of rains and planting time when soils are softer. This has made the use of these machines less prominent for field operations in Kilombero. Indeed, Kilombero farmers complain that these machines did not generate enough power to till the dry hard soil. This concern was also echoed by others, including ministry officials. Table 10 shows the activities under which power tillers operated in the two districts.

Table 10: Usage of power tillers in Mbarali and Kilombero districts

	Activities	Mbarali		Kilombero	
		Respondents	%	Respondents	%
1	Farming	60	100	7	17
2	Transportation	46	77	31	66
3	Irrigation	6	10	0	0
4	Threshing	2	3	0	0
5	Grounded	0	0	8	17

Source: Survey data

Clearly, Mbarali's farmers use power tillers more directly on agricultural-related activities than is the case with Kilombero's farmers. Even though 77% of owners in Mbarali use these machines for transportation, in most cases it was for transporting farm inputs and produce to and from the farm, as explained by farmers as well as the District Agricultural and Livestock Officer. To the contrary, most transportation in Kilombero district was being treated as a business in its own right and not necessarily connected to farming activities.

The research also revealed that a significant proportion of power tillers in Kilombero district were reported as being out of service. This was further corroborated by many formal complaints to the District Council by Kilombero district farmers. Documented evidence on power tiller malfunction availed by farmers as well as by the District Council vis-à-vis the supplier confirmed dissatisfaction among farmer groups over tiller malfunctioning. In one such communication, in April 2011, the supplier was required by the District Council to visit the district to inspect and fix machine-related problems emanating from inaccurate technical specifications and operational and manufacturer shortfalls. A subsequent letter addressed to the District Executive Director from the chairperson of the Kiburutubu ward farmer group confirmed that the supplier's technician

went to the site to inspect the machines and agreed with the cited problems, promising to fix them to the extent possible.

In terms of the contribution of power tillers to agricultural output and productivity, and the original intention of their use, results vary between the districts, reflecting the differences in the intensity of power tiller use in primary farming activities. Table 11 shows the responses of farmers in the two districts with respect to improved agricultural productivity, mainly in terms of crop yield improvements per unit of land.

In Kilombero district, respondents in the farmer group category indicated that power tillers had not increased their agricultural productivity because the farmers in the groups do not use them for agricultural activities. In the case of individual farmers, almost 50% of the respondents indicated that power tillers had improved agricultural productivity. The overall results, however, demonstrated that 57% of the respondents had not improved their agricultural productivity. As explained earlier, this was attributed to the fact that power tillers failed to generate sufficient power for ploughing the area's hard soils.

Table 11: Improved agricultural productivity

S/No	Response	Kilombero district				Mbarali district	
		Group	Individual	Respondents	%	Respondents	%
1	Yes	0	20	20	43	55	92
2	No	6	21	27	57	5	8

Source: Survey data

The 43% of respondents in Kilombero who indicated improved agricultural activities, linked power tillers to the improved ability to prepare a good seed bed. Hence, farmers used these machines to transplant paddy, contrary to previous planting techniques via broadcasting.

By contrast, the majority of respondents (92%) in Mbarali district cited improved agricultural productivity because power tillers enabled them to prepare their farms better and on time with the use of rotovators. The extra income obtained was used for purchasing fertilizers, thus considerably increasing the amount of paddy produced per unit area.

The few farmers (8%) who claimed a lack of productivity improvements associate the failure to late planting and failure to use enough fertilizer on their farms, rather than on machine malfunctions. Data provided by district authorities in Mbarali corroborate farmers' claims on increased productivity, especially of paddy, as shown in Figure 2.

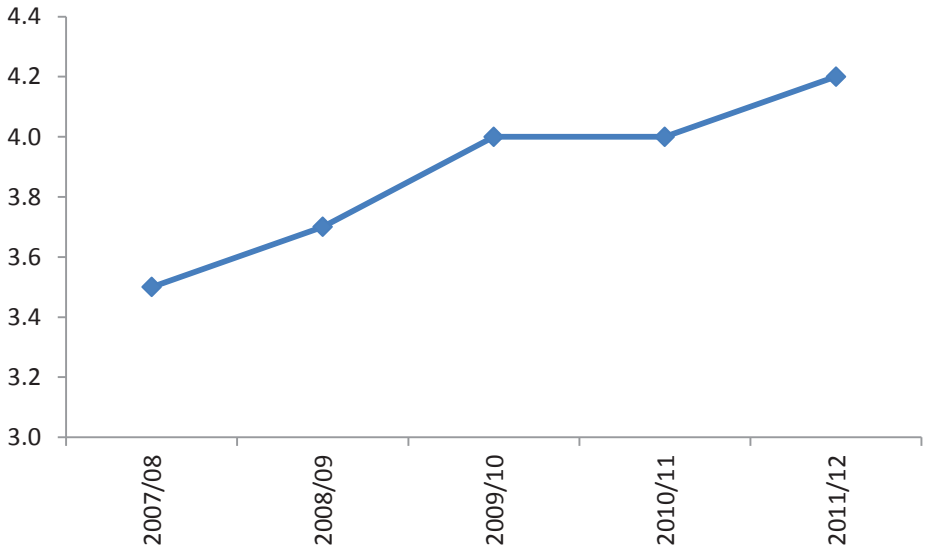


Figure 2: Productivity change (yields) in Mbarali in tonnes/hectare 2007/8–2011/12

***Source**:* Mbarali District Council

While productivity in some areas was reported to have increased as a result of power tiller use, it is possible that improvements could also result from other factors, although the available data cannot provide a detailed analysis of these. In addition, the sample size was not large enough for disaggregating by categories of land size, gender, or prior income for analysis of significant variations.

In terms of transportation cost, the results in Table 12 show that 91% of the Kilombero respondents and 80% of the Mbarali respondents had reduced their transport costs. The trailer has a seat, which allows the user to ride behind the power tiller instead of walking, as for the case of ploughing, harrowing, and puddling. Power tillers are therefore used for transporting various goods, including produce, firewood, water, building materials, etc. Moreover, of the 9% (Kilombero) and 20% (Mbarali) who claimed not to have benefited, none own power tiller trailers.

Table 12: Reduced transport costs

S/No	Response	Kilombero district				Mbarali district	
		Group	Individual	Total	%	Respondents*	%
1	Yes	3	40	43	91%	48	80%
2	No	3	1	4	9%	12	20%

Source: Survey data

*All respondents in Mbarali owned their own power tillers

In terms of area under cultivation, Table 13 demonstrates that a majority of the Kilombero respondents (57%) have not increased their area under cultivation, because they use their power tillers mostly for haulage. The Kilombero farmers who claimed to have increased their area under cultivation (43%) reported to do so because of flexibility in operational timing and reduced drudgery.

In Mbarali district 80% of farmers cited increased area under cultivation (Table 13). The increased areas vary from 1 ha to between 2 and 3 ha, and a few farmers have increased from 2 to 5 ha of paddy production. This was attributed to availability of irrigation facilities (schemes) as well possession of power tillers and tillage implements, mainly ploughs and rotovators. Although Mbarali farmers appeared to have increased the area under cultivation, they reported a new challenge related to transplanting. Transplanting in Mbarali district is mainly done manually via hired labour. With an increase in cultivated area, the demand for hired labour had gone up, resulting in increased labour costs. Therefore, farmers in the area were looking for alternatives. at the time of fieldwork farmers were working closely with the Mbarali District Council to explore ways of acquiring tiller-powered rice transplanters. While the increased labour cost was seen as a challenge, it was also a result of positive externalities arising from power tiller usage and the corresponding creation of an additional avenue for increasing area under cultivation and thus increasing farmers' incomes. Reduced transport costs and increased farmer incomes accruing from transportation services can also be considered as positive externalities.

Table 13: Increased area under cultivation

S/No	Response	Kilombero district				Mbarali district	
		Group	Individual	Total	%	Respondents	%
1	Yes	0	20	20	43%	48	80%
2	No	6	21	27	57%	12	20%

Source: Survey data

3.4.6 Institutional Support for User Knowledge and Maintenance

At the time when power tillers were introduced, very little knowhow existed on their use and maintenance, neither at the Ministry of Agriculture and other institutions nor among the farmers and power tiller operators hired by the farmers. For a variety of reasons, some owners preferred to hire other people as operators, while other owners operated themselves. As suggested by some officials, farmers were not sufficiently prepared on how to operate these machines under optimal conditions. Another official from the supplying unit likewise noted that part of the complaints from farmers emanated from a lack of user preparedness in understanding the conditions under which these machines could be used, resulting in unwarranted modifications.

Power tiller operators are vital in making the technology useful to both small- and medium-scale farmers. The key responsibilities of operators are to operate power tillers and to carry out normal routine maintenance that prevents them from frequent breakdowns and major repairs. Employing a competent operator ensures better returns on the investment. Thus, it is very important for an operator to be trained.

Results from Kilombero district reveal that very few power tiller operators (4%) acquired operational skills through formal training. This also applies to Mbarali district where it was revealed that none of the operators had an opportunity to attend formal training. The formal power tiller training in Kilombero was conducted over the course of three weeks at VETA Mikumi College, but unfortunately the study could not adduce reasons as to why other operators (96% for the case of Kilombero) did not have the opportunity to attend the training.

The other operators in both districts acquired operational skills via on-the-job training for different periods of time, ranging from one day to one year. Others acquired skills through one-day training sessions from power tiller suppliers. This was the case with operators of power tillers owned by farmer groups in Kilombero. Lack of adequate training could be one of the causes for why 50% of power tillers owned by farmer groups were out of service.

Similarly, there was no robust maintenance support system in many areas of the country. Repair and maintenance, therefore, has been a challenging undertaking, although it has evolved over time. Repairs and maintenance are measures taken to sustain and restore the machine's performance and prolong its lifespan. Repairs are undertaken to replace the machine's malfunctioning or fatigued parts and include both scheduled and unplanned replacements. The term maintenance can be defined as the work done to ensure that failure does not occur before reaching a specified lifespan. This includes cleaning, daily oil checks, greasing, battery inspection, engine tuning, and general machine check-up. Maintenance work is typically graded on a daily and seasonal basis. Therefore,

carrying out repairs and maintenance necessitates having a reliable source of spare parts and trained personnel.

In Kilombero district the study found that spare parts for power tillers were obtained from various places, including Ifakara, Mngeta, and Mang'ula villages. The distances from where the power tillers were based to spare part shops in these areas in most cases ranged from about 1 km to 80 km. However, if a spare part could not be found locally it had to be sourced from Iringa, Mbeya, or Dar es Salaam.

Farmers in Mbarali district purchased spare parts mainly from Chimala and Madibira villages, which are in the range of 0.2 to 30 km from most of power tiller owners. Other places include Mbuyuni, Ubaruku, Mkunywa Kijijni, Rujewa, and Mahango villages. On rare occasions farmers travelled either to Iringa or Dar es Salaam to purchase spare parts.

Although Mbarali subsequently developed better local capacity for maintaining these machines, it presented an exception rather than the rule. First, because of high demand, the traders, especially Auto Sokoni Ltd, moved in quickly to set up a supply base within the district, with several agents also selling spare parts. Second, the agricultural training institute located at Igurusi in Mbarali district imparted knowledge and skills through field demonstrations on irrigation. Combining this and the service from local mechanics working with private suppliers, maintenance capacity was built, which led the farmers in the respective areas to even modify some tiller features. The most common form of modification, as noted earlier, was increasing the axle load capacity on the trailers. This included replacing the original axles with stronger, locally fabricated axles and replacing the original rims with stronger and wider, locally modified rims.

It can generally be concluded that power tillers are simple machines that can be easily repaired and maintained in rural areas using existing skills. Their reliability in terms of undertaking proper work according to specifications, however, and identifying genuine parts and undertaking appropriate modifications is doubtful. The potential for positive externalities in raising local engineering skills exist, but the linkage between manufactures, suppliers, farmers, and machine operators as technology users is not robust enough to achieve the full theoretical benefits of frugal innovation. While the reasons for this lack of linkages could not be established, two hypotheses can be projected. First, the volumes of tillers supplied in Tanzania are too small relative to global share for the manufacturer to invest in the desired linkage. Second, the national system of innovation is not robust enough to propel local adaptations of technologies and innovations. These may limit the effectiveness of this technology and its long-run demand in Tanzania.

3.4.7 Suitability of Power Tiller Designs

The study found that power tillers in the study areas attracted young operators, a majority of whom were between 21 and 30 years old. This was revealed by 51% of the respondents in Kilombero and 60% in Mbarali districts. The fact that power tillers attracted young people had a positive impact on reducing the rural to urban migration. The current trend has been for educated and young people to migrate from rural to urban areas to liberate themselves from drudgery associated with the use of hand tools in agriculture, leaving the older people in the villages.

The suitability of power tillers is their motorized source of power, their relatively small size, and low price. Power tillers can also be hitched to different implements for various operations, including tillage, water pumping, threshing, transportation, etc. The added seat when using a trailer likewise makes power tillers suitable for transportation purposes.

Despite these design features the technology was not fully accepted in all places where it was introduced. In some areas like Mbarali district the technology was well received, although a lot of modifications were also made. In Kilombero district the technology proved to be somewhat a failure as it could not perform as expected in primary activities in agriculture, principally because of the lack of engine power for tilling hard soils.

3.5 The Case Study's Contribution to the Main Research Programme

The broader hypothesis of the main research programme is anchored on the important role played by embeddedness of local knowledge and technology networks in re-engineering of high-value products in ways that can make them attractive and useful by those in the BoP, potentially building a high-volume market for manufacturing firms. The absence of this embeddedness of local knowledge is likely to constrain successful re-engineering or even the adaptability of the products concerned. This case study demonstrated how the lack of embeddedness of local knowledge and agro-economic conditions in power tiller design rendered them ineffective in areas that did not have complimentary interventions, notably the irrigation scheme. Local knowledge was applied *ex-post*, mainly in modifying certain functions to suit other needs considered secondary, particularly transportation.

Few efforts had been made to promote local assembly or customization of power tillers, except a failed attempt by one private company located in the Western Lake zone to produce power tillers. The Centre for Agricultural Mechanization and Rural Technology (CARMATEC) based in Arusha, a state institution established in 1981, should have played a leading role in identifying appropriate machines and technologies or proposing customizations to make tillers work better for the intended purposes. Yet the centre seemed to have played only a minor role in this particular process. Only a few machines procured directly through the government tender or specific projects were passed through CARMATEC

for testing and advice. The majority of these machines, especially those imported by traders, did not use CARMATEC, perhaps because the law did not strictly require all imported agricultural machinery to be tested and approved by CARMATEC.

The study confirms the hypothesis of generalized failures related to technical design, reflected in the underpowered motors relative to the hardness of the dry clay soils that characterize many farming districts in Tanzania. The institutional limitations are also evident in the supply-driven approach, which was not conscious of agro-ecological differences and the importance of scaling up user training on mechanization and maintenance systems to achieve positive results. The demand for power tillers and the corresponding positive contribution to farming and livelihoods in Mbarali does not reflect a routinized institutional platform for promoting this innovation, which was also the case in many other districts for which power tillers were promoted. In addition, the manufacturing firms had not responded to the needs arising from this diversity in the agro-ecological conditions in Tanzania.

3.6 Conclusion and Recommendations

This study on power tillers was carried out as a pilot project for a broader research project led by Leiden-Delft-Erasmus (LDE) consortium. The broader project intends to focus on the role of innovation, technology transfer, and technology networks in Africa's economic transformation, using the notion of frugal innovation. This pilot project was carried out to ascertain how different actors were involved in introducing and applying power tillers in Tanzania. Overall, the study suggests that power tillers in Tanzania were introduced using top-down, state-induced innovation that was not adequately informed by technical and agro-ecological differences in Tanzania. As a result, power tillers were imported from various Asian countries, and no re-engineering was carried out to match their designs to local needs. In addition, no thorough preparation was put in place in terms of identifying user needs, training operators, and setting up maintenance and service systems. Frugal innovation entails more than just reducing the complexity and costs of products or services while retaining basic functionality. It also entails a functional interface between technological and institutional dynamics.

The result is that in some places the technology was adopted with some modifications, whereas in others the technology was not suitable for the purpose that was initially conceived. Local innovation, however, resulted in positive externalities, where secondary use of transportation and hauling goods prevailed over primary farming functions. Power tillers can therefore provide solutions to primary concerns on agriculture mechanization for smallholder farmers only where agro-ecological conditions commensurate with the current technical design of power tillers. The study also suggests that the political economy of agrarian transformation needs to address the diverse needs of the farmers and package interventions that are appropriate

to agro-ecological conditions and socio-economic environments that may be crop specific, market specific, or locational specific.

Further research is needed to benchmark systems and processes involved in product designs or re-design that embed characteristics of frugal innovation, seeking to make such products functional in the local circumstances, robust for the operating conditions, user friendly, and affordable to those at the bottom of the pyramid. Such research will provide room for benchmarking different products and institutional processes involved in bringing innovation to bear for local economic development.

CHAPTER FOUR

THE IMPACT OF AGRICULTURAL INPUT SUBSIDIES ON POOR SMALLHOLDER FARMERS: LESSONS AND CHALLENGES FOR IMPLEMENTATION OF NATIONAL AGRICULTURAL INPUT VOUCHER SCHEME IN TANZANIA

Cornel Jahari

4.1 Introduction and Background

Globally, food security remains a key concern of all countries, thus monitoring world food security nationally and internationally is critically important for responding to long- and short-term food security threats. The current World Population Prospects Review of 2017 (UN, 2017), has signposted that the current world population is about 7.6 billion and it is expected to reach 8.6 billion in 2030, 9.8 billion in 2050 and 11.2 billion in 2100, and Africa will continue to experience high rates of population growth. In addition, life expectancy in Africa is increasing as witnessed by an increase of about 6.6 years between 2000-2005 and 2010-2015 after rising by less than 2 years over the previous decade. As a result of population growth and increased life expectancy Africa is facing a critical challenge of meeting 2030 Global Sustainable Development Goals (SDGs) adopted the by UN in 2015 which replaced the Millennium Development Goals. The SDGs have 17 goals, among others and three goals are critical in this aspect and include ending poverty, zero hunger and ensuring sustainable consumption and production patterns. However, it remains a challenge in meeting these goals as more mouths will need to be fed. The FAO, (FAO, 2017) has shown that 700 million people globally are still in the extreme poverty today and almost 800 million people are chronically hungry and 2 billion suffer micronutrient deficiencies. The prevalence of undernourished populations is slightly decreasing in the world, but it remains higher in Africa particularly in Eastern Africa as seen on Table14 below.

Table 14: **Prevalence of Undernourished in Africa 2000 – 2016**

	2000	2005	2010	2011	2012	2013	2014	2015	2016[10]
				Percentage					
World	14.7	14.2	11.5	11.2	11.0	10.8	10.7	10.6	11.0
Africa	24.3	20.8	18.3	17.9	17.8	17.8	18.1	18.5	20.0
Northern Africa	6.8	6.3	5.1	4.8	8.5	8.4	8.3	8.3	8.3
Sub Saharan Africa	28.1	23.7	20.6	20.2	20.0	20.0	20.4	20.8	22.7
Eastern Africa	39.3	34.3	30.9	30.2	30.6	30.6	30.9	31.1	33.9
Middle Africa	37.4	29.4	23.8	23.1	22.5	22.3	24.0	24.4	25.8
Southern Africa	7.1	6.4	6.7	6.3	6.2	6.2	6.5	6.6	8.0
Western Africa	15.1	12.0	10.0	9.9	9.9	9.8	9.8	10.4	11.5

Source: FAO 2017

Looking at Africa, FAO report (FAO, 2017) has shown that Africa and Sub Saharan Africa is more vulnerable to poverty and hunger because of the sharp decrease of food security. According to Brian et al (Brian & Kienzle, 2016), majority of smallholder farmers in Sub Saharan Africa are resource-poor and their income seems not to be consistent. They are more liquid at the harvesting season and in a short period they run out of cash as many postponed necessities are to be met at the harvesting period. Furthermore, to enable them to survive, they put a lot of pressure on the natural resources ending up with environment degradation. However, saving to them is almost impossible. This means that, they have low levels of disposable income to demand for improved farm inputs as well as land and therefore labour productivity remains at low levels. If this poverty situation is not addressed, it will persist for a long time and they will stay in the same circle of poverty. This is aggravated by an inverse relationship between population growth and production levels. The data from World Bank shows that the population growth rate is higher than the production rate (Table 15) which raises worries on whether the population increase is a labour power blessing or is poverty accelerator.

[10] FAO 2017 projected values

Table 15: Population and Food Production in Sub Saharan Africa

Indicator Name	2000	2005	2010	2011	2012	2013	2014	2015	2016
Population, total (000,000)	670	765	877	901	927	952	979	1,006	1,033
Population growth (annual %)	2.7	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.7
Food production index (2004-2006 = 100)	83	100	120	119	122	126	125		
Food production index % (2004-2006 = 100)	0.020	0.180	0.200	-0.010	0.020	0.040	-0.010		
Cereal production 000,000 (metric tons)	86.8	109.2	133.7	125.7	134.8	135.9	151.4	143.6	148.0

Source: http://www.worldbank.org/

In order to increase productivity for farmers, governments introduced input subsidies for small holder farmers over a long time. The input subsidy policies in SSA have had a long history dating as far back as 1960s (Dorward & Chirwa, 2014) in the Post-colonial era which was dominated by the cold War and oil crisis. However, agricultural subsidies were found to be inefficient and not economically viable with a lot of market distortions as governments were dominating the economy, the private sector was undermined and the benefits to the recipients of subsidy i.e. smallholder farmers were limited.

Despite many agricultural policy challenges on fertilizer, seeds, agro-finance and farm support, there have been many initiatives aimed at increasing agricultural productivity in sub Saharan Africa. The (AERC Senior Policy Seminar XVII, 2015) gave an overview of agricultural development as traced back to1960 and before, and argued that agriculture in SSA was susceptible to the weather as it was/is in many cases a rain fed. So, adopting high return agricultural technology by poor smallholder farmers who were main crop producers in the environment where inputs such as fertilizers and improved seeds were very expensive and not easily available was a risk. To rescue smallholder farmers, through one of rural development initiatives for subsidizing the inputs such as fertilizers and seeds was inevitable.

However, according to the OECD-FAO Agricultural Outlook 2016-2025, SSA is going through demographic change, the rise of the African middle class, growing access to new information and communication technologies, rapid urbanization and consequent shifts in food demand. This is accompanied by downstream modernization of food systems, a considerable shift in the labour force from farming to nonfarm jobs and rising global interest in available African farmland strengthened by the sharp rise in agricultural commodity prices over the past decade. Thus, expanding agricultural sectors calls for appropriate governance systems, institutional capacities, and macroeconomic structural and sectoral policies which will work together to improve food security on a sustainable basis.

Agricultural subsidies in Tanzania were a priority just after independence, and this evolved through various initiatives. As agriculture was characterized by cooperatives, this was not particularly successful, and from the mid-1970s there was a shift to state owned enterprises (SOEs) commonly known as parastatals dominating marketing. But these SOEs were not efficient or successful either, and the liberalization policies in agriculture from the mid-1980s witnessed a shift back towards cooperatives, with a viable private sector emerging from the 1990s. Nevertheless, limited access to information on market opportunities has been a problem for small farmers and increases of input prices reduced profits and discouraged production (Isinika, et al., 2005). This problem motivated the government to reintroduce fertilizer subsidies from 2003, albeit on a limited basis. This will be discussed in evolution of agriculture subsidy section.

Indeed, Tanzania achieved impressive economic growth, as the GDP grew to an average of 7 per cent in last decade, but without manifest confidence for inclusive growth and decline in poverty. Most of the rural people lived close to food and income poverty line and most of poorest households were subsistence smallholder farmers and day labourers who depended mostly on agriculture (URT, 2009). The net GDP growth benefited only the economy while the income of many people did not grow proportionately to the overall economic growth (Hoogeven H, 2009). It is from this background that, most of smallholder farmers continued to face risks and shocks which undermined their long-term productivity and hindered their transition to higher-return activities. Among these risks and shocks are input supply shortages, seasonal unpredictability in their food production, price fluctuations and prolonged droughts. Therefore, agricultural transformation in Tanzania is imperative on the following grounds: first, the majority of poor people live in rural areas and make their living from land; second, agriculture has to produce food crops which is the basic need for food availability, food security and income; third, the largest national labour force is employed in agriculture and they would like to remain there for a long time and fourth, agriculture remains the main source of foreign exchange. It is these imperatives that led the reintroduction of the

agricultural production support in 2008 through the National Agriculture Input Voucher Scheme (NAIVS) to smallholder farmers.

This chapter analyses three broad agriculture historical periods in Tanzania in the context of their design and implementation and with emphasis on their dynamics in agricultural input subsidy policies. More emphasis though is on the factors that shaped the political economy of input subsidy policies. It provides in short, the lessons of general agricultural subsidies implemented after independence, challenges in the period of structural adjustments and more importantly it intensely analyses the empirical data from the re-introduced input subsidy under NAIVS scheme.

4.2 Overview of the Chapter

The remainder of the sections are structured as follows: section 2 presents the hypothesis of the study, research question and methodology. Section 3 presents the theoretical and conceptual framework linking producer subsidies, targeting, productivity, food security and poverty alleviation. Section 4 describes evolution of agriculture policy and broadly discusses agriculture subsidy policy in Tanzania. Section 5 evaluates the implementation of National Agriculture Input Voucher Scheme and section 6 concludes the chapter and highlights some policy recommendations.

4.2.1 The Study Hypothesis, Research Question and Methodology

4.2.1.1 Hypothesis

Smallholder farmers in Tanzania are described as food producers and food purchasers (URT, 2007). In other words, smallholder farmers produce food for own consumption and for sale to finance other foods and non-food requirements. Most of rural smallholder farmers use their own land and household labour in production. Therefore, a smallholder farmer uses household owned land and free household labour and will not have to pay for farm preparation, planting, application of fertilizers, harvesting and sometimes transporting yields to either home or to the market. On other hand, the small holder farmer will only need financial resources to purchase fertilisers, improved seeds and sometimes to pay for transportation of inputs and yields.

More often than not, even in a situation where a smallholder produces enough output for own consumption and for sale, the input and output markets are not stable enough to accelerate economic growth of smallholder farmers. The input price has been increasing faster than the price of output. Therefore, the higher the prices of inputs tend to lower the income obtained by smallholder farmers and this reflects another challenge to the farmers on the profitability when using fertilizer and improved seeds. It is therefore hypothesized that given this inverse relationship between the prices of inputs and the prices of produce, input subsidies are inevitable. However, for these subsidies to support increased production, productivity

and increase in smallholder farmer's incomes, they must be reliable, supplied in appropriate quantities and at the right time.

4.2.1.2 Research question and its rationale

The research question addressed by this chapter is: To what extent do systems of agricultural production and governance in the distribution, management and utilization of agricultural inputs influence the impact of subsidized inputs on agricultural production and productivity of small holders?

This question is necessitated by the fact that agriculture employs about 76% of the labour force in Tanzania and is dominated by smallholder farmers (peasants) cultivating an average farm size of between 0.9 hectares and 3.0 hectares each. About 70% of Tanzania's crop area is cultivated by hand hoe, 20% by ox plough and 10% by tractor. It is rain fed and food crop production dominates the agricultural economy in which about 5.1 million hectares are cultivated annually, of which 85% is under food crops and women constitute the main part of labour force (URT, 2010/11).

The National Strategy for Growth and Reduction of Poverty (NSGRP), known by the Swahili acronym as MKUKUTA[11], was introduced in 2005 with the objective of improving the agricultural growth rate from 5% in 2002 to 10% in 2010, with corresponding crop sub-sectors growth. In the medium term, the emphasis was to be on small scale agriculture, with gradual shift to medium and large-scale farming. (URT, 2005: 37). However, the agriculture sector has not grown significantly to meet these targets, especially to generate enough food surpluses for food security. Real agriculture growth rate has averaged 4 percent over the last five years which is below MKUKUTA growth target (URT, 2010/11).

The National Agricultural Input Voucher Scheme (NAIVS) was launched in 2009 as part of the Accelerated Food Security Program (AFSP) launched earlier in 2008. The overall aim of AFSP was to boost food production and productivity in targeted areas with low agricultural input intensity but a big potential for increased production and productivity of selected food crops mainly maize and paddy. The main objective of NAIVS was to improve farmers' access to critical agricultural inputs (fertilizer and improved seeds) for maize and rice production and was implemented by issuing to farmers subsidies equivalent to half of the price of a package of improved seed and

[11] The National Strategy for Growth and Reduction of Poverty in Tanzania known as MKUKUTA was approved in February 2005 to be implemented in five years and it was a successor of Poverty Reduction Strategy Paper. MKUKUTA was informed by Vision 2025 and committed to the achievement of the Millennium Development Goals (MDGs)

fertilizer12. This chapter seeks to find out the impact of governance systems in ensuring maximum impact of the programme on production, productivity and food security as well as income to smallholder farmers in Tanzania.

4.2.2 Statement of the Problem

From 1960 to mid-1980s, Tanzania practiced general producer subsidies which were abolished in 1986 due to wider financial crisis in the country. Although GDP had grown tremendously to about 7 percent since 2004[13] to date, however, agricultural growth has lagged behind (about 4 percent), yet about 76 percent of labour force is in agriculture and dominated by smallholder farmers and their level of food insecurity is still very high.

This work seeks to explain the structure of governance on agriculture production and how utilization of subsidized inputs influenced the rates of production and productivity to smallholder farmers since independence in 1961. This will be analysed in overall agricultural policy evolution in Tanzania since independence. The system of smallholder agriculture in Tanzania is discussed consistently within the broader three agriculture development phases i.e. the first phases is the Pre-Structural Adjustment Policies (SAPs) which covers the period between 1960 -1967 which was dominated by private smallholder farming where subsidies were mainly through cooperative unions in which peasants were members and had a say. It was also influenced by Ujamaa and villagization policies with subsidies targeting collective farms and controlled directly by the state through a state-owned enterprise (SOE). The second is the SAP phase with zero subsidies, and last is the post-SAP, during which subsidies were re-introduced mostly through targeting. It was during the last phase that The National Agricultural Input Voucher Scheme (NAIVS) was launched. The chapter will highlight the main policy objectives and features of NAIVS and analyse it implementation based on empirical data from NAIVS evaluation survey.

4.2.3 Sampling Methodology and Methods

The research used empirical panel data collected by REPOA, an independent Research Institution in Tanzania. In 2010, REPOA was contracted by the Innovations for Poverty Action of the World Bank and the Ministry of Agriculture, Food Security and Cooperatives (MAFC), to carry out a panel survey for impact assessment of the National Agricultural

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[12] Public Expenditure Review, 2013, Report of The Ministry of Agriculture, Cooperatives and Marketing, Prepared by David Biswalo, Xavier Gine, Aparajita Goyal, Oswald Mashindano, Donald Mmari, David Rohrbach, under the overall guidance of Stephen Mink, MAC&M, Dar Es Salaam.

[13] http://tanzania.opendataforafrica.org/tbocwag/gdp-by-country-statistics-from-imf-1980-2022?country=Tanzania

Input Voucher Schemes (NAIVS) in Tanzania. A baseline survey was carried between October 2010 and May 2011 and a follow up survey was undertaken between June and August 2012. The survey was designed to be quantitative with emphasis on objective measurements and use of numerical analysis.

The NAIVS scheme was initially implemented in targeted regions with the highest potential of maize and paddy production; the target population for this study comprised of smallholder farmers including scheme beneficiaries and non-beneficiaries. The sampling used data from 2003 Agriculture National Census (ANC) and 2009 National Panel Survey (NPS), and a sample size of 2,000 of household was assumed to be representative of the NAIVS with 10 households per village in 200 villages. The main program areas covered uni-modal rainfall regions of Ruvuma, Iringa, Rukwa and Mbeya in the south zone and Kigoma in the western zone which are also known as the grain belt. The other Regions covered were Morogoro in the central zone, Kilimanjaro and Arusha in the Northern zone which experience bi-modal rainfall patterns.

Districts in each region were assigned weights based on the total number of eligible smallholder farming households. Therefore, the regions with eight (8) or more districts such as Iringa and Mbeya were assigned two (2) sample districts and the regions with less than eight (8) districts were assigned one (1) sample district. Wards as well as villages were randomly selected in each sample district.

A total of 120 villages were evenly distributed to bi-modal rainfall regions and forty (40) villages were assigned in each of Meru, Same and Ulanga districts while a total of 80 villages were assigned to uni-modal rainfall districts, including Kilolo and Njombe, Mbeya Rural and Mbozi, Kasulu, Sumbawanga and Tunduru. However, a total of 16 villages were sampled per region except Iringa and Mbeya Regions where 2 sample districts were selected hence 16 villages allocated per region were divided evenly between the two districts.

At the village level a total of 10 households were sampled including 5 eligible beneficiaries and 5 eligible non-beneficiaries. The selection of 5 beneficiaries was alternated by selecting 2 or 3 female-headed households and 3 or 2 male-headed households from 2010 beneficiary list. The major component of this survey was Household Survey but was also supplemented by Listing Survey, a Village voucher committee survey, a Village survey and Agro-dealer Survey.

4.3 Theoretical and Conceptual Frameworks

The key conceptual and theoretical issues in this chapter are briefly described in this section. The aim is to contextualize and locate the work within specific conceptual and theoretical frameworks. The main conceptual and theoretical issues in this work are discussed in connection

with food security, producer subsidies, targeting, agricultural productivity and structural adjustment. These are briefly discussed below.

4.3.1 Food Security

The oldest definition of food security came to be known from the work of Thomas Malthus (1798: 41) which he used in determining disequilibrium between population and food. For him to maintain equilibrium, it is important that the rate of growth of food availability should be not lower than the rate of growth of the population. Therefore, food security is a matter of aggregate per capita food availability. However, recently, food security has been related to individuals. FAO (2010) defines food security as ‘‘a situation in which all the people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary requirements and food preferences for healthy and active life’’.

Moreover, the World Health Organization[14] (WHO) defines food security based on food availability, food access and food use, and in addition WHO explains food security as having available and sufficient quantities of food on a consistent basis. This involves food access accompanied by having sufficient resources, both economic and physical to obtain appropriate food for a nutritious diet and food use. It involves appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation. Furthermore, food security also includes the aspect of stability of the three mentioned dimensions of food security over time. FAO (FAO, 1996) has explained four critical pillars of food security as: food availability, access to the food, food utilisation, and food stability. However, this definition does not pay attention to factors such as agricultural supply, productivity and technology which are dominant aspects in food security discourses and practice. In addition, this definition does not critically look at developing countries with a lot of food insecurity where many people are worried about getting food to eat and food preference seems not to exist for the majority of smallholder farmers.

4.3.2 Food Insecurity

Food insecurity and malnutrition are typically a result of many interrelated failures at different levels. According to Ecker et al (2012), it arises from failure to command food range due to internal, external and international domains. Internal factors include floods, drought, lack of land and assets used to produce food. External failures are extended to include macro dimensions, external shocks and stresses. At the macro level the causes of food insecurity include macroeconomic instability, slow economic growth, poor infrastructures, inefficient marketing systems, insufficient and inefficient budgets as well as failure of international and national institutions in achieving food security. According to the FAO (FAO, 2017),

[14] *www.emro.who.int/nutrition/food-security/*

world hunger is on the rise. The number of chronically undernourished people in the world in 2016 was estimated to have increased to 815 million, up from 777 million in 2015 although still down from about 870 million people in 2010–2012 FAO (2012), and 900 million people in 2000. However, and the majority of them live in developing countries. In Tanzania food insecurity discussed here is related to access as some regions are food surplus almost throughout the year while others are food insecure and the majority of people are too poor to afford the necessary food and nutritional requirements.

4.3.3 Producer Subsidies

OECD (1995), defines Producer Subsidy as "the value of the monetary transfers to agricultural production from consumers of agricultural products and from taxpayers resulting from a given set of agricultural policies in each year." Five categories of agricultural policy measures are included in the OECD calculations of Producer Subsidy Equivalents (PSE)., According to Cahill et al (1990: 16) these are market price support which include: producer and consumer prices which are direct payments to producers without raising prices to consumers; reduction of input costs which lower input costs with no distinction being made between subsidies to capital and those to other inputs. Furthermore (Pratap & Gupta, 1991), defines subsidy as a form of financial assistance paid to a business or economic sector and is used to support businesses that might otherwise fail, or to encourage activities that would otherwise not take place. In the case of NAIVS, the basic definition is based on subsidising producer inputs for the purpose improving productivity of maize and paddy growers, through lowering prices for inputs.

4.3.4 Targeting and Penetration

Coady and others (Coady et.al. 2003: 13-15, 2004: 65-67), Srivastava (2004: 16) and Weiss (2004) have analysed four methods of targeting namely individual/household targeting, community targeting, categorical targeting and self-selection targeting. However, only categorical targeting and community targeting will be discussed because the NAIVS implementation has relied on the combination of two techniques.

Categorical targeting: this is a method in which all or specific individuals in a specified category such as geographical location, ethnicity or demographic composition are entitled with eligibility criteria to receive benefits. This method involves defining eligibility in terms of individual or household characteristics that are easy to observe, hard to falsely or manipulate and which are closely correlated to poverty.

Community based-targeting: this is a method which uses community members or a community leader who are normally not involved to the program to make wise decision on who should benefit and who should not benefit in the community. This involves the formation of committees of ordinary community members or committees of ordinary community

members but mixed with local officials to determine eligibility criteria and or sometimes also involved in selection of beneficiaries.

NAIVS used a combination of geographical and community targeting concentrating in the smallholder farmers in regions with high potential for producing maize and paddy. Policy analysts recognize targeting to be effective, this is conditioned to the high level of penetration rates as they are provided through means testing (Crawford, et al., 2006: 19), and the assumption is that appropriately targeting projects will maximize the reduction of poverty and increase social welfare (Acosta, et al., 2011: 7, Coady, et al., 2003: 7). Druilhe et al (2012: 23-24) have shown that a recent targeting schemes has largely increased agricultural production and reduced food insecurity, as they have targeted smallholder farmers who have higher marginal fertilizer use. The targeting policy approach has always considered the questions related to how targeted projects should be to the population that receives benefits.

4.3.5 Targeting Errors

Together with the effectiveness associated by targeting there are weaknesses as well. Acosta, et al (2011: 6), Mkandawire (2005: 9) and Sen (1995: 13), have argued that even sophisticated targeting tends to miss some of the poor, due to the error of exclusion or under-coverage associated with resources constraints. Hence possibilities of trade-off between coverage and duration are common. Furthermore, the inclusión error of including non-poor/over-coverage is also pronounced due to difficulties associated with exclusion since demands are articulated by organized groups and may end up including non-poor.

Administrative cost is one of the critical constraints to targeting and it is more compounded in poor countries where most of the economic activities are dominated by the informal sector. Thus, classifying poor and non-poor or different levels of poverty with the precision is extremely expensive and it requires sophistication and a lot of administrative resources which do not exist in most developing economies due to lack of information, financial barriers, lack of services, lack of voice and elite capture as well as corruption (Srivastava, 2004: 10**,** Mkandawire, 2005: 9).

4.3.6 Agricultural Productivity

Agricultural productivity as defined by agricultural geographers and economists is the measurement of the quantity of agricultural output produced for a given quantity of input or a set of inputs (Dharmasiri, 2009). If output increases at the same rate as inputs, then productivity is unchanged. On the other hand, if the output growth rate exceeds the growth rate in the use of inputs, then productivity is positive. However, the drivers of productivity should look ahead to include the function of conventional inputs like land, labour, water, chemical fertilizers, physical capital, public investment and extension services.

Productivity growth in agriculture is critical and has big interest to economists, because as agriculture develops, it releases resources to other sectors of the economy. This has been the base of success in industrialised world and therefore agricultural development is an important precondition of structural transformation towards industrial development, as it precedes and promotes industrialization (Morris & Adelman, 1988). However, it remains a challenge to poor countries whether they should replace their labour by mechanised agriculture or improve their productivity and retain labour intensive agriculture.

The crop yields in developing economies are inevitably affected by many factors such as weather vagaries and ecological differences across zones and across and even within regions. Rainfall is the most important factor because agricultural is rain fed. The rainfall distribution differs from year to year and there are huge differences between farming practices, amounts and type of fertilizer used, quality of seeds and application of irrigation to realise crop yields.

4.3.7 Land Productivity

Crop yields are measured by partial factor production (PFP) calculated by a ratio of agricultural outputs to agricultural inputs rather than the overall sector performance which is measured by Total Factor Productivity (TFP) (Murgai, et al., 2001: 201).The land productivity defined here uses a common measure of land productivity used by Patrick Diskin (1999) which is the amount of crops or yields harvested per amount of land planted. The crop harvested will be subjected to the use of different factors of production such as land, labour and inputs. In Tanzania land and labour in most cases are non-monetary since they are owned by households and producer inputs are monetary because they are purchased.

4.3.8 Labour Productivity

Labour productivity is measured by the amount of goods and services produced by one hour of labour. (Freeman, 2008) (Stocker, et al., 2015), in other words, labour productivity is a measure of the efficiency with which inputs are used in an economy to produce goods and services, it can be measured in various ways. Labour productivity is equal to the ratio between a volume measure of output and a measure of input use i.e. total number of hours worked productivity of labour is personal capacities of workers or the intensity of their efforts. Labour productivity reflects how efficiently labour is combined with other factors of production, how many of these other inputs are available per worker and how rapidly embodied and disembodied technical change proceed.

The growth of labour productivity can result from either increase efficiency in the use of labour, without more of other inputs, or due to each worker working with more of the other inputs, such as physical capital, human capital or intermediate inputs. Labour productivity can also show an increase if the mix of activities in the economy has shifted from activities

with low levels of productivity to activities with higher levels even though none of the activities have become more productive.

Measuring labour productivity for agriculture in poor countries is difficult because agriculture is largely practised in the informal sector where there is absence of reliable and detailed data on outcomes of employment in agriculture. Additionally, in many rural areas it is common for the farmers to work part-time in other activities, thereby smoothing out seasonal fluctuations in agricultural labour demand. This leads to inconsistencies in the number of days or hours spent in agriculture (Gollin, et al., 2012: 7). In the Tanzanian context most of labour used is household based and unpaid and therefore labour productivity is not analysed in this chapter.

4.4 Evolution of Agricultural Subsidy in Tanzania

4.4.1 Agricultural Subsidy in Tanzania after Independence

After independence Tanzania inherited a colonial export-oriented economy. Agricultural production in 1961 was typically associated with the colonial mode of production with reliance on export-oriented crop production. In this period agriculture was dominated by peasant farming, a small-scale farming for subsistence as well as for cash sale in the market. According to (Hyden, 1980), the peasantry in Africa was taken as unique in nature, with its own mode of production, associated with poverty as a social class. As a result, after independence, efforts aimed at tackling poverty had to tackle rural poverty in an effort to *transform this class.*

4.4.1.1 Agriculture subsidy under state monopoly

During the 1960's and 1970's, the government having recognized the peasant mode of production was based on smallholder farmers, deliberately initiated several programs which encouraged the smallholder farmers to make use of fertilizers, pesticides and mechanization in agriculture to improve production and productivity. This effort was facilitated by institutionalization of the cooperative chain through Agricultural Products Act (APA) in 1961 and the formation of National Agricultural Products Board (NAPB) in 1962. These initiatives were launched to guard against famine and guarantee food security. These reforms were justified by crop failure in 1961 because of wide spread drought (Meertens, 2000: 335). Nonetheless, the justification above was not the only reasons but the measures seemed to be necessary and important toward government control over production, import and export of agriculture products.

It is in this context that in 1963, the NAPB was given a monopoly role over prices and marketing of all-important agricultural products through cooperatives as agents. The state continued to act as the sole moderator from there and the whole period to the early 1970s. Unfortunately, this period was characterised by inefficiencies and corruption within cooperatives and finally the cooperatives were unable to offer differentiated

prices to farmers depending on production cost and local conditions (Putterman, 1995: 312).

Despite these weaknesses just after few years in 1965, several programs were already initiated to encourage the use of subsidised fertilizers and pesticides and the use of more capital inputs in agriculture. These measures were expected to accelerate growth of agriculture and the economy and truly a decade following independence grain exports exceeded imports (Putterman, 1995: 312). These achievements were because of diversification of the economy and overall success of cooperatives and marketing boards which played a big role in raising the use of agriculture inputs through provision of credit needed to finance inputs (Putterman, ibid). Agriculture grew to more than 50 per cent of the GDP and sisal, coffee and cotton were the main three cash crops which accounted for about 57 per cent of exports. Food crops in particular, and grain production in general were not a priority. Despite these achievements, the economy experienced critical imbalances apparently aggravated by the inherited capitalist system of land and property ownership and the government thought that in order to redress these imbalances it had to adopt a socialist policy under the Arusha declaration was passed in 1967 (Ngowi, 2009: 262).

4.4.1.2 Arusha Declaration and villagization policy

The Arusha Declaration was launched as an effort to correct high levels of inequality and exploitation which existed in the economy and in agriculture in particular. In this declaration the economy operated under the policies of socialism and self-reliance with policies aimed at equal growth to all as the main objective (Nyerere, 1977: 1). The state became a major owner, controller and manager of the State-Owned Enterprises (SOEs). The revolution urgently started to respond to the economic need, particularly in ending up capitalist practices which existed even after independence with the market failures as the state did not take full control of the economy. Needless to say, the majority of Tanzanians had not enjoyed the fruits of independence and poverty continued to persist among the majority (Ngowi, 2009: 262-263). The main philosophy behind revolution was to bring economic and social development to the impoverished country and navigate the complex global economic and political arena (Ellison, 1967). This policy change led to nationalization of banks, insurance companies, major industries, commercial farms and plantations, wholesale businesses and much of the retail trade (Meertens, 2000: 335, Suzuki & Bernard, 1967: 5-7).

In addition, the other major change was the resettlement of people in villages famously known as "*Vijiji vya Ujamaa"* or collective farms. This meant further government control of marketing of agricultural products and the distribution of important agricultural inputs and consumer goods (Meertens, 2000: 335). It was accompanied by the formation of National Milling Corporation (NMC) as a sole buyer and distributor of agricultural

inputs and outputs and in early 1970s more effort was devoted to the promotion of the use of fertilizers by smallholder farmers (Benson, et al., 2012: 8). Again government established and strengthened State Owned Corporation by formation of Tanzania Fertilizer Company (TFC) to manage the whole process of distribution of fertilizer to farmers. Many other schemes were developed, and all investments aimed at achieving national agricultural growth and food security by enhancing smallholder farmers' access to subsidised fertilizer.

The main reason behind the formation of village resettlements was to bring the people into central places from where services could be easily delivered because it was very expensive for the government to provide social services in scattered holdings. Thus, the first attempt was to encourage farmers to form villages voluntarily, but the response was not satisfactory. Therefore, by the end of 1973, the government announced mandatory resettlement for all peasant households into villages as a second attempt. The newly formed villages were then termed as registered or developmental villages (Wangwe, 2005: 3), and indeed the task of their formation was accomplished in 1976 (McHenry, 1979).

4.4.1.3 Disincentives of Arusha Declaration

The argument behind all controls and interventions in the economy and the changeover of its structure with regard to Arusha Declaration was to accelerate growth and correct the inequalities and imbalances in distribution of resources. However, they acted as disincentives to the smallholder farmers. A critical analysis by Mbilinyi and Nyoni (2000) indicates that producer prices were low, and crops were often purchased on credit terms, which served as an additional tax on farmers' incomes, and subsidised the government through its control over the foreign exchange embodied in crop sales. The government continued with controls over producer and consumer prices and provided subsidies for producer inputs and consumer goods until 1984. Surprisingly the forced village resettlements did not achieve significant benefits because their agricultural output did not improve since the resettlement disrupted local farming patterns and led to losses of income and short-term famine in some areas (Mbilinyi & Nyoni, 2000).

Furthermore, the anticipation of facilitating agriculture productivity and transition to intensive system of land use through villagization in a shorter or longer term resulted in lowering the rate of the agricultural productivity. The low agriculture productivity happened because the state failed to ensure necessary inputs to increase both land and labour productivity. Above all, from the increase of acreage per household or worker over previous levels it could not be inferred that the rate of labour productivity had increased, because more and more land was cultivated every year and could not be left to regenerate soil fertility (Kikula, 1997: 25-26). In other words, villagization was not directly concerned with the issue of productivity. Rather it was more aimed at logistical ease because the

concentration of households in village clusters greatly eased the problem of controlling, collecting and transporting the marketed surplus in contrast to the previous obstacle to commercialized production and transport from inaccessible and scattered households.

Consequently, Tanzania's economy experienced a short run growth, but a long run economic decline. The agricultural sector performance lagged behind with an average growth rate of 2.1 percent in the mid-1970s. Though the overall GDP growth was 3.5 percent, agriculture lagged behind because the sector was given limited resources. For example, the resource allocated to agriculture was about 9 per cent of fixed capital formation throughout the 1966 to1970s period (Wangwe & Charle, 2005: 4).However, the role of the private sector was phased out in this period and at the same time the state was not stable to sustain the development process on its own, this witnessed a lost opportunity in economic growth (Ngowi, 2009: 263). The economy as whole did not do better in 1980s and was in the crisis which resulted to overall economic dwindling. The GDP growth rate declined from an average of 5-6 per cent in the 1960's to 4 per cent in 1970's and to a perilous level of 1 per cent in 1980 to1985 period.

This decline grossly affected income per capita and the provision of social services because the rate of population growth was 2.8 per cent per year (Ngowi, ibid). In summary, according to (Morrissey & Leyaro, 2007), the importation and distribution of agriculture subsidy since independence in 1961 was under cooperatives and owned and controlled by the members on a democratic basis. Under this arrangement sales were restricted to the controlled official market and the marketing board purchasing price was also fixed. The actual producer price was the board price minus unit marketing costs. As a result, producer prices varied across the country according to variations in agreed unit costs and this was due to variation was transport costs. In 1974 the National Maize Project was introduced, and fertilizer use on food crops increased substantially, the project initiatives involved a packet of fertilizer, improved seed and pesticides, which were subsidized initially at 100%. However, the government could not finance this, so a subsidy of 50% on fertilizer remained effective from 1976 to 1984 (Skarstein, 2005) to the areas with high potential, especially the southern highlands regions. Thus, increased provision producer inputs by subsidizing inputs in potential areas led to the rise of the so-called "Big Four" grain basket regions - Iringa, Ruvuma, Mbeya and Rukwa as often referred to as evidence that the subsidization policy worked. However the policy initiative realized only inequitable efficiency because cheap subsidised fertilizers were misused in some areas, demand of inputs in one hand outstripped supply in such a way that the recommended quantities were not applied, also there was competition for fertilizers between cash and food crops on the other and finally input subsidies became a big burden on the government budget, for example subsidies for fertilizers rose from shs.49.6 million in 1976/77 to shs.215 million in 1983/84 when they were abolished (URT, 1986).

4.4.2 Structural Adjustments and Globalization

In 1989, the Economic Recovery Program (ERP) under which the earlier subsidy was being implemented was modified and the Economic and Social Action Program (ESAP) was passed. The goal of the new program was to restore the physical infrastructure and ease social impacts because while, industrial capacity and non-traditional exports increased, farmers did not benefit as prices for their crops did not improve and prices for inputs such as fertilizers rose, job creation declined, and minimum wages actually decreased in value due to inflation. The government at the same time failed to effectively implement the control of food production and marketing and this resulted into critical food shortages in 1980s. According to Bryceson (1987), the shortage of food in 1980s was very serious; therefore, the government imported 251 thousand tons of maize. This shortage was more intense in the cities where an increasing number of urban consumers was primarily depended on imported food, since the supplies of the NMC were insufficient to meet the demands. It should be clear that only farmers from the remote Southern Highlands sold their surplus maize through the official channels.

Tanzania's economy was in a critical situation and could no longer sustain its social welfare system and subsidy policy especially in the periods between 1978 and 1984. This was a result of multiple factors including food shortage, the war with Iddi Amin of Uganda, the shortage of foreign exchange, reductions in donor support and high level of corruption in the country. The smallholder farmers in rural areas were seriously affected with the shortages of both consumer and producer goods.

4.4.2.1 Decline of General Subsidy

Following economic crisis, Tanzania was forced to reform its economy as from 1984. The period between 1984 and 1986 the economy was under open-door programmes and policies which started with market liberalisation. Market liberalization marked reduction of state controls over import and export trade and cooperative unions were reintroduced to revive the deteriorated rural production and marketing system. Further to that subsidies on maize flour were abolished with the 1984/1985 budget and first steps were taken to liberalize imports of consumer goods. From 1984 to 1986, the real producer prices of maize and other important food crops were raised sharply and the pan-territorial pricing system[15] was replaced

[15] Pan territorial pricing is a policy of setting a uniform price for the crops throughout the country regardless of location and or transport cost of moving such crops from one area to another. In Tanzania this policy aimed at achieving regional equality and diversified production, however this policy had some undesirable effects of its own and sooner or later the whole policy was overwhelmed with high-ceilinged operational cost.

with a two-tier price regime that differentiated between premium and non-premium high potential cereals areas (Geier, 1995).

By 1988/1989 chemical fertilizers had an implicit subsidy of up to 80 per cent but due to increasing pressures on the budget the government decided to phase out the subsidy gradually from 70 per cent in 1990/1991 to zero in 1994/1995 budget (Meertens, 2000: 337). In 1986, Tanzania adopted structural adjustment policy (SAP) with a general agreement reached between the government, the World Bank and the International Monetary Fund (IMF) as the way forward for enhancing the recovery of the economy.

4.4.2.2 Agricultural performance under Structural Adjustment Programme (SAP)

Following fifteen years of implementing SAPs, contrary to traditional interpretation, the quality of life for Tanzanian citizens did not improve (Agrawal, Ahmed, Mered, & Nord, 1993). Moreover, literature suggested that the economy and welfare of people became even worse (Bert Meertens 2000: 342). The author argued that SAPs though aimed at increasing output of food and exports through better producer prices, improve product and input marketing as well as increase government financial commitment to agriculture, there were not any achievements in the sector and the per capita productivity for important food crops such as maize and paddy had deteriorated while the population was growing at 2.9 per cent annually.

Mbilinyi and Nyoni (2000) have argued that SAPs completely altered the environment for farming and nonfarm activities in the rural areas because the access which rural women and men had to social services such as markets, credit, farm inputs, transport, and consumer goods especially food disappeared. SAPs led to cost sharing in public services, increased sales taxes for producer and consumer goods, the privatisation of public SOEs and a general reduction in the role of the national government in provision of social services, including agricultural extension services. Furthermore, Muganda (2004: 2) also argued on the reality that the economy under SAPs did not improved and the changes did not address the fundamental price distortion and exchange rate.

4.4.3 Reintroduction of Agricultural Producer Subsidy

The market failure had adverse effects in agricultural inputs as farmers and small holders in particular faced acute constraints such as low output, high fertilizer prices, lack of credit and lack of knowledge. The market was no longer able to fill the vacuum left by the withdrawal of state agencies in overall supply of the necessary producer inputs which was substantially important to poor rural households. Morris et al (2007: 4) and Druilhe et al (2012: 23), have argued that the government had to take its role not only in facilitating commercial marketing of producer inputs but also targeting distribution of subsidised producer inputs to poor households which had been excluded by the market due their lack of resources needed to purchase fertilizers on a commercial basis.

4.4.4 Re-introduction of agricultural input through NAIVS

The NAIVS was introduced in 2008 and was expected to wind up in 2013. This scheme was particularly for increasing food production with particular attention given to maize and paddy which are the main crops consumed by majority of people of Tanzania. The main objectives of the NAIVS were to promote the use fertilizer inputs. This was done by facilitating fertilizer use in high-potential areas, offsetting rising cost of fertilizers, stimulating production to reduce food prices and stimulating private distribution networks which had been displaced for quite long-time. The private sector was involved through tendering processes in the supply of inputs up to the village level. More and above, about 5.7 per cent of rice farmers and 0.7 per cent of maize farmers used improved seed varieties together with fertilizers in Africa (Keneth & Hansen, 2011/12). Indeed, this was a concern for most of the African nations. For example, the Abuja Declaration on Fertilizers for an African Green Revolution meeting held in 2006 at Abuja agreed that African nations should develop policies of granting subsidies with special attention to poor farmers (Druilhe & Barreiro-Hurlé, 2012: 2). Thus, the main purpose of NAIVS was to subsidize producer inputs to help in enhancing technology adoption, lowering prices of food crops, improving national food security and enhancing income to smallholder farmers.

4.4.4.1 Design and coverage of NAIVS

The NAIVS was designed to cover about 45 per cent of small holders in 65 districts, and subsidies were specifically targeted for producers of maize and rice which are the major food staples. The scheme was to enable each beneficiary farming household to be entitled to an input package suited for the cultivation of 1 acre of maize or rice at a 50 per cent market price subsidy.

The subsidy was offered through a package which consisted of one 50 kg bag of urea, one 50 kg bag of Di-ammonium Phosphates or two bags of Minjingu Rock Phosphate with nitrogen supplement of 50 kg each and 10 kg of hybrid or Open-pollinated varieties (OPV) maize seeds or 16 kg of rice seeds. The coordination of the scheme was spread from national level to village level through a voucher committee chain, tasked with overseeing the allocation and distribution of vouchers.

The voucher committee at village level was critical in overseeing the scheme and its overall implementation. These committees were known as The Village Voucher Committees (VVC). They comprised of six members of whom three were women elected by the village assemblies. The VVCs were responsible for assessing the proposed beneficiary criteria and for selecting beneficiaries. They were also responsible for preparing lists of recipients who were then presented to the village assemblies for approval.

The NAIVS was a time limited scheme targeting small holder farmers, the beneficiaries were supposed to receive subsidized inputs for three years

consecutively and therefrom graduate or phase out from the scheme. The scheme had general objectives of promoting the use of producer inputs and to empower small holder farmers who met the criteria to adopt the technology and continue using it even after they had graduated from the scheme.

4.4.4.2 Methods and targeting criteria

The NAIVS was designed with the overall intention of reaching targeted small holder farmers who had not used any chemical fertilizers and improved seed for at least five years prior to the scheme. The anticipated beneficiaries were farmers and residents of the selected villages. The term 'farmer' for the purposes of the scheme, refers to a single household and not every farming individual in the household. The conditions were that the targeted beneficiaries should be small subsistence farmers with an average of less than one hectare of land and who cultivated maize or paddy and the vouchers were provided for inputs satisfying one acre of maize or paddy and would only be used on that acre. Beneficiaries were required to co-finance the subsidy by paying 50 per cent of market price and priority was given to female headed households.

The selection of beneficiaries took place at different levels. At village level the VVC members were involved in identifying and selecting the eligible beneficiaries. This was done in collaboration with sub village or hamlet leaders who were more informed of the household characteristics in their areas. However, this was done after the district had assigned the number of vouchers to each village. District Agriculture and Livestock Officers were responsible for the allocation of vouchers to the villages.

4.4.4.3 Eligibility criteria and poverty challenges

The eligibility criteria set by the Ministry of Agriculture, Food Security and Cooperatives (MAFC) had some elements of exclusion. It had the potential of creating a gap between the very poor small holder farmers who could not afford inputs and the modestly poor small holder farmers who were barely able to access the inputs. This design appeared to put the very poor small holder farmers in a more poverty volatility and continued fall in the trap of extreme poverty. For example, the ability and willingness to co-finance the subsidy criterion was an impediment to poor small holders who were not liquid enough as they were supposed to buy inputs later after harvesting season while at the same time, they were already facing food shortage and had to buy food (URT, 2007: 46; Benson, et al., 2012: 9). So, the financing criterion effectively excluded the poorest farmers from receiving the subsidies due to their financial inability.

Furthermore, the eligibility criterion set by MAFC which required small holders to have not used some or any producer inputs (fertilizers and seed) over the previous five years seemed to be subjective and arbitrary and could be used to exclude the appropriate eligible small holders.

4.4.4.4 Distribution and allocation of input subsidy

MAFC started distributing input subsidies covering a total of 730,667 farmers in 2008/2009 and the number increased to 2,000,000 in 2010/2011 but again in the fourth year of program implementation, the number of beneficiaries decreased as some of them had to exit from the program. This is indicated in table 1 below. This was part of its targeting mechanism: that beneficiary' farmers would have to graduate and exit from the scheme after they had received vouchers for three years consecutively.

Table 16: Distribution of subsidized inputs through voucher

Years	# of beneficiary farmers	Tones of fertilizer	Tonnes of maize seed	Tonnes of rice seeds
2008/2009	730,667	36,533.40	7,306.70	-
2009/2010	1,514,871	75,743.60	15,058.30	388.5
2010/2011	2,000,000	100,000.00	19,411.50	667
2011/2012	1,800,000	90,000.00	16,923.80	1,462.70
2012/2013	1,781,136	178,136	18,240*	
2013/2014	932,100	93,210	9,620*	

Source: Annual Reports: MAFC (URT)

*Please these figures are for both rice and maize seeds

4.4.4.5 Voucher delivery and exit strategy

The input distribution and supply were primarily undertaken by the private sector. The supply went through the chain of identified agro dealers who completed a business and management training programme delivered by the Citizens Network for Foreign Affairs (CNFA). The agro-dealers procured the inputs from the open market to enable access to the farmers. Farmers spin in vouchers for a reimbursement at certified agro-dealers, who then redeem vouchers to National Microfinance Bank (NMB).

4.4.4.6 Gender issues and their implications

The national Growth and Poverty Reduction Strategy (NGPRS) known as MKUKUTA in Swahili dictates that gender should be mainstreamed in all policies, through the representation of males and females in all aspects of social and economic activities. This notwithstanding, NAIVS was not explicitly designed to take care of gender issues. The scheme was designed to target farming households and not individuals. It is likely that when targeting households, the responsible person should be the head of household and in many regions of Tanzania the majority of households are

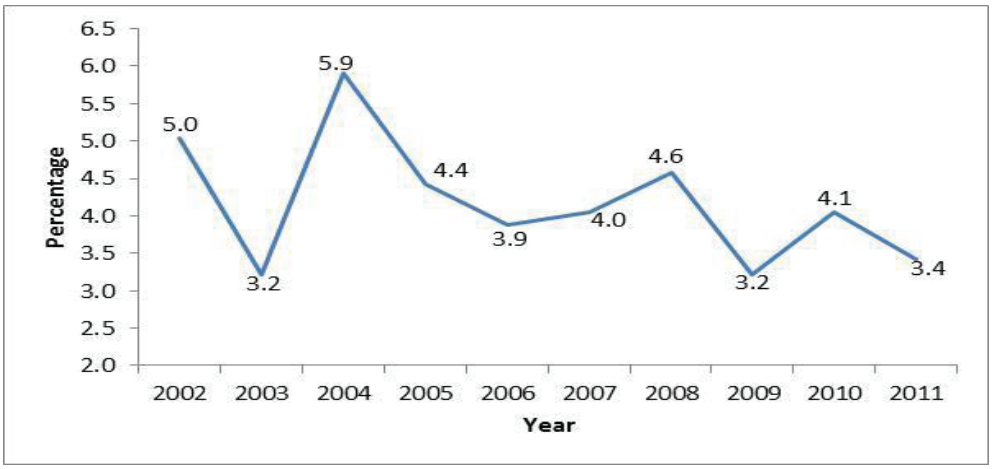
headed by males. This is to say men have more say in decisions on how the producer subsidy should be used.

However, in the implementation it was clear that preference was given to female headed households but was not sufficient for eligibility criterion in participating in the NAIVS if the head could not afford to co-finance the voucher. Though female headed households were given priority in NAIVS, they were highly excluded since the majority of them could not meet the financial requirement criterion. Therefore, if gender equality was really a priority the vouchers could have been supplied freely to female headed households. According to Dorward (2009), this would have increased the possibilities for females to access producer subsidies. Otherwise giving priority to female headed household without eliminating other criterion that might hinder them from accessing subsidy did not have an impact on community gender composition of poor households.

4.4.4.7 The Producer subsidy and agricultural performance

The evidence on the implementation of NAIVS shows that it has not contributed to significant change in the overall agricultural productivity and outputs. The growth rate in the broad agricultural sector has shown rather stagnant trend and maintains the same growth trend on an average of 4 per cent as indicated in the table below. This has not taken into consideration the crops subsector the programme does not cover.

Figure 3: Average Annual Growth Rates of Agriculture (2001 Prices)



Source: Adopted from National Account (URT 2012)

4.4.4.8 Land productivity

The overall productivity for main food crops in Tanzania has not shown a significant rate of growth. There was no huge difference before and after the implementation of NAIVS. Furthermore, maize and rice did not show their potential role for food security as compared to some other crops such

as sweet potatoes as shown below. Probably this suggests rethinking of policy direction so that those left out could be included in food security priorities.

Table 17: Land productivity for selected food crops

Crop	Yields and productivity	Beans	Maize	Paddy	Sorghum	S/potato	Wheat
2005/ 2006	production'000' tons	708	3,423	1,239	712	2,606	110
	yield tons/ha	1.1	1.33	1.95	0.99	4.41	2.06
2006/ 2007	production '000' tons	889	3,302	1,342	971	2,467	83
	yield tons/ha	1.05	1.27	2.4	1.19	4.83	1.1
2007/ *2008**	production '000' tons	571	5,439	1,400	551	411	43
	yield tons/ha	0.76	1.37	1.58	0.97	2.01	1
2008/ 2009	production '000' tons	774	3,326	1,335	709	1,417	82
	yield tons/ha	0.89	1.12	1.66	0.81	2.17	0.55
	Production'000' tons	868	4,733	2,650	799	2,424	62
	yield (tons/ha	0.72	1.55	2.33	1.29	4.21	1.14

Source: Statistics Unit-Ministry of Agriculture, Food and Cooperatives

*National Sample Census of Agriculture2007/2008

4.4.4.9 Productivity before and after re-introduction of producer inputs

The re-introduction of subsidies was expected to lead to a huge difference in productivity after the introduction of NAIVS in 2008, but the trends shown in the figure 4 below do not clearly show a significant productivity increase in either of crops. This will be discussed more in chapter five to understand the productivity for both crops when the two categories of the scheme beneficiaries and non-beneficiaries will be analyzed.

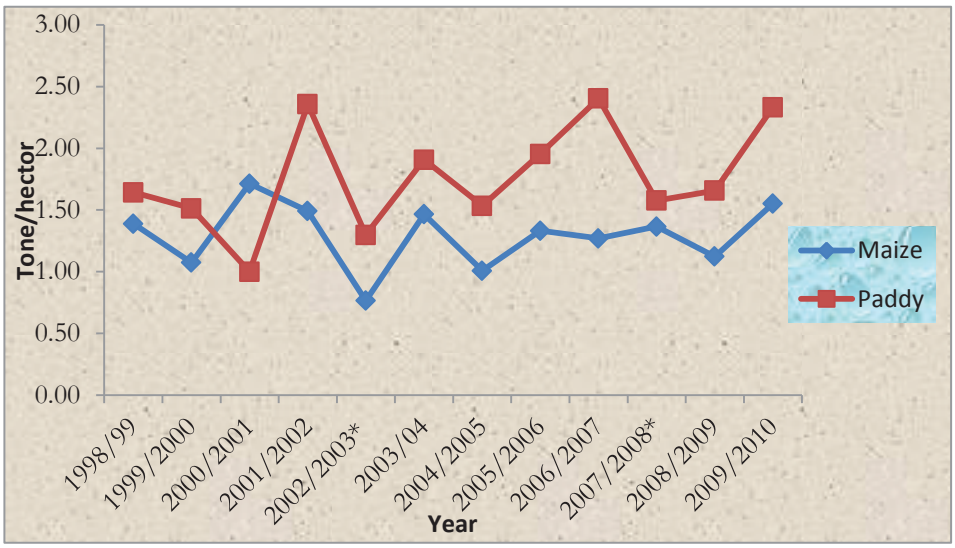


Figure 4: Maize and paddy productivity in Tanzania

Source: Statistics Unit-Ministry of Agriculture, Food and Cooperatives.

* National Sample Census of Agriculture 2002/2003

4.4.4.10 A critique of the execution of farm input subsidies under NIAVS

NAIVS was designed primarily as a productivity enhancing program. However, at the same time it was intended to replace the Government's earlier general subsidy scheme which had proven unsustainable and in the longer term this scheme was considered to be capable of serving as a safety net (World Bank, 2012). The scheme targeted smaller farmers who were presumably poor. Furthermore, it was a time limited scheme as discussed earlier. It is worth thinking on how smallholder farmers could continue affording the inputs after they had graduated from the scheme. Though the three years exit strategy was based on the premise that smallholder farmers could generate enough income and savings and could manage to access the producer inputs on their own (Keneth & Hansen, 2011/12), it was unimaginable to what extent this was feasible. More importantly, there was no evidence of premises used to justify that three years was enough for the smallholder farmers to afford financing producer inputs on their own.

Additionally, there was no clear analysis and enough convincing evidence to suggest that the adoption of technology was likely to happen after three years. Indeed, the subsidy scheme was introduced to address the distortions that were created by imperfection in the market rather than market imperfections themselves. Therefore, the smallholder farmers who graduated from the program were likely to decline input use. Some literature suggests that, producer subsidy as other subsidy schemes should have limited duration, if possible, set at the outset, so that producers do not get addicted to the subsidies and the cost of the scheme does not spiral out

of control (UNEP, 2003: 15). However, the complexity of what happened with producer subsidies should be understood better. For example, removal of producer subsidy resulted into higher market prices to smallholder producers and consumers. This, in turn, led to the fall in production, decrease in rural employment and wages, resulting in household food insecurity and lowers the GDP.

The survey supports the argument that subsidies have improved household food security and income to some extent. Its exit therefore would have economic and social consequences to the smallholder farmers and national food security. This would not only have impact on smallholder farmers who were in the scheme but it this would lead to a rise of food crop prices and hurt the welfare of poorer smallholder farmers. Furthermore, NAIVS did not to reach majority of poorest smallholder farmers particularly those unable to finance inputs. But given its wide coverage, it probably reached the middle poor (World Bank, 2011: 41-43).

4.5 Analysis of NAIVS Follow-Up Survey Data

4.5.1 Introduction to NAIVS Survey Findings

This section highlights the findings from the NAIVS survey that was conducted in 2012 covering eight districts of Tanzania mainland. It briefly highlights the household social economic indicators and critically analyses the producer subsidy initiative, looking at the scheme awareness, design and implementation. It further looks at how producer subsidies affect productivity of maize and paddy. The section then discusses the challenges associated with the targeting design and practices having in mind that production of these food crops requires smallholder farmers to have efficient access to monetary as well as non-monetary resources.

4.5.2 Household Social Economic Indicators

The NAIVS program appears to have excluded the poorest of smallholder farmers. Using wealth indicators, findings presented in Table 18 reveal small but significant differences between beneficiaries and non-beneficiaries. More than four fifths of households are male headed; 7 in 10 have robust walls and roofing (itself an indicator of household wealth); only a third have cement flooring; relatively high asset ownership with more than 7 in 10 owning a radio or mobile phone while about half of non-beneficiaries had a bicycle. Asset ownership underlines a source of alternative income, an investment or savings that can be liquidated in times of need to serve a purpose. Land utilization is minimal with 3 in 5 beneficiaries and more than two thirds of non-beneficiaries cultivating less than a hectare of maize despite large land ownership. This concurs with eligibility criterion which requires farmers to grow 1 or less acre of maize or paddy.

Table 18: Selected social economic characteristics of small holders

	Beneficiary	Non-Beneficiary	p-value*
Sex of household head			
Male	86%	80%	0
Housing Construction			
Walls (burnt bricks or cement)	73%	69%	0
Roof (corrugated tin)	73%	67%	0
Floor (cement)	36%	32%	0.01
Assets ownership			
Radio	86%	72%	0
Mobile Phone	83%	78%	0
Bicycle	70%	52%	0
Land ownership			
Average acreage owned	8.5	6.7	0.02
% cultivating less 1 ha maize 2011/12	59%	69%	0

Source: Listing 2011/12.

If ** p-value = 0.0 indicates that the difference in means between beneficiaries and non-beneficiaries is statistically significant*

4.5.3 People's Awareness and Attitude to NAIVS

The awareness of the scheme was central and critical in the assessment. This was for eliminating some errors which could happen if people are not well informed on scheme design and implementation. Looking at the findings, farmers were generally aware of the existence of the scheme in their villages as shown in the table below. However, the level of knowledge to specific eligibility criteria and participation time limit varied strongly among the farmers. Survey results as well as field work observations in various NAIVS villages, revealed clearly that farmers interpreted scheme rules and operations differently.

It is not surprising that the implementation of NAIVS went hand in hand with an awareness campaign to the intended rural communities as a result of which the awareness of scheme was significantly high. About 93.5 per cent of smallholder farmers knew about the existence of scheme. However, only about 51 per cent of them knew the required eligibility criteria. On top of that when looking at individual perceptions on their eligibility status, about 68 per cent claimed to be eligible but at the same time when looking at three years exit as a specific criterion, it is only 28 per cent who knew that beneficiaries would have to graduate and exit the scheme after a three-year circle. Furthermore, the 72 per cent of farmers who failed to mention three years criterion had different understanding of the scheme. About 47 per cent of them said that they did not know anything regarding beneficiary time limit while 19 per cent said the voucher scheme was continuous and farmers would continue receiving vouchers every year.

These findings suggest that there is a knowledge gap between ordinary smallholder farmers and the elites in the village. If people are not well informed it is difficult for them to raise their concerns in the implementation processes, and this makes it easy to divert the producer inputs to unintended beneficiaries. For example, the vulnerability survey conducted in Kilimanjaro in 2009, revealed high level of elite capture because about 60 per cent of voucher beneficiaries were households with or associated with village officials and this was more pronounced remote communities (Pan & Christiaensen, 2012).

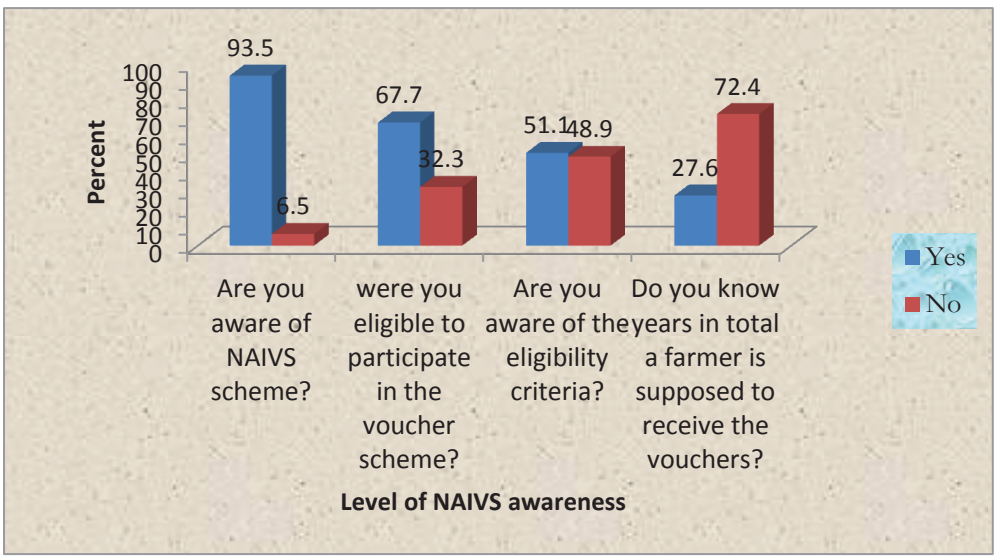


Figure 5: Awareness of Voucher Scheme

Source: NAIVS Household Survey 2012

4.5.4 Transparency in Identification and Selection of Eligible Farmers

Transparency was among the core ethical requirements throughout the implementation of NAIVS. Normally leaders were required to listen to the smallholder farmers and every process was to be participatory through the village assembly. This was meant to help in making more informed and better decisions. Furthermore, the targeting errors could be minimized. Findings show that the process of identification and selection of scheme participants overall was not very transparent. This is shown by the trends indicated in the Table 19 below.

The lack of transparency normally exacerbates doubts and uncertainty because people will have no faith and trust, and this may result into economic and social failure altogether. Faith and trust is very important, and leaders are always obliged to establish and maintain the faith and trust of people they lead. The existence of transparency tends to facilitate the accomplishment of intended mission and goals. Thus, for NAIVS to achieve its mission and goals, transparency could probably be a key factor.

Table 19: Transparency in identification and selection of eligible farmers

Response	Identification	Selection
Very transparent	15.3	14.8
Moderately transparent	42.7	42.5
Not transparent	42	42.7
Total	100	100

Source: NAIVS Household Survey 2012

4.5.5 Equitability of NAIVS

It is imperative that NAIVS as a vital instrument of agriculture policy is seen as addressing concerns related to equal treatment of farmers. Social equity as Frederickson has puts it is a manifestation of a social contrast or designs to recognise differences among actors in a society and address them in a manner consistent with their contribution and attainment of social welfare (Frederickson, 1968). Social equity is inherently linked to the sustainability of policy and programs through its ability to transcend heterogeneity in society in defining collective benefits and costs (Beder, 2000).

> *Almost 6 in 10 of those surveyed found NAIVS to be generally inclusive in its administration. Nonetheless, long term social support for the program could potentially be undermined by significant perception of its failure to provide social justice as demonstrated by the 40 percent of respondents who found it socially inequitable.*

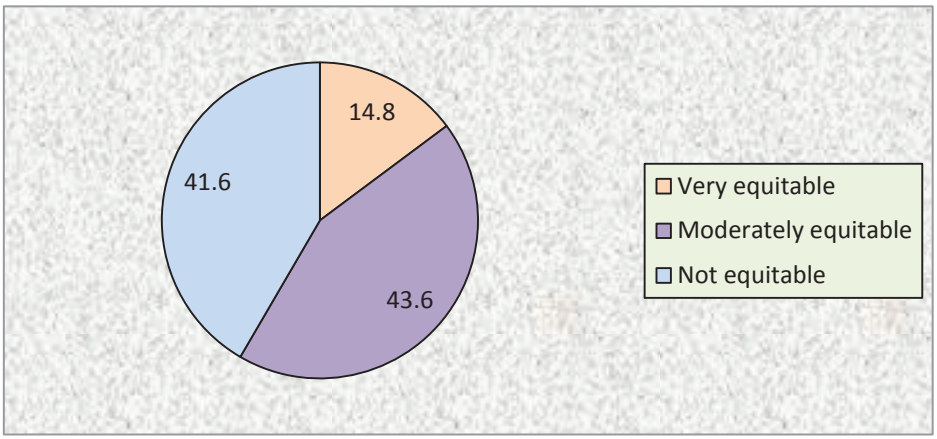


Figure 6: Equitability of NAIVS

Source: NAIVS Household Survey 2012

4.5.6 Targeting Criteria for Producer Subsidy

According to (MAFC) different eligibility criteria were planned to guide the process of implementing the NAIVS scheme as discussed below.

4.5.6.1 Land ownership and land cultivation

Land ownership was not a problem to the smallholder farmers. Only 1 per cent of smallholder farmers did not own land. About 53 per cent owned 1 hectare or less of cultivatable land and 62 per cent of them cultivated 1 hectare or less of land during the 2011/2012 long rain season. Based on land as eligibility criterion, about 50 per cent owned more than 1 hectare and 45 per cent of farmers cultivated more than 1 hectare of land. According to NAIVS targeting criteria, this category of farmers was not supposed to be included in the scheme. If indeed this was a necessary condition, these farmers would have been excluded from the scheme. This brings doubts to whether the scheme was beneficial to smallholder farmers or whether the elite capture was highly pronounced since the data collected did not include the information on elite capture. Furthermore, irrigation did not seem a common practice to most eligible smallholder farmers in surveyed areas. The critical issue here was how smallholder farmers who are dependent on weather would realise the potentials of a producer subsidy if they were not assured of the output, or should emphasis have extended beyond and given equal weight to other technologies like irrigation?

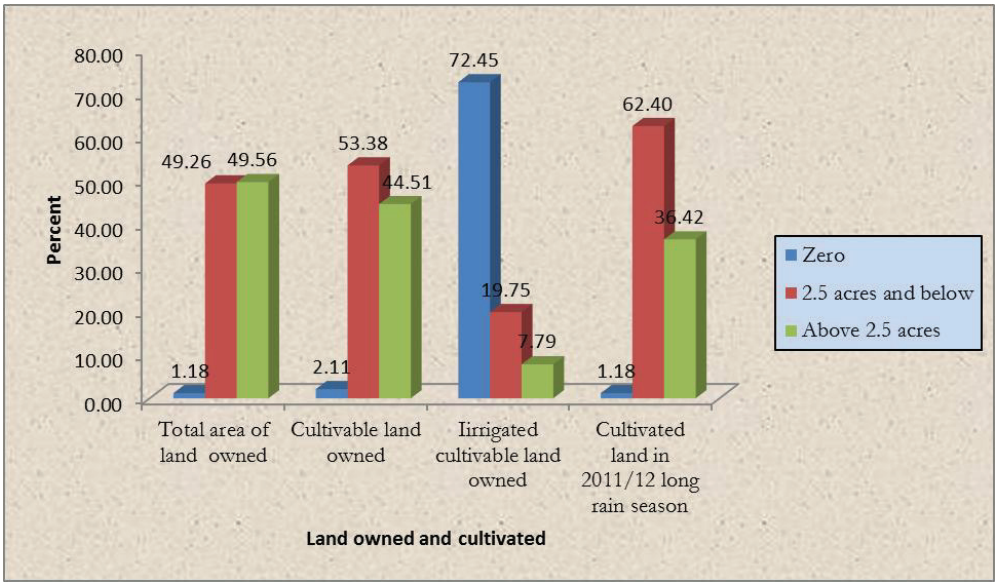


Figure 7: Land ownership

***Source*:** NAIVS Household Survey 2012

4.5.6.2 Ability of smallholder farmers to co-finance the voucher

The most important criterion in participating in NAIVS was the ability of the farmer to pay the top up amount for the voucher. It was evident that the scheme did not work for the poorest smallholder farmers who met all other eligibility criteria but could not afford paying for voucher. However, findings from listing survey with random selected farmers were very interesting. They showed that the majority of smallholder farmers in three years consecutively (above 73 per cent) claimed to have the ability of co-finance vouchers if they were offered vouchers. Though the majority of smallholder farmers claimed to have the ability to finance top up amount, this was not enough justification of their ability to go for the market price. This was witnessed after graduation that smallholder farmers could not sustain the farms on their own and the government continued to give subsidies to the same farmers. In 2015/16, the government reverted back to the paper voucher scheme with a more or less similar design to NAIVS which again lasted for that one year only and in 2016/2017 the government opted for Bulk Procurement System (BPS).

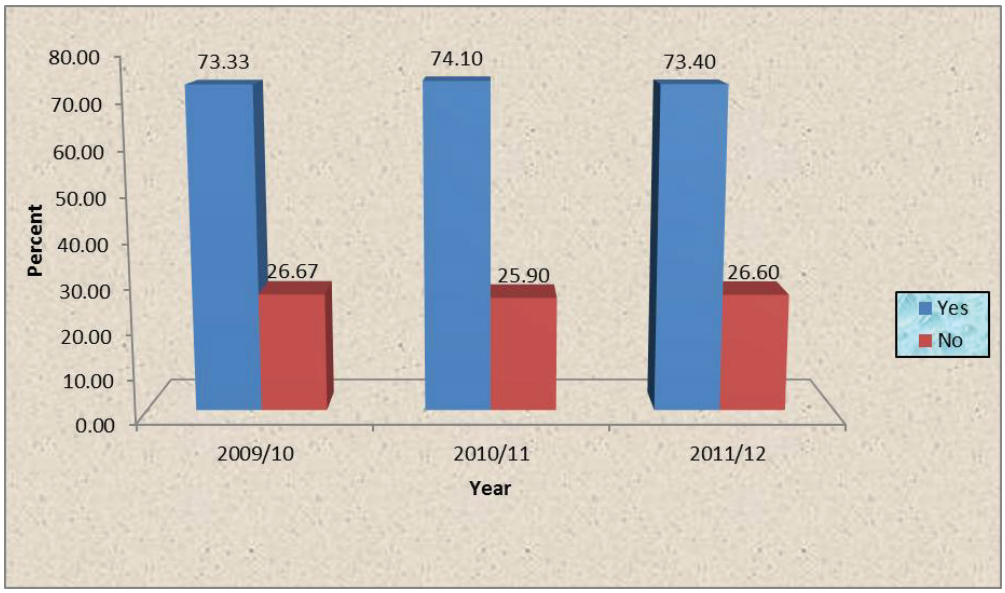


Figure 8. Ability to top-up if offered the voucher

Source: NAIVS Listing Survey 2012

4.5.6.3 The sources of money for co-financing producer inputs

In the conceptual framework, I argued that smallholder farmers tend to sell their crops soon after harvesting when the prices are very low and purchase producer inputs later when they do not have enough money, at the same time buying food for consumption. However, smallholder farmers are also engaged in nonfarm activities as another source of income. The findings show that their savings on average contribute to about 66 per cent in financing seed, planting fertilizers and bursar fertilizers but there is missing information on their main sources of savings i.e. whether they are from sales of yields or other sources. Other sources of money to co-finance subsidies are sales of livestock, sales of other assets, friends, loans, exchanging one type of voucher with another voucher i.e. fertilizers with seeds and so on.

Table 20: The sources of money for co-financing subsidy

Source of money	Seed	Planting fertilizer	Bursar fertilizer
Cash savings	61	69.5	68.2
	17	12.7	13.4
Sold another asset	10.2	8.5	10.2
	6	4.5	3.8
Loan	3.4	4.2	3.3
	2.2	0.6	0.9
Other	0.2	0	0.2
	100	**100**	**100**

Source: NAIVS Household Survey 2012

4.5.7 Extension services to smallholder farmers

Provision of extension services to smallholder farmers was an important objective in formulation of NAIVS, with the intention of imparting agricultural good practice and knowledge to enable farmers in boosting productivity levels. Results show that about 69 per cent needed extension advice but only a minority of about 13 per cent received the extension service and among those minority who received extension service 92 per cent of them had to apply for the service.

The results show that extension services are important and are appreciated by smallholder farmers who employ rudimentary technologies leading to low productivity. The extension services are important in helping farmers to identify available opportunities, giving knowledge relating to coping with droughts, crop diseases, season timing and other good farming practices. It seems that government extension services have not managed to reach the majority of smallholder farmers living in remote areas, and remote areas have remained unattractive to private sector extension providers and farmers have little capacity to hire private field officers for technical assistance even if they are available. Hence there is a critical concern that government should make available extension officers and or should scale up these services. This will as well help in raising awareness knowledge on the importance of extension services to farmers since about 31 per cent said they did not need extension services.

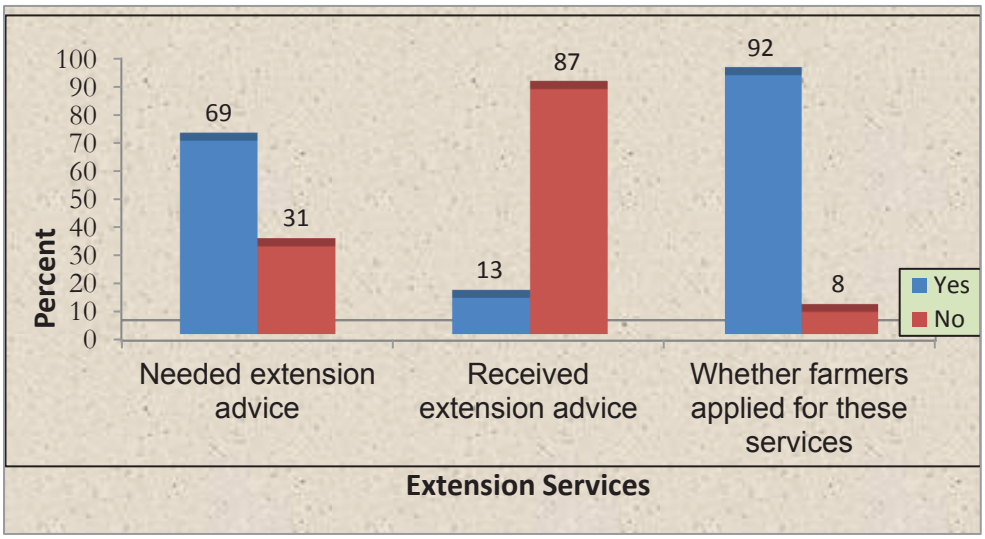


Figure 9: Proportion of farmers needed and received extension services

S*ource:* Household Survey 2011/2012

4.5.8 Low Application of Producer Inputs

The continuation of producer subsidy is a prerequisite for increasing agricultural output. However agricultural marketing is one of the major obstacles to agricultural transformation and farmers have been affected by several market related factors (Msambichaka, et al., 2010). These factors include poor infrastructure which makes market accessibility difficult, lack of capacity of the local producers to meet the market standards; and weak local institutions (ibid). Even with the provision of subsidy, the adoption of technology has remained low. Only about 30 and 28 percent of farmers used seeds and fertilizers respectively. The voucher was their main means of accessing inputs and only about 18 and 11 per cent bought seeds and fertilizers at a market price respectively. Most farmers did not use either seeds or fertilizers (52 per cent for seeds and 61 percent for fertilizers).

Together with the market problems discussed above, the main obstacles for smallholder farmers in accessing producer inputs was associated with lack of financial resources. About 64.9 per cent for seeds and 77.3 per cent for fertilizers said cost of inputs was a constraint for them. Furthermore, about 19 per cent for seeds and 10 per cent for fertilizers did not see the need of using technology. The market was not a big problem. This may be due to the phase four government initiative of involving private sector distribution of producer inputs throughout the country.

Table 21: Application of producer inputs in 2011/2012 planting season

Proportion of farmers who bought producer inputs		
	Seeds	**Fertilizer**
	29.99	27.84
Yes, without voucher	17.53	11.03
	52.48	61.13
Total	**100**	**100**
Reasons for not buying producer input		
	Seeds	**Fertilizers**
	64.91	77.26
Not available to buy	10.05	7.48
	18.89	9.74
Other	6.14	5.51
	100	**100**

Source: NAIVS Household Survey 2012

4.5.9 Impact of Producer Subsidy on Yields and Income

Overall producer subsidy has contributed to the smallholder farmers' yields and income. About 75% of smallholder farmers said their yields increased and 73% said their incomes have increased after they started using input voucher. However, when you relate to the food security to be discussed later, the majority of smallholder farmers are still worried about the likelihood of food insecurity. Needless to say, this has immense association with the premise that majority of smallholder farmers usually sell their yields soon after harvest when the price of food is low to secure non-food items, at the same time they need cash income to purchase food and non-food items in lean periods when the price of food is high. It is from this argument that one can assume that the increase of yield and income is not enough to meet their food demands throughout the year.

Table 22: Outcome of voucher inputs to yield and income

Yield and income	Frequency	Percent
Are there any changes in your yields since after the voucher inputs?		
Higher yields	742	75.4
Same yields	180	18.3
Lower yields	62	6.3
Total	**984**	**100**
Are there any changes in agricultural income after using voucher inputs?		
More income	716	72.8
Same income	208	21.1
Less income	60	6.1
Total	**984**	**100**

Source: NAIVS Household Survey 2012

4.5.10 Maize Output With and Without Producer Subsidy

For quite a long time in Tanzania, the agriculture sector and the crop sub-sector has suffered from low productivity levels, due to many reasons among them low use of modern producer inputs. This was caused by financial constraints in accessing inputs whose prices kept increasing. Subsidizing farm inputs was one of the solutions to encourage smallholder farmers to access and afford technology. It was assumed that this in turn would translate into higher yields and productivity. The findings on maize produced in the 2010/2011 long rain season show that the average yields per acre produced by using input vouchers was higher compared to their counterparts who did not use input vouchers.

Thus, smallholder farmers who received input vouchers and used them to purchase improved seeds and fertilizers and applied them, produced an average of 7 bags of 100 kilograms per acre and those who did not use the technology harvested an average of 4.4 bags of kilograms. However, the yield and productivity vary strongly within beneficiaries as seen in median level. This may be due to ecological differences across regions. For example, the soil in southern regions is fertile as compared to northern regions and other regions. The other reason may be different farming

practices among farmers. For example, according to my field experience, some farmers do not plant their crops at the appropriate time or they weed their farms when it is too late.

Again, since those who received vouchers and used them were also able to pay for the top up, this suggests that only smallholder farmers who are better off financially are likely to use technology and to increase their yield levels as well as their income than others. Therefore, if this program is not extended to reach poorest smallholder farmer, it might widen the poverty gap among smallholder farmers.

Table 23 Average maize yield (Kg) per acre in 2010/11 rainy season

	Kg/acre (median)	Kg/acre (mean)
Beneficiary	500	704
	300	436
Southern Regions	450	683
	320	491
Other Regions	250	338

Source: NAIVS Household Survey 2012

4.5.11 Paddy Output With and Without Producer Subsidy

Rice is one of the most important food grains widely produced and consumed by the majority in Tanzania. The productivity of rice has increased in last few years. For example, the quantity of paddy produced between 2002/2003 and 2007/2008 increased by 135 percent (URT, 2011) and thereafter the growth has shown an increase though the fertilizers use has been constant. This expansion may be due to favourable weather, but more importantly the expansion of irrigation after the number of private traders started to enter the business of food grains after trade liberalization in the 1980s (Kadigi, 2003).

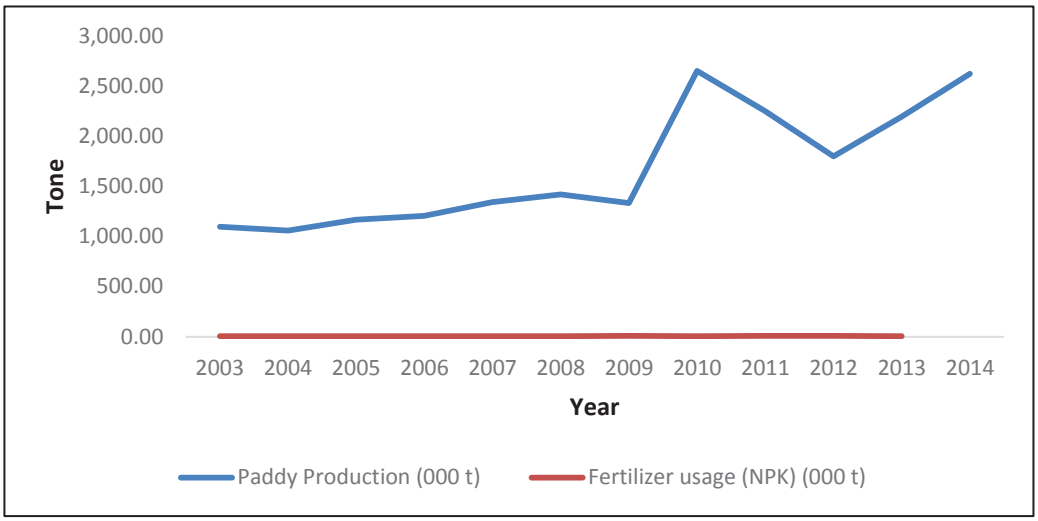


Figure 10: Paddy production in the country

Source: ricepedia.org/tanzania

The findings in Table 24 below show small and modest differences in median productivity. However, looking on average, non-beneficiaries seem to have higher productivity than their counterparts. This inconsistence can probably be due to the sample used because only 292 household reported to have grown paddy out of 2040 households.

Table 24: Average paddy yield (Kg) per acre in 2010/11 rainy season

	Kg/acre (median)	Kg/acre (mean)
Beneficiary	750	985
	663	1064

Source: NAIVS Household Survey 2012

4.5.12 People's Perceptions on Food Security

Food security seems to be a major problem related to nutrition status at both national and household levels. This can be due to non-availability of food, and supply issues without adequate linkages to the nutrition situation. According to Msambichaka et al (2010), Tanzania has been food insecure

despite it potentials in agriculture as documented in global hunger index[16] (GHI) in 2008.

The problem of food insecurity at the national level is caused by several factors including serious disparities in production and consumption of cereals; lack of access to food grains, logistics and financial constraints in the transportation and distribution of food grains to deficit areas. At household level food security is clearly more than food production alone, since subsistence farmers need to satisfy non-farming food demands like meat, fish, sugar, salt and so on.

The food insecurity worry is perhaps as a result of household's inability to retain enough food stocks to ensure food security. The findings indicated that small holder farmers are worried about food security. Although about 44 per cent of smallholder farmers indicated they had worries with food availability, the remaining 49 per cent had worries though with different magnitude. However, their failure to command food of their preference due to lack of resources is more pronounced. About 66 percent reported that they failed to eat food of their preference at least for more than three days in past month. Nevertheless, worries about food security and failure to command the preferred food is common to both categories i.e. beneficiary or non-beneficiary farmers as shown in Table 25 below.

On another dimension, it is worth arguing that NAIVS has not brought enough hope to the smallholder's mind and perceptions with its role of ensuring national and household food security.

Table 25: Worries and failure to have enough food in past 30 days

Response[17]	**All**		**Beneficiary**		**Non-beneficiary**	
	Worries of not having enough food	Failure to eat preferred foods due to lack of resources	Worries of not having enough food	Failure to eat preferred foods due to lack of resources	Worries of not having enough food	Failure to eat preferred foods due to lack of resources
Never	44	34	46.82	36.3	40.2	32.18
Rarely	33	31	32.42	30.43	34.62	30.96

[16] Global Hunger Index (GHI) is measured by Proportion of people who are calorie deficient, Child malnutrition prevalence; and Child mortality rate.

[17] The responses rarely, sometimes and often are defined as once or twice, three to ten times and more than 10 times in the past 30 days and in lean period respectively.

Response[17]	All		Beneficiary		Non-beneficiary	
Sometimes	18	24	16.87	23.7	19.49	25.28
Often	5	11	3.89	9.57	5.69	11.57
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Source: NAIVS Household Survey 2012

4.5.13 Amount and Type of Meals Consumed by Household

Most of rural small holder farming households, food security is obtained at great expense. Households use a larger proportion of their resources on food especially in lean periods. Eating frequencies seem to be small overall. On average people eat twice in lean periods and their frequency goes up to three times in normal periods. The number of meals eaten by households is one determinant of food security as well as the amount and type of food consumed. Smallholder farmers were asked about the number of meals they used to eat in last month (30 days), majority of them (about 73 per cent) reported to have had three meals, this was no surprise because data collection happened just after harvesting season. The same question was asked in lean season and about 45 per cent of smallholder farmers reported to have eaten two meals per day. Furthermore, about 62.11 per cent reported to have consumed small amounts or different types of food as compared to the food they normally consumed or both.

Table 26: Number of meals consumed by household per day

Number of meals per day on average	Last 30 days	Lean period
0	0.1	0.05
1	1.23	10.1
2	25.93	45.49
3	72.75	44.36
Total	**100**	**100**
Amount and type of meals in lean period	Frequency	Percent
Smaller	881	43.19
Different types of food from normal	250	2.25
Both small and different type	136	6.67
No, they were the same	773	37.89
Total	**2040**	**100**

Source: NAIVS Household Survey 2012

4.5.14 Maize Production, Consumption and Sales

Maize is the most important food crop and its shortage translates into famine in the country. Looking at the production trends in last decade, the production rate has not grown significantly to ensure food availability. The country is still suffering from insufficient food, for example there is high proportion of maize imported as compared to export. NAIVS has not shown overall growth of maize production. The maize production trends starting in 2008/2009 to 2009/2010 indicate that the production had no observable surplus necessary for food security in the country. Again, the maize exports were not significant and at the same time the country imported maize too. In addition, the maize importation was high in the last decade as compared to maize exports which were far beyond the objective of NAIVS (Figure 11).

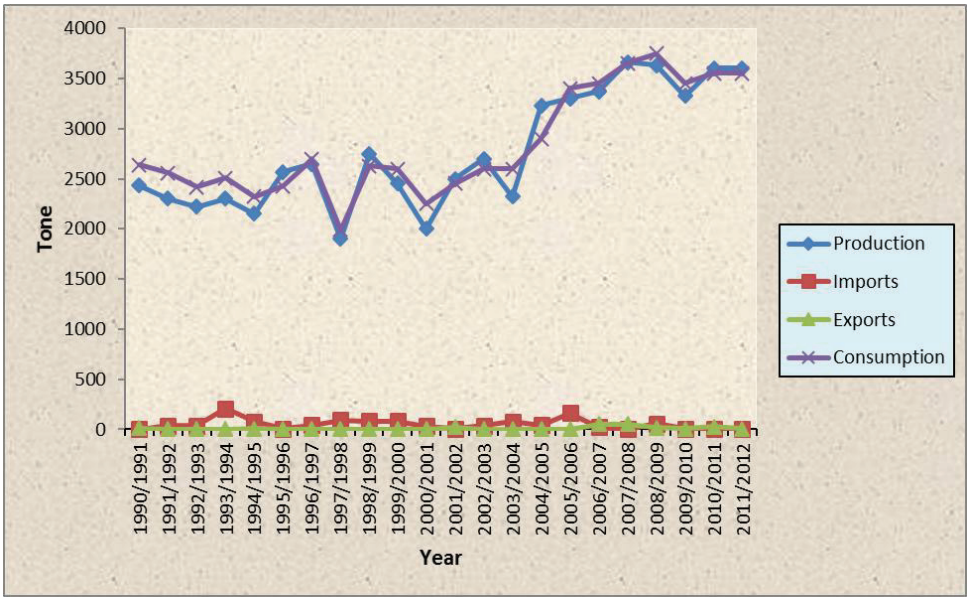


Figure 11: Maize Production, Consumption and Trade (000mt)

Source: The United States Department of Agriculture (USDA) 2011

4.6 Conclusion and Recommendations

4.6.1 Concluding Remarks

Smallholder farmers in Tanzania are net food producers and net food buyers producing food for their own consumption and for sale in order to finance other foods and non-food requirements. Since small holder farmers use their own land and labour, they only need financial resources to purchase fertiliser, improved seeds and sometimes to pay for transportation of inputs and yields.

The output from production has both monetary and non-monetary benefits. The food produced is used for own household consumption and for the market to cater for the other needs beyond food requirements. The money obtained from sales of food crops plays an important livelihood role as most smallholder households use farming as a major source of income. However, the majority of smallholder farmers tend to sell their produce soon after harvesting when the price is very low, thus the income obtained is also very low.

Sometimes even in a situation where a smallholder produces enough output for own consumption and for sale, the input and output markets are not stable enough to accelerate economic growth. The input price has been increasing faster than the price of output. Therefore, the higher prices of inputs tend to lower the income obtained by smallholder farmers and this reflects another challenge to the farmer on the profitability when using fertilizer and improved seeds. Under this circumstance the provision of subsidy to smallholder farmers is inevitable.

Agriculture remains a main livelihood strategy for the majority of smallholder farmers and the whole country. The sector needs to be taken seriously by all stakeholders. The agriculture sector is vulnerable to natural disasters since it is highly dependent on rain. Furthermore, the effects of climate change and variability are undeniably clear with impacts already affecting agricultural systems over the history of Tanzania associated with drought and floods.

Literature review has shown that the low fertilizer use in Tanzania can be explained by demand and supply factors. On the demand side, the use of fertilizers is low because incentives to use them is undermined by low crop yield and high fertilizer prices relative to the price of agricultural produce. Other factors include the inability of many smallholder farmers to raise financial resources required to finance the purchase of fertilizers and variability of smallholder's knowledge about the technology and how to use it efficiently.

In Tanzania, the pattern of food production is mainly spread around the border regions because of the annual rainfall distribution pattern. For example, except for drought years the country was food sufficient in aggregate between 1961 and 1966. However, because production was concentrated in a few regions and due to severe problems of transportation and internal distribution systems. The food production deficit regions were at great risk of food insecurity because they were compounded by the geographical distribution of production areas which were remote from the main consumer markets.

One of the challenges the Tanzania government will continue facing is how to promote the use of fertilizers among smallholder farmers. Most probably it will be unable to tackle the critical problem of low fertilizer use by initiating these short-term subsidy schemes, which resemble those

implemented so many times in the past. For almost all the direct price schemes used to promote the use of fertilizers, the results have always been unsatisfactory, and the cost of subsidy has been far above the ground, and the benefits accrued by the using improved seeds and fertilizer have been modest. The government intervention on price of producer inputs seems to be a short-term intervention and probably not a sustainable solution to low use of inputs. It is plausible that this has in effect influenced implementation of NAIVS either through ill preparation of the supply chain or limited capacity of programme administrators or problems in the construction of an interface with intended beneficiaries as evidenced by significant perceptions of social inequity associated with NAIVS. Consequently, it is unlikely that NAIVS will influence the adoption of technology as consumers of fertilisers continue to remain susceptible to weather conditions as well as outputs prices. This may further constrain public support for producer inputs support with consequence on its long-term sustainability and effectiveness.

4.6.2 Policy Recommendations and Suggestions

It is important for policy to focus on investment in other associated areas to reduce production variability. It is obvious that experience of food insecurity in Tanzania is highly associated with drought, therefore, the central policy concern should aim at dealing with this impediment, since poor smallholder farmers rely heavily on natural resources and are most vulnerable to external shocks and environmental risks. It is in this context that, producer inputs whether subsidized or not can gain more benefits if and only if they are practiced in synergy with other policy initiatives like expansion of water conservation schemes, water harvesting, irrigation, land conservation, extension services, good markets both for producer inputs and agriculture output.

Additionally, crop export bans could be reviewed and give farmers freedom to access markets of their own choice. If these policies will be in practice, then the smallholder farmers will likely be assured of benefits and the adoption of producer input technology may be realised. More importantly attention should be given to drought-tolerant crops, such as cassava and sweet potatoes since their productivity is high as compared to other crops and currently, they have now gained popularity among the majority of people as superior food staples.

The overall design and implementation of projects like NAIVS leads to a presumption that the scheme was not designed to reach the poorest smallholder farmers. This is contradictory with its objective of meeting vulnerable smallholder farmers' needs as explained by World Bank (2009: 2). The lesson which can be drawn from this is on the need to carefully design policies that deal with majority of the poor population such as this one on producer subsidy, since different stakeholders have different interests over these policies. This is not to say that all parties gaining from the scheme have to be satisfied with the proposals. But their position and

interests must be understood by policy makers and policies should seriously pay attention to macro and micro impact of gainers and losers.

CHAPTER FIVE

ANALYSIS OF THE COMPETITIVENESS OF THE TOBACCO VALUE CHAIN AND EXPORTS

Jamal B. Msami[18], Moses Tekere[19] and Calvin Manduna[20]

Summary

The economic 'over-dependence' of Tanzania on tobacco cannot be understated. Some 1.45 million people benefit directly or indirectly from the tobacco industry and it recently accounted for 29 percent of export earnings from traditional agriculture.

However, to advocate strengthening of competitiveness in the tobacco value chain would be paradoxical given Tanzania's commitments under the WHO Framework Convention on Tobacco Control. Despite its economic impact, tobacco has also resulted in massive environmental damage (deforestation) and caused negative health consequences for the growers, smokers and non-smokers.

A viable alternative(s) to tobacco has yet to be found. To safeguard livelihoods and replace lost government revenues a clear long-term strategy needs to be implemented by all stakeholders to guide diversification from tobacco and strengthen alternative crop value chains. The next generation tobacco and nicotine products will impact tobacco consumption, cause declining demand for traditional tobacco products, and affect long-term profitability. Sales of cigarette sticks are shifting from developed to developing countries like China and India which have rapidly growing populations, but even these markets are experiencing changing product preferences e.g. a shift away from high tar cigarettes.

The tobacco value chain faces production and marketing constraints. Demand constraints include bottlenecks in input supply and distribution, obtaining formal financing, insufficient land and declining soil quality, poor farm infrastructure like barns, high cost of labour, declining availability of firewood and various pests and diseases. Market constraints and inefficiencies involve poor grading and pricing systems (including price information), delays in payments after sale, taxes and charges and a buyers' oligopsony which creates asymmetrical relationships.

5.1 The Global and National Tobacco Sector

The global tobacco industry is one of the world's most profitable with a market of just over 1 billion smokers worldwide (an average of 1 in 8 people). It is a major contributor to the economies of many developing countries and the livelihoods of millions of people, that include smallholder

[18] REPOA, Tanzania. Email: jamal@repoa.or.tz
[19] TRADES Centre, Zimbabwe. Email: mtekere@tradescentre.co.zw
[20] ACP International Trade Advisors, Washington DC. Email: cmanduna@gmail.com

farmers, retailers and others employed in the tobacco supply chain. Tobacco leaf is grown in at least 124 of the world's countries. The leaf (nicotiana tabacum) is used to produce cigarettes, cigars, pipe tobacco, flavoured shisha tobacco, snuff, chewing tobacco, dipping tobacco and snus. The global tobacco market was worth about US$816 billion in 2016, of which the global cigarette market is valued at around US$720 billion or 90 percent of the global tobacco sales value. The global cigarette market continues to grow and averaged about 7 percent growth between 2009-201621. Despite cigarette volumes experiencing a gradual decline year-on-year at a global level, the value of the cigarette market continues to grow led by the development and commercialization of the next generation of tobacco and nicotine products. Market research by Euromonitor International forecasts that with changing consumption and regulatory trends in the developed economies, the market for cigarettes sticks will lose US$7.7 billion by 2021. This will be offset by the US$13.2 growth in sales of heated tobacco products[22]. The growth of vapour products as alternative modes of tobacco consumption is the key disruption in the tobacco industry and has economic implications for tobacco leaf producers like Tanzania. Vapour products are expected to be the fastest growing segment of the tobacco industry in at least 35 markets – led by Japan, the USA and European Union. Growth is forecast to reach US$15.4 billion in 2021, up from just US$2 billion in 2016. This represents 3.5 percent of the cigarette market and growth of nearly 700 percent. Factors sustaining sales growth in the cigarette market include a continuous increase in the prices of cigarettes and an increasing popularity of premium products. Sales of cigarette sticks are shifting from developed to developing countries like China and India which have lax regulatory environments and growing populations. Thus, while all other regions experienced decline in cigarette sales, between 2005 and 2015, cigarette sales in the Asia Pacific, Middle East and North Africa regions have increased (Figure 12).

[21] IBISWorld. (2017). *Global Cigarette and Tobacco Manufacturing – Global Market Research Report*. Available at https://www.ibisworld.com/

[22] EuroMonitor International. (2017). *Cigarettes to Record US$7.7 Billion Loss by 2021 as Heated Tobacco Grows 691 Percent | EMI MRX Blog*. [online] EMI MRX Blog. Available at: https://blog.euromonitor.com/2017/06/cigarettes-record-loss-heated-tobacco-grows-691-percent.html [Accessed 10 October. 2017].

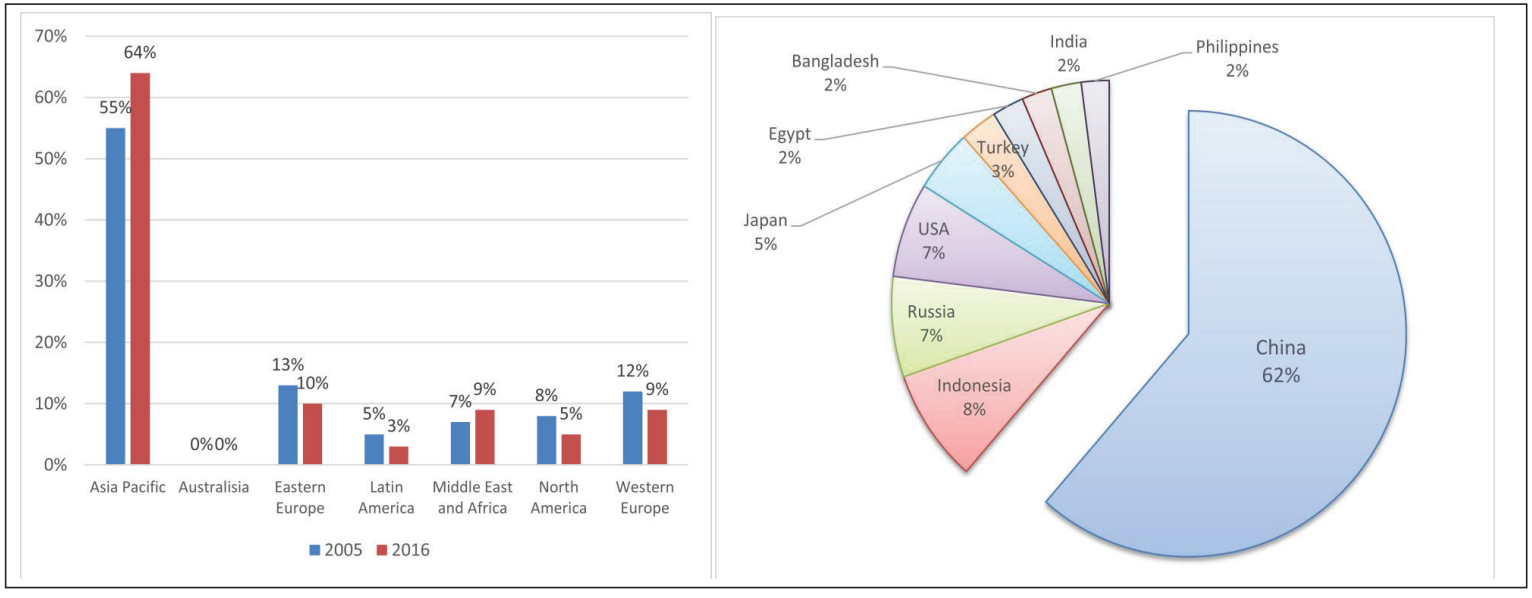


Figure 12: Trends in Global Cigarette Market by Region (2005-2016) and Top ten cigarette markets by volume – 2016 (billion sticks)

Source: Euromonitor International, 2017

The five largest markets accounted for 61.4 percent of all cigarette consumption in 2016, led by China, whose market is gradually shifting towards lower tar cigarettes. Indonesia's market is dominated by kretek cigarettes blended with cloves – with imports from Tanzania. However, this market declined slightly by 1.5 percent over the last decade. India is an important market for cigarettes although its market is dominated by bidis (hand-rolled cigarettes) and smokeless tobacco.

The global cigarette and tobacco manufacturing industry is highly concentrated with the leading four operators accounting for 74.8 percent of industry revenue in 2017, a slight drop from 80.4 percent share in 2012.[23] The top multinationals that dominate the global tobacco value chain include China National Tobacco Corp (with 41.5 percent of the global market and largely focused on the Chinese market), Altria Group (largely focused on the USA market), Philip Morris International and British American Tobacco (BAT), Japan Tobacco Inc. and Imperial Tobacco Group. While tobacco is produced using various out-grower or contract-based arrangements, smallholder farmers have very little bargaining power within the tobacco value chain when dealing with lead firms and leaf buyers.[24]

Tobacco use is a major risk factor for many preventable diseases and cancers, particularly, those affecting the heart, liver, and lungs. The adoption of the World Health Organization's Framework Convention on Tobacco Control (FCTC) in 2003 (which Tanzania ratified in 2007), has been a game changer for the future of the tobacco industry. The FCTC seeks to protect future generations from the devastating health, social, environmental and economic consequences from tobacco consumption. The treaty's provisions have resulted in restrictions on the manufacture, sale, marketing and packaging of tobacco products in nearly all countries and markets. These restrictions include the introduction of plain packaging, product-specific regulation, graphic health warnings on packs, higher taxes, stringent restrictions on smoking in enclosed public places and bans on shops displaying tobacco products at the point of sale.

In Tanzania, debates on the future of tobacco have been intense. There are some 2.88 million tobacco users (including 50,000 children), with an estimated 6,800 annual tobacco-related deaths. Some studies found that 32 percent of cancer deaths in Tanzania were related to tobacco. Anti-smoking activists have called for strengthening of the Tobacco Products

[23] IBISWorld. (2017). *Global Cigarette and Tobacco Manufacturing – Global Market Research Report*. Available at https://www.ibisworld.com/

[24] Goger, Annelies; Bamber, Penny and Gereffi, Gary. (2014). *The Tobacco Global Value Chain in Low-Income Countries*. Duke University Center on Globalization, Governance & Competitiveness (Duke CGGC)

(Regulation) Act, 2003. Policy debates have also focused on the question of operationalizing Articles 17 and 18 of the FCTC and finding "crop substitutes"—to support tobacco-dependent economies like Tanzania, Malawi, Zimbabwe to diversify from tobacco production towards alternative crops and livelihood strategies.[25] Despite various value chain studies identifying crops with growth potential in terms of output and productivity, for various reasons, crop substitution has been challenging and less than successful.[26] Some researchers[27] conclude that in Tanzania, tobacco has benefitted from a disproportionately high allocation of modern agricultural inputs at the expense of other crops, especially cereals. About 83.7 percent of tobacco growers received high yield inputs compared to 13.36 percent for maize. They believe that if alternative crops were to receive comparable levels (as tobacco) of inputs, fertilizer, seeds, affordable credit, and reliable markets and prices, they would surpass tobacco production. Other comparative studies argue that tobacco production is the most labour-intensive crop (219 person-days) compared to four other crops: maize (40 person-days), beans (38 person-days), groundnut (48 person-days) and paddy (131 person-days)[28] (-. Tobacco also has more input requirements than other crops. Due to low mechanization and low productivity in other crops, tobacco retains its relative profitability[29] .

Another challenge facing the global industry, including Tanzania, is the rising illegal market for illicit tobacco products. Illicit cigarette trade includes smuggled contraband to avoid payment of excise duty (with potential losses of US$31 billion in taxes), counterfeit products and illicit whites (brand manufactured legally in one country but smuggled and retailed in another market). The Tanzania Revenue Authority (TRA) lost nearly Tsh30 billion in unpaid taxes in 2016 due to smuggling of illicit

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[25] Keyser, John C. (2007). *Crop substitution and alternative crops for tobacco: Study conducted as a technical document for the first meeting of the Ad Hoc Study Group on Alternative Crops established by the Conference of the Parties to the WHO Framework Convention on Tobacco Control.* Available at http://www.who.int/

[26] Leyaro, Vincent and Morrissey, Oliver. (2013). Expanding Agricultural Production in Tanzania: Scoping Study for IGC Tanzania for the National Panel Surveys. International Growth Centre Working Paper.

[27] Kidane, A et al. (2013).. *Agricultural Inputs and Efficiency in Tanzania Small Scale Agriculture: A Comparative Analysis of Tobacco and Selected Food Crops*. Tanzania Economic Review, : 3(1-2):1-13

[28] Ntibiyoboka, J. (2014). *Economics of smallholder tobacco production and marketing in Mpanda District.* [online] Suaire.suanet.ac.tz. Available at: http://www.suaire.suanet.ac.tz:8080/xmlui/bitstream/handle/123456789/660/Jaliwa%20Ntibiyoboka.pdf?sequence=1&isAllowed=y [Accessed 2 Feb. 2018]

[29] Leyaro, Vincent and Morrissey, Oliver. (2013). Expanding Agricultural Production in Tanzania: Scoping Study for IGC Tanzania for the National Panel Surveys. International Growth Centre Working Paper

tobacco products. Illicit cigarettes are one of the fastest growing segments in the European market with an estimated 460 billion illicit cigarettes sold globally. They are particularly concerning as they are cheaper and more attractive to youth, they often contain dangerous additives and excessive levels of cadmium, tar and carbon dioxide[30].

5.2 Analysis of Tanzania's Tobacco Value Chain

5.2.1 Understanding Production

Introduced into the country in the 1930s and 1940s from Malawi (then Nyasaland), tobacco is now grown in 13 regions covering at least 33 districts that include Geita, Iringa, Kagera, Katavi, Kigoma, Mara, Mbeya, Morogoro, Ruvuma, Shinyanga, Singida, Songwe and Tabora – which accounts for 60 percent of Tanzania's production (Tanzania Tobacco Board, 2017).[31] According to the International Tobacco Growers Association (ITGA), the tobacco industry employs 1.45 million people in Tanzania. Three types of tobacco are cultivated in Tanzania: (i) Virginia Flue Cured tobacco (VFC) which accounts for 95 percent of Tanzanian leaf. It is cured by flue (water steam) and is grown in Tabora, Shinyanga, Singida, Katavi, Mbeya, Iringa and Kigoma regions; (ii) Dark Fire Cured tobacco (DFC) which is cured by smoke, and is largely grown in Ruvuma; and (iii) Air Cured tobacco (Burley) which was being tried in Ruvuma, Kagera and Morogoro regions.[32] Farmers favour tobacco because it has a reliable market and can be grown in a wide range of soils and climatic conditions, although in recent years farmers have also felt the impact of drought and insufficient inputs, due to bottlenecks and limited competition in the inputs distribution market.

The crop production season begins from mid–August to December and runs from January through April. These periods are labour intensive. Like other crops, land must be cleared for cultivation followed by manual tilling. Other activities include firewood collection, land preparation, nursery work and transplanting, weeding and fertilization, topping and de-suckering, harvesting, curing, grading and subsequent marketing. Production has grown since the 1960s to reach a high of 130,000 MT in 2011 (a feat which

[30] For an in-depth exploration of the effects of illicit tobacco products see Ashley, D., Watson, C., Polzin, G. and Calafat, A. (2003). Determination of tar, nicotine, and carbon monoxide yields in the smoke of bidi cigarettes. *Nicotine & Tobacco Research*, 5(5), pp.747-753; and O'Connor, R., Li, Q., Stephens, W., Hammond, D., Elton-Marshall, T., Cummings, K., Giovino, G. and Fong, G. (2010). Cigarettes sold in China: design, emissions and metals. *Tobacco Control*, 19(Supplement 2), pp.i47-i53

[31] Tanzania Tobacco Board. (2017). *Overview of the Tobacco Sub-Sector and Investment Opportunities Available in Tanzania.*

[32] Ntibiyoboka, Jaliwa. (2014). *Economics of Smallholder Tobacco Production and Marketing in Mpanda District.* Sokoine University of Agriculture. Available at http://suaire.suanet.ac.tz

has not impressed anti-smoking activists) but has been fluctuating during the last decade (Figure 13). The successful growth of tobacco output was attributed to improved supply and use of farming inputs.

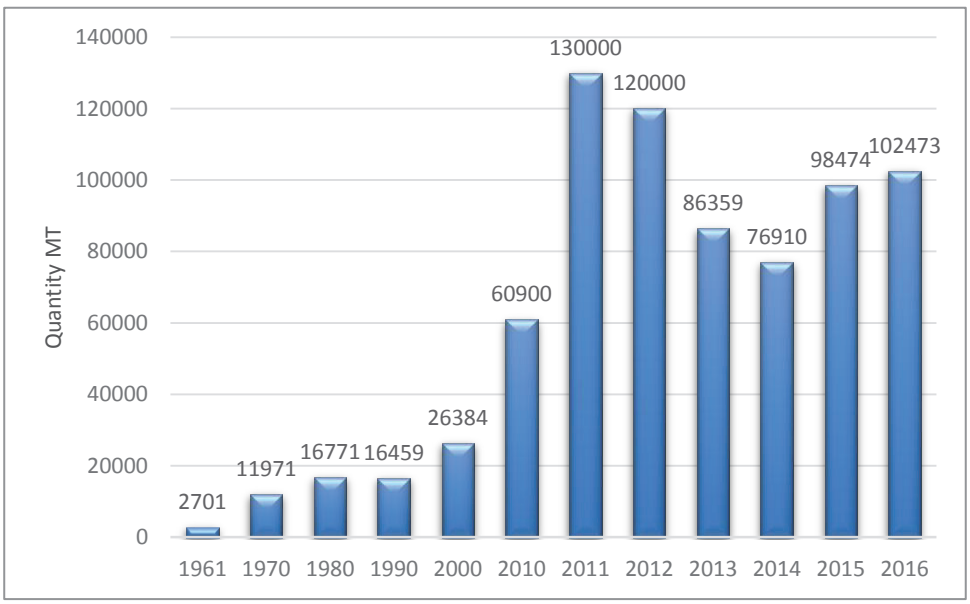

Figure 13: Tobacco production in Tanzania 1961-2016 (MT)

Source: FAOSTAT

Tobacco cultivation is dominated by over 92,000 smallholder subsistence farmers averaging 0.7 ha – 1.0 ha per season. Farmers also practice inter-cropping with food crops like maize, beans, groundnuts and rice. Farmers are organized into rural primary societies within their respective districts. There are about 150 primary societies and 7 regional unions. They face many challenges related to governance, and due to lack of resources, limited capacity to support members and conduct effective advocacy on policy issues arise.

Most small holder farmers grow tobacco under contract farming with major leaf buying firms. Contracts for sale of tobacco are regulated under the Tobacco Industry Act (2001). In Tanzania, the major leaf buying firms include Tanzania Leaf Tobacco Company Ltd (TLTC) (USA based), Alliance One Tobacco Tanzania Ltd (with a USA based parent), Premium Active Tanzania (with a United Arab Emirates based parent) and JTI Leaf Services Ltd (with a Japan based parent). Leaf buyers use contract farming to commit farmers to follow buyers' technical specifications and control species variety. Concerns were also raised over whether contract farming was contributing to farmers indebtedness and dependency on leaf buying firms. With liberalization, lead firms sought to improve agronomic

practices.[33] For example, Tanzania Leaf Tobacco Co. (TLTC) and Alliance One Tobacco Tanzania (AOI) helped to establish the Association of Tanzania Tobacco Traders (ATTT) which provides extension services and training on good agricultural practices to about 53,000 farmers, with a staff that includes 600 field technicians.

In recent times, great emphasis has been placed on sustainability and compliance, which includes mitigation against deforestation, agricultural labour practices, water and soil management. Farmers are provided with tree seedlings for reforestation under the motto "no trees no tobacco". Changing attitudes and behaviour has been a challenge and tree planting is now a condition in the tobacco contracts. Use of underage workers can also result in contract cancellation. It is therefore, an on-going challenge to educate farmers on sustainability and labour issues, while retooling the industry towards better energy efficiency and reducing its carbon footprint. The Tobacco Research Institute of Tanzania (TORITA) established in 2000 and Urambo Research and Seed Farm have been active in tobacco research and conducting field trials on various technologies and fertilizer blends that could boost productivity and fight disease. TORITA has released higher yielding varieties and is examining ways to improve curing efficiency by upgrading heat channels in the curing barns based on local conditions. Its work could greatly use support to better address issues such as forest sustainability, climate mitigation and rejuvenation of soil fertility.

Leaf buying companies supply tobacco seed varieties like K326, LTF10 and RG 17, as well as fertilizers – which are key nutrients in tobacco production. On-going training on good agricultural practices would help farmers improve of methods and techniques of agricultural production, farm management and increase of income and of productivity and production quality. Yields vary widely and have reached highs of 1,500 per ha. However, this is only half of what is achieved in countries like Brazil, but still represents an improvement for Tanzania's climate. Farmers have complained about bottlenecks in the distribution of inputs, including red tape from financial institutions in processing financing which was delaying input purchases.

Management of diseases and pests found in seed beds and fields is key to both quantitative and qualitative enhancement of tobacco yields. This requires on-going and improved extension services from both lead firms and other stakeholders like the TTB and local government authorities. Diseases include damping-off, leaf blight and black shank in flue cured tobacco nurseries. Cutworms, aphids, vegetable weevils and flea beetles are also common problems in tobacco nurseries. In the field crops face pests like tobacco hornworm (Manduca sexta) and budworm (Heliothis

[33] Tuinstra, Taco. (2015). *A Remarkable Journey: Tanzania's Transformation into a Prominent Leaf Tobacco Supplier*. Available at http://www.tabpi.org

virescens) which requires annual treatment on as much as half the planted acreage. The practice of 'topping' and 'de-suckering' to achieve higher leaf yields and levels of nicotine contribute to depletion of soil nutrients. Farmers themselves are also exposed to green tobacco sickness (GTS), due to nicotine dermal absorption from handling tobacco leaves. Cultivation in Tanzania is largely subsistence agriculture, and dependent on family labour, hand tools and natural resources. In some districts, researchers found that 69 percent of farmers favoured clearing virgin land each year for planting new tobacco crop to avoid soil-borne diseases and in pursuit of higher yields[34]. This shifting cultivation was a major cause of deforestation and more studies are needed to determine the extent of deforestation and the remedial measures.

5.2.2 Harvesting, Post-Harvest Management

For human consumption, tobacco leaves are picked, dried and cured and subsequently processed into various products. Leaves are heated in barns for 5 to 8 days to temperatures up to and over 70°C which gives the leaves a distinctive yellow/orange colour. Virginia tobacco, which commands the highest prices, requires flue curing over several days in wood burning kilns. This is another major contributor to deforestation. After curing, the tobacco is graded based on various characteristics and perceived quality of the tobacco, such as maturity, conformity and colour. Proper tobacco curing, and barn management are critical to maximize yield and quality. This requires improved furnace designs for curing barns that are energy efficient, and subject to regular inspection. On-farm storage is required to store tobacco from the time it has completed curing, through grading and baling, until it is transported for marketing. Good agricultural practices are key to avoiding tobacco leaf deterioration in quality and low yields. This includes storing tobacco at the correct moisture and density, free from any non-tobacco materials or contaminants. Agro-chemicals should not be applied post-harvest. The harvesting, curing and storage process remains susceptible to diseases like cucumber mosaic virus, barn rot, mould and pole rot.

5.2.3 Value Addition, Processing and Upgrading

Tobacco processing generates economic benefits and employment in different segments of the value chain. They include transportation and logistics, processing / manufacturing, grading and marketing services. This involves various value chain actors such as transporters, buyers, grading companies, auction markets, technical and support services and regulatory institutions. The Tobacco Act of 2003 seeks to promote local agro-processing and prohibits exports of green leaf. Production has spread to

[34] Lecours, N., Almeida, G., Abdallah, J. and Novotny, T. (2012). Environmental health impacts of tobacco farming: a review of the literature: Table 1. *Tobacco Control*, 21(2), pp.191-196.

different regions, with about 60 percent in Tabora region. This has scattered Tanzania's tobacco growing far and wide covering an area the size of Germany, but without the integrated transport and logistics, especially with respect to the quality of rural roads. Most farmers sell unprocessed leaf leading at low prices. Leaf processing is largely concentrated in Morogoro by virtue of historical reasons – availability of water, electricity and transport logistics compared to other regions. This is some 700 km from Tabora and entails long transport distances by road and rail for farmers which can compromise leaf quality as tobacco is highly perishable in its raw/green form. On farm processing such as curing would increase shelf life and result in higher prices. Quality has been gradually improving according to leaf buyers. In the 1990s, Tanzania's two-colour tobacco was mostly used as filler leaf. Today, with improved compliance to export market requirements, Tanzania produces the full range from filler to semi-flavour and flavour styles that are sought after by blue-chip customers. Key factors behind the improvement are liberalization of the sector, effective extension services with support provided by lead firms. However, Tanzania has only two manufacturing factories. There is therefore, little competition and opportunity for greater value addition.

5.2.4 Retailing, Marketing, Transportation and Storage, Packaging Etc

Prior to the TTB, the Tanzania Tobacco Processing and Marketing Board (TTPMB) supplied farmers with inputs (seeds, fertilizers, crop protection agents) and was responsible for processing the crop at its factory in Morogoro and marketing. The system was not efficient and with liberalization in the 1990s, the government sold its factory to Universal Leaf Tobacco Co (ULT) while Alliance One Tobacco Tanzania (AOI) built its own factory. Market liberalization was aimed at providing competition and promoting efficiency in tobacco industry and is regulated by the TTB. Prior to the season, the TTB and industry stakeholders assess the cost of production and determine an appropriate 'margin' and minimum price per grade. This provides farmers with a price indication at the start of the season. At harvest time, leaf buyers and growers meet in the Tanzania Tobacco Council to determine final prices per grade and discuss other industry issues. The mechanism can be time consuming and farmers have lamented the lack of clear pricing mechanisms on the auction floors. Farmers have also complained about low producer prices, contradictory grading systems, lack of competition among buyers, changes in regulations and taxation. Notwithstanding these challenges, it is a stable marketing mechanism coordinated by the government.

All tobacco is sold to the contracted tobacco buying companies like TLTC. The costs of inputs provided on loan by Cooperative Unions are deducted from earnings. Leaf buying companies provide guidance on how sorting, grading and baling should be done at the centre registered by TTB under the supervision of primary societies. Bales should weigh at least 25kg - 75 kg and should contain tobacco of one quality. The final decision to award a

grade to a bale is handled by leaf classifiers from the TTB, TTC and tobacco leaf companies. Research by REPOA on the challenges in the marketing system found that classifiers from TTB had closer relationships with leaf buyers than farmers, which could compromise their objectivity.[35] The study concluded that the marketing oligopsony was problematic for a competitive tobacco marketing system. Quality is the most complicated component of the tobacco grading and the key determinant of price and profitability. It involved different subcategories of maturity, leaf structure, weight, oil content, colour intensity, width, length, uniformity, injury, and waste tolerances. TLTC identified 68 grades of tobacco and some stakeholders contend that automatic grading machines would promote fairness in the tobacco classification. To improve competitiveness, the systems efficiency could be strengthened, including greater automation and reduced reliance on subjective decision making. Processes could also be streamlined to reduce time-consuming bureaucracy in the marketing process.

5.2.5 Export Markets

Notwithstanding the anti-tobacco campaign, tobacco remains Tanzania's leading agricultural export accounting for about 29 percent of all the country's export earnings in 2016 from traditional crops and placing Tanzania among the world's leading producers of tobacco with a 1.5 percent market share.[36] Between 2013 and 2016, the value of Tanzania's tobacco exports soared almost three fold upwards from US$129 million in 2013 to US$370 million in 2016 while export volume remained the same around 75000 tons (compared to a record high of 110000 tons (US$223 million) in 2012) an indication that global prices have been going up. An issue therefore is whether Tanzania should take advantage of the soaring global prices by increasing tobacco production or due to the healthy and moral considerations around tobacco it should diversify away from production of tobacco so that it complies with its FCTC commitments. Figure 14 illustrates the key tobacco export markets namely Belgium (64 percent), South Korea (10 percent), Germany (6.6 percent), France (3.8 percent), China (2.7 percent). Other smaller markets for Tanzania include Poland, Portugal and Romania. Tanzania also imported about US$8.7 million worth of tobacco products from Uganda, Brazil, India, South Africa and Zimbabwe.

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[35] Rweyemamu, Dennis and Kimaro, Monica. (2006). *Assessing Market Distortion Affecting Poverty Reduction Efforts on Smallholder Tobacco Production in Tanzania*. REPOA Research Report 06.1

[36] Economic and Social Research Foundation (ESRF). Quarterly Economic Review. Volume 15, Issue 2, April - June 2015. Available at http://esrf.or.tz/

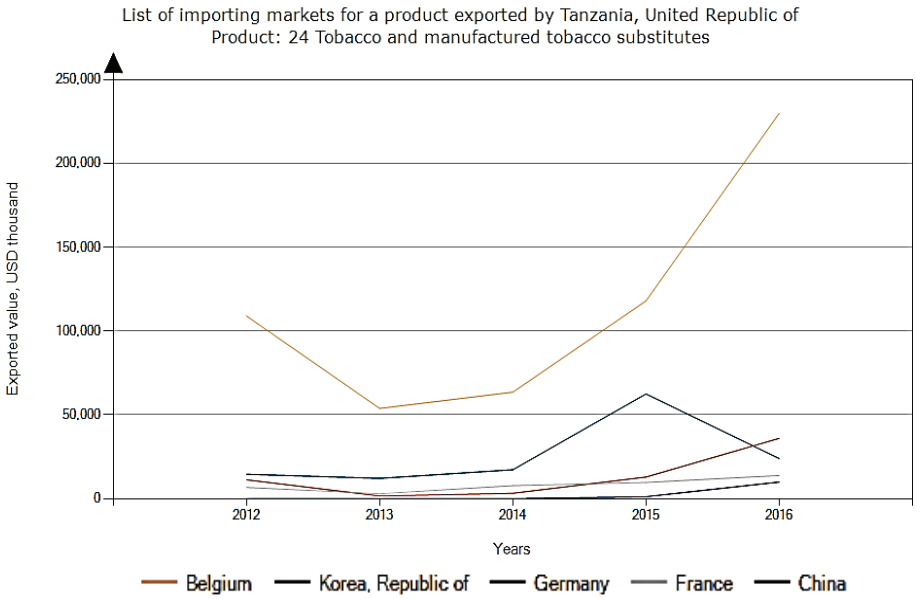

Figure 14: Trends of Tobacco Exports to Top 5 Destinations (2012-2016)

Source: https://www.trademap.org/Country_SelProductCountry_TS.aspx?nvpm. Accessed 20 January 2018

5.3 Bottlenecks Facing the Tobacco Sector

The preceding discussion has highlighted some of the problems facing the sector. They include environmental and health challenges, efficiency of the marketing system, and achieving higher yields and productivity – which is paradoxical in light of Tanzania's commitments under the WHO Convention on Tobacco Control. Problems of side-selling have declined but still exist. Poor governance, including corruption[37], of primary societies and unions remain a challenge. Any inefficiency in the primary societies presents a major bottleneck as they are key actors in organizing credit, inputs and extension services. Production costs in Tanzania are high and declining demand has reduced profitability as buyers also look at lower cost producers in Malawi and Zambia. In the 2017/18 budget, the government committed to remove 10 levies charged on tobacco products such as the tax of US$400 on licenses to buy dark fire cured tobacco (DFC). It remains to be seen to what extent this will boost competitiveness. Poor disbursement of development funds to agriculture has also constrained support to

37 Tuinstra, T., 2016, 'A Remarkable Journey' on Tobacco Reporter, on https://www.tobaccoreporter.com/2016/07/a-remarkable-journey/ accessed 17th October 2018

tobacco. In 2015/16 only, 16 percent of the government's development budget was disbursed, meaning projects such as mapping of farmland, issuance of title deeds, inputs schemes, construction of warehouses and support for research and extension services were limited.

In terms of good agricultural practices, a key concern has been the deforestation and soil-degradation associated with tobacco cultivation as farmers use wood for curing. Deforestation causes soil erosion, loss of soil productivity for food crops, depletion of timber for other uses like construction and cooking. The industry has suggested that deforestation is largely due to charcoal production for domestic use. Whatever the cause, the industry must play a leading role in addressing the issue. Other problems stem from the use of agro-chemicals in tobacco farming such as pesticides, fumigants, insecticides, fungicides, etc.[38] This use of chemicals has been associated with destruction and contamination of ground water sources.

5.4. Conclusions and Recommendations

Tanzania's tobacco finds itself at a crossroads with shifts taking place that may impact future demand and attitudes towards tobacco. Certainly, while tobacco is a major foreign currency earner for the country, values of its exports are soaring up and remains a source of livelihood to millions of people but against the background of the anti-smoking campaign and FCTC that Tanzania ratified its long-term future is questionable. Accordingly, the recommendations being made here are for the short term.

A key challenge for Tanzania is to improve the competitiveness and quality of its tobacco. This involves on-going improvements in agronomy to improve leaf quality and curing which results in better grades. Tanzania should also seek to reduce the share of tobacco that is filter. The major market challenges with Europe are that most of the tobacco exported there is raw or semi processed and with little value addition. Tanzania requires investment in more processing infrastructure to create greater value addition. However, there are gradual changes taking place in the major developed markets with a shift towards new products which may negatively impact on demand. Tanzania should therefore, also look to alternative growing markets like Asia and the Middle East. However, the key concern for the sector and farmers in the long run is developing viable alternatives to tobacco, which have so far proved elusive.

Finally, to advocate strengthening of competitiveness in the tobacco value chain would be paradoxical given Tanzania's commitments under the WHO Framework Convention on Tobacco Control. Yet a viable

[38] Lecours, N., Almeida, G., Abdallah, J. and Novotny, T. (2012). Environmental health impacts of tobacco farming: a review of the literature: Table 1. *Tobacco Control*, 21(2), pp.191-196

alternative(s) to tobacco has not yet been found. To safeguard livelihoods and replace lost government revenues a clear long-term strategy needs to be implemented by all stakeholders to guide diversification away from tobacco and strengthen alternative crop value chains.

CHAPTER SIX

CONTRASTING TALES OF VALUE CHAINS: TANZANIA AND VIETNAM**

Blandina Kilama

6.1 Introduction

In the previous chapters it has been shown that in the implementation of agricultural policies in Tanzania, more emphasis on re-distribution and neglect of other productive actors in the agricultural sector, led to limited outcomes in the implementation of policies. In addition, in there were other problems that reduced the impact of policy interventions. Implementation was top down, and peasants were treated as objects and not the subjects of change and state actors were more focused on plans than the qualitative aspects of the processes of implementation. In addition, there were low levels of investment in skill development which affected production and productivity along most of the agricultural value chains. As a result, investments made yielded limited outcomes. As will be shown in this chapter the processes and outcomes were different in Vietnam although both countries had a socialist orientation to begin with and later switched to market oriented approaches. The difference in outcomes of policy implementation lies in how each of the two countries organized the agricultural value chains to yield maximum results in the globalized agricultural markets.

Gray (2018) provides more information around contrasting economic history, by looking at the common roots of the two economic systems that were adopted under socialism. In their respective histories, what is common to both Tanzania and Vietnam is the high percentage of their population that lives in the rural areas, their planned economies and later the adoption of a free market. The transition from socialism to liberalization (free market) saw an increase in the production of different produce in terms of crops and other goods in Vietnam, while erratic trends have been observed in Tanzania. As with other African countries, production has been on the rise in Tanzania but improvements in productivity remain a challenge.[39] There is stronger differentiation among cashew farmers within Tanzania

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* * This material was first published as Chapter 5 "Contrasting tales of value chains." In B. Kilama. 2013. The Diverging South: Comparing the Cashew Sectors of Tanzania and Vietnam. African Studies Centre, African Studies Collection 48.

[39] See Dietz (2011: Section 3) for an overview of the expansion in cropping areas, yield and productivity.

and between Vietnam and Tanzania, for instance, the amount of land owned is higher in Tanzania than in Vietnam. The case of cashew points to discrepancies in cashew output, yield, productivity, tree density, the age of trees, proneness to disease and the availability of tools and inputs between Tanzania and Vietnam. What emerges from the divergence observed is how the actors in the sector interact. This is the focus of this chapter which looks at the premise that the value chains operate differently.

The erratic trends in production in Tanzania, I would argue, are due to the numerous reversals in policies, with the peasant always being treated as a residual on the margin and without flexibility. This happened mainly with processing being an afterthought as a way of utilizing excess produce, i.e. the adoption of forward linkage leading to an unbalanced value chain. On the other hand, the skyrocketing of cashew production in Vietnam, I argue, is due to the adoption of strategic policies, with the peasant provided with flexibility. This, I further argue, was made possible with processing being considered as central to the cashew sector, i.e. the adoption of a backward linkage leading to a balanced value chain. Looking at the value chain like this implies that price allocates resources by itself but, as will be shown, there is a need for formal coordination to overcome inefficiencies.

The chapter focuses on the meso and sector levels of marketing dynamics and presents the coordination systems of the cashew market by adopting a Global Value Chain (GVC) framework. The functioning of each strand in the chain depends on the interaction of the actors within it. The implementation of an industrial policy in Vietnam versus the opportunistic policy in Tanzania has ensured increased production and erratic production in the two countries respectively.

Firms as secured entities have room for innovation (Penrose, 1959). In economics, a market clearing price is obtained, and resources are allocated efficiently under perfect competition but, in the real world, the pursuit of self-interest by the market may not yield the best solutions. In areas where there are not many buyers and sellers and with information asymmetry and barriers to entry or exit, the allocation of resources becomes imperfect and leads to market failure, i.e. the market cannot allocate resources efficiently (Wood, 2001). These market failures need to be corrected by state involvement. This can be seen as government intervention bringing governance to the chain and potentially more power to producers. The cases of cashew in Tanzania and Vietnam show how market failures can be tackled by different processes of coordination. In Vietnam, downstream and upstream stakeholders are linked with coordination providing inclusive incentives to all actors. Coordination in Tanzania provides exclusive incentives to mainly downstream actors, i.e. to a single stakeholder, namely the farmer.

6.2 Creating Space for Actors to Perform in the Value Chain

Actors in the market are organized differently depending on time and space. Global Value Chain (GVC) analysis explores and predicts how nodes of value adding activities are linked in the spatial economy (Sturgeon 2009). GVC assists in understanding the governance structure of tradable goods and 'describes the full range of activities that firms, and workers do to bring a product from its conception to its end use and beyond'.[40] GVC has been evolving since Gereffi (1994) announced that the two static forms of governance were either buyer driven, or producer driven. Initial research on value addition was mainly focused on manufacturing in the automobile and electronics sectors[41] and case studies provided useful information but lacked rootedness. Work on value chains that focuses on crops produced in poor countries and consumed in rich countries[42] has gained prominence since the mid-1990s, especially following the so-called GVC initiative in 2000.[43] This research assumed that the governance of the chain is consistent at all the different nodes in it. Commodity chains are rooted as they originate from a particular place, especially when referring to extractive commodities. For consistency, these commodity chains are simply referred to as a 'value chain' in this chapter.

Following (Talbot, 2009), it is acknowledged that the governance of the value chain differs within a commodity chain. In addition, different actors play key roles in different parts of the chain. Coordination is required to ensure that inputs are provided on time, output is traded promptly, and processing is not disrupted. If such a situation exists, transaction costs are minimized, and production is maximized with a high equilibrium. Coordination needs to occur among downstream actors, upstream actors and at the sectoral level. However, coordination problems may lead to multiple equilibriums and delays at any level are costly and result in a lower equilibrium with less return for producers. The (OECD, 2017) reports points out that segments are relocated, often across national borders, to the places where the tasks can be performed most efficiently. Thus, the core subject of the literature today is not only the movement of final products, as classical theories have focused on (under the third premise), but also the cross-national transfer of tasks, or the value added generated by these tasks (*ibid*).

The coordination of actors comes about through forward linkage or backward linkage. In as much as actors higher up in the chain create more value, the relationship among actors in a value chain affects the quality of

[40] See http://www.globalvaluechains.org/concepts.html
[41] For more information, see Barnes & Kaplinsky (2000) in Kaplinsky & Morris (2001).
[42] Gereffi (1994, 1999); Cramer (1999); Dollan & Humprey (2000); Gibbon (1997); Gibbon & Ponte (2005) and Gibbon *et al.* (2010).
[43] A network of researchers that consolidates information on GVC.

the entire chain. Compatible partnerships ensure efficiency while incompatible partnerships lead to inefficiencies. In a balanced value chain, upstream actors have strong linkages with downstream actors who are more flexible, while in an unbalanced value chain, there is a weak linkage with downstream actors that is often captured[44] by upstream actors that thus remain rigid and are treated unfairly, mainly as residual.

The operating environment of a sector is crucial; adopting strategic policies or opportunistic policies makes a difference. Strategic policies provide room to learn through trial and error, while opportunistic policy leaves little room for knowledge creation and utilization.

Market failure highlights the issue of contracting. Contracts are needed because one party may have more or better information, which is termed 'asymmetric information', and the presence of transactional costs that lead to uncertainty. Contracts can be a basic understanding or agreement provided by word of mouth or can be written down on paper. Though not the preferred outcome, this may happen as a result of changes in the market environment that make it impossible for one party to keep their side of the deal. Given the gestation period of a crop, the nature of contracting among cashew-sector actors is crucial.[45] [46] For trading to occur, coordination is thus key, and linkage is created between downstream and upstream actors. The presence of a strong domestic raw material supply to upstream actors is attributed to low transportation costs, little bureaucracy and reliable quality control. Since upstream actors have invested in machinery, they are vulnerable and may face hold-up problems.[47] This can lead to under-investment and inefficiency (Klein *et al*. 1978). Given economic freedom, downstream producers produce a product with better returns and upstream producers are obliged to pay a reasonably good price to encourage downstream producers to provide the raw materials they require. The economic freedom to choose other products by downstream actors is a credible threat as actors incur sunk costs that make them vulnerable (Kilama, 2013).

Due to information asymmetry on the quality of the produce offered, buyers would play safe when offering their price. If the offered price is high, farmers will continue to produce. If the offered price is low, this

[44] Global Value Chain Initiative: http://www.globalvaluechains.org

[45] The uncertainty in production streams and prices leads to implicit contracting. The marketing of goods occurs in accordance with the level of uncertainty involved. Goods such as sugar, farm inputs and household utensils are sold through spot marketing. Spot contracts operate with buyers and sellers trading their output once a price has been given.

[46] The discussion on contracts goes hand in hand with that on trust. Trust is created over time and farmers learn from past events. A trader who is engaging with farmers for the first time will only get produce and this will not guarantee that if the trader returns, he will be successful again.

[47] For more information, see Hart *et al*. (1988); Rogerson (1992) and Mackintosh (2001).

would discourage production of good-quality produce and the market will be left with low-quality goods, signifying a typical 'lemon' problem (Akerlof 1970). Without cooperation among buyers and sellers to enhance the quality of production, the buyer and seller will offer a low price and low quality in anticipation of others doing the same, a typical 'Prisoners' Dilemma' problem. In reality, this would lead to low yield/output and a low price, i.e. a low-yielding equilibrium. A low price affects production in future seasons. For markets to work, a sound institutional set-up that thrives on enhancing the operation of the market in a self-monitoring way is needed. A thin market tends to create a monopoly or monopsony situation, neither of which is efficient in allocating resources, but which is, instead, a way of letting a few actors accumulate wealth by creating artificial barriers at the expense of others.

A change in price (both relative and absolute) leads to a reaction from all types of cashew farmers. The type of payment paid to the farmers also affects production. Downstream actors receive a core payment or a residual payment. A core payment involves receiving revenue without transaction costs associated with marketing. Receiving residual payment means that farmers pay for inefficiencies at other levels in the value chain. In other words, residual payment means receiving revenue after deducting any marketing-related costs. This situation is worse in bad years as marketing costs are not adjusted according to output. This can be attributed to the lack of industrial policy that strategically integrates all actors in the sector. In the end, low prices discourage personal effort and downstream actors have little incentive to improve the quality of their produce.

Economies of scale are made by continued commitment to growth brought about by the long-term effects of increased production with falling average production costs (Penrose 1959). Economies of scale are strongest when there is relational contracting and the actors at all the different levels benefit from best performances as profit is maximized. Diseconomies of scale occur when there is little to no coordination among actors and goods are continually produced at an increasing cost per unit. Such diseconomies of scale are expected to be short term and every time a product is traded, a new contract appears with little coordination of the consequences related to the previous actions of any actor.

Downstream actors make reasonable investments and thus also incur sunk costs and hold-up problems. The bargaining position of downstream actors' changes after production (Gow *et al.* 1998). They prefer to receive the highest price for their produce and in a timely fashion. The price received in any one season affects the efforts put into production in the next season. A high price means that downstream actors will firstly continue producing and tending their farms and also that, they are more likely to expand or upgrade them. On the other hand, a low price means that downstream actors will be more inclined to discontinue production, not tend their farms properly or even sell or abandon them.

Linking downstream and upstream is important for integrating all the actors involved and creates a self-governing mechanism in the form of implicit contracting.[48] If local upstream actors are unable to offer a reasonable price, upstream actors from other countries will seize any opportunities presented. If not rectified, this type of contract arrangement aggravates the problem of low-quality produce or lemons, especially with the restrictions on non-local actors' participation due to their low resource base.

6.3 Methodology

This chapter contrasts cashew value chains in Tanzania and Vietnam by looking at the important roles played by the various actors within the chain at the different stages. Cashew farmers are also involved in other activities but in Tanzania, most of funding for other activities depends on their income from cashew production. The cashew processors in Tanzania and Vietnam mainly produce kernels but are also involved in the production of cashew nut shell liquid (CNSL) and other milling products. The cashew value chain is not a rigid phenomenon and has changed in nature over time. Looking at the current organization of cashew marketing can help explain some of the differences using the history of evolving marketing systems. Cashew has moved from being a wild crop used to give shade to a commercial crop in both Tanzania and Vietnam. This has involved changes in the appearance of the tree, which is now a resource that needs to be cared for and whose product is traded worldwide. Visits to key stakeholders in the cashew sector in Tanzania and Vietnam were conducted for comparative purposes, with key informant interviews being held with processors, government departmental heads in the cashew-related ministries, research institutions and coordinators of (input and output) marketing.

A desk review of relevant data supplied or recommended by key informants was also carried out. This information was supplemented by the researcher's own observations. With the premise that value chain operates differently in Tanzania and Vietnam, the chapter is organized as follows. Before analysing the position of the actors in the chain itself, it begins with a section covering Tanzania and later Vietnam. It considers the organization of the marketing of raw cashew, processed cashew (kernels) and inputs and the support system for cashew producers. The last section before the conclusion tries to synthesize the observed differences.

6.3.1 Tanzania

Tanzania has shown a low-level equilibrium with regards to production of cashew with high volatility. The cashew sector in Tanzania has experienced four kinds of marketing. Initially there were cooperatives, then marketing boards and later private traders (with the liberalization of the economy) and

[48] Uncertainties in the production stream and over prices lead to implicit contracting.

finally the Warehouse Receipt System (Kilama, 2013). A constant feature to all these different kinds of marketing is the farmers' income. It is a residual, therefore bearing most of the cost burden with little room to manoeuvre. This section will ascertain these findings.

6.3.1.1 Radical reversals in marketing raw cashew in Tanzania

Tanzania has two types of traders: private and multi-tiered government-led traders. The cashew sector in Tanzania has experienced repeated and radical institutional changes that have affected both the quality and the quantity of the cashew produced. These many reversals of policy and implementation have affected the institutional set-up. Opportunist policy limits the room for stability in Tanzania. Such a set-up leaves little room for learning from below. Tanzania had marketing boards, crop authorities and a free market. Interlocking markets in a market-tiered system supplied inputs on loan and enforced a residual payment system to farmers. Production increased in places where there was no disease in the past but forced villagization and unfair compensation to farmers regardless of the increased world price led to a fall in production. Kriesel (1970) concluded that prices paid to farmers were artificially held down by the National Agricultural Products Board in order to offer higher prices for maize and cassava. This acted as a disincentive as the marketing boards determined the price offered to farmers and, with falling prices, farmers neglected their trees and farms. The entire cost was borne by the farmers who received residual payments, where the marketing cost was off-loaded from inefficiencies higher up in the market. Until 1992 the marketing boards were parasitic and shifted the entire burden onto the farmers.

When Tanzania adopted its SAP in the mid-1980s, the support system was dismantled, the state halted its coordination of the sector, infrastructure was left undeveloped and grading was not taken seriously. In Tanzania, liberalization resulted in splitting the market for input and output, with buyers more interested in output. Liberalization introduced private traders and the state withdrew from involvement in the production of all sectors. During liberalization, prices fluctuated between and within seasons. The withdrawal of government support resulted in a collapse in coordination and severe credit shortages for inputs. This led to the production of low-quality produce, i.e. lemons. The argument goes as follows; there are a number of farmers (downstream actors) in a sector who produce raw cashew of quality $\{Q_1, Q_2, Q_3 \ldots Q_{P1} \ldots Q_{P2} \ldots Q_N\}$ where (1, 2, 3..., P1...P2 and N) denotes the grade of cashew, with a lower number indicating superior quality. Q_1 output is of a higher quality than Q_{10} output. Buying agents (i.e. upstream actors) offer downstream actors two choices: price P_1 and price P_2. The first price, P_1, is paid for raw material in the quality range (Q_1 to Q_{P1}) and the second price, P_2, is paid for the raw material in quality range (Q_{p1+1} to Q_{P2}). Ideally, each grade of cashew should have a matching price. This means that producers of higher quality should be compensated more for their efforts than downstream actors who produce lower-quality cashew,

but this is not the case. A rational producer therefore knows that it does not pay to produce higher-quality cashew as one ends up being paid the same as those who produce a product of lower quality. This would lead to a reduction in the quality of produce where only those of lower quality (Q_{P1} and Q_{P2}) with matching (lower) prices are produced, i.e. 'lemon'. As far as downstream actors are concerned, there is not much difference between producing a quality product or a lower quality product as they both sell for the same price. Since buyers anticipate low quality, they will tend to offer the lowest possible price. This is a classic 'Prisoners' Dilemma' solution in game theory, where parties choose bad solutions in anticipation of others doing the same (see Figure 13).

Buyers of raw cashew in Tanzania include local processors and exporters. Demand for raw cashew mainly comes from outside Tanzania, with exporters having a significant role to play here. There are few local processors comprising upstream actors so most of the raw cashew produced are bought by foreign exporters to be processed elsewhere. Figure 13 illustrates the decisions on quality and price that are likely to be offered by farmers and exporters. The top right-hand entry in Figure 6.4 represents payoffs for exporters and the bottom left-hand entry represents the payoff by farmers.

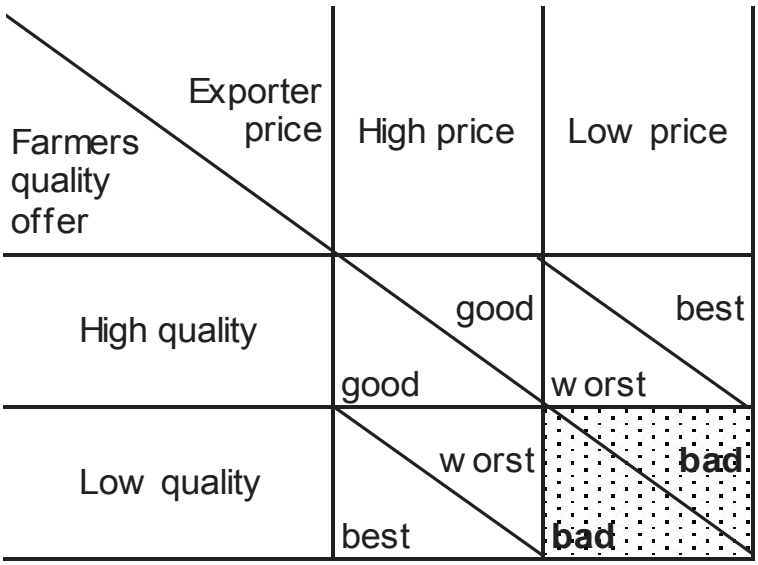

Figure 13: Marketing of cashew as a Prisoners' Dilemma, Tanzania

A farmer has a choice of producing high-quality or low-quality cashew and an exporter can offer a high or low price. So, for both the farmer and the exporter, there is a good option of farmers producing high-quality cashew and receiving a high price from the exporter and also a bad option where farmers produce low-quality cashew and receive a low price. But since neither the farmers nor the exporters can tell anything about the price or

quality, this would lead to a Prisoners' Dilemma solution in game theory. If both farmer and exporter arrive independently at the worst decision, which is to offer a low price and receive low-quality cashew, this is worse for both rather than aiming for high quality and a high price, which is good for both. This is an equilibrium where the farmer produces low-quality cashew and receives a low price from the exporter. A low price means less money is available for maintenance for the farmer and the cycle continues, leading to further low yield.

Liberalization only counted on market prices to allocate resources and this worked until the end of the 1990s but the collapse in prices in 2000 led to farms being neglected. At the beginning of the season, private traders bought raw cashew at a high price and later in the season for a much lower price. This had repercussions for the quality of the raw cashew produced. Traders used to bargain amongst themselves and the highest bidder received the consignment regardless of its quality (see Box 1).

Box 1: Trading cashew on the free market in Tanzania

To trade in cashew, one had to obtain approval from the Cashew nut Board of Tanzania, and the regional and district business officer for crop shipment. The latter was very bureaucratic, and a good relationship was needed to have approval on time.

Additionally, all accredited companies were required to deposit cash for procurement at the primary society and no limit or floor was sanctioned. A detailed roaster with specific buying days was prepared, which remained intact whenever prices were equal. If the price changed, the one with the higher price would be given priority.

Buying was held at the primary societies. Most had strong and trustworthy people so there was little chance of losing money. In cases of theft, the same amount was deducted from the levy to be paid to the village. Before taking the consignment, a cutting test was used to grade the cashew, but again the location and time of buying was important. Trading during the rainy season impacted on the quality of the cashew.

Source: Traders, interview by researcher

Farmers living in remote areas received lower prices than those close to main centres and middlemen were involved at both the village and regional levels. A farmer selling to a 'higher' middleman was assured a better price than others. Yet again, the situation was bad regarding the provision of farm inputs for all farmers. Traders were only interested in obtaining raw cashew and not in supplying farm inputs. The total withdrawal of the government during liberalization created a vacuum in coordination. This

lack of coordination, which farmers felt as a lack of inputs and fluctuating prices, led to state officials announcing that traders were bad for farmers. The former experienced insufficient supply due to a lack of traders. Worse still, the few big traders started a cartel, thus making it difficult for farmers to benefit. The trading system in Tanzania moved from a cartel to a monopoly in the buying of cashew. In a way, private traders were no different from state boards as they were also parasitic in nature and left the farmer marginalized with residual payments.

To bring back a coordinating role, another radical change was made, with everything related to cashew trading being centralized (monopolized) from the purchasing of produce, to the supplying of jute bags, transport and even the provision of inputs. In 2007, coordination picked up with the introduction of the Warehouse Receipt System (WRS) but even with this, Tanzania is locked in a low production equilibrium. The next few pages illustrate how the system was operating in Tanzania during my fieldwork period in 2008 up to 2010.

6.3.1.2 Current marketing of raw cashew in Tanzania

There is a channelled system in Tanzania for buying raw cashew through the Warehouse Receipt System (WRS).[49] In order to sell in the WRS, a farmer must belong to a primary society. Farmers have the option of selling their cashew through the primary society (part of the WRS) or *kangomba*[50]. Cashew is categorized visually into A or B grades and different prices are allocated accordingly. In the WRS, farmers use their output as collateral to obtain loans from banks and repay these once their produce has been sold at auction.[51] Producers can thus wait and sell their produce when the market is more favourable.[52] Produce sent to the warehouse is recorded according to quantity and quality and the producer is given a receipt with all the corresponding details. The receipt is transferable, and the producer can

[49] The Warehouse Receipts Act No. 10 of 2005, Tanzania Cashewnut Marketing Board Act No. 21 of 1984, Cashewnut Industry Act No. 18 of 2009 and the Cooperative Societies Act No. 20 of 2003.This section on WRS benefited from interviews with the key informants from CBT; NARI; Mtwara Regional Officers; Tandahimba District Officers and TANECU.

[50] The unofficial buying of cashew. In *kangomba*, the traders set the price of cashew per kilo. Traders, especially large-scale farmers, place a set of weighing scales in front of their house to indicate that they are buying cashew. By selling through *kangomba*, farmers get paid the full cash price on the spot. Though *kangomba* is illegal and the amount paid is less than that offered by the official primary society, farmers needing instant cash have no other alternative.

[51] An agreement between depositors and financial institutions has been set with guarantees from the government allowing the depositor to receive a percentage of an indicative price via an overdraft. Once the produce has been sold, the buyer clears this with the bank and the depositor receives the remaining percentage of the price of the cashew sold.

[52] Lacroix *et al*. (1996).

receive an advance from the bank representing a percentage of the current market value of the produce. The storage facilities at the warehouse are secure and the producer agrees to pay a fee to cover storage costs. Produce at the storage facility still belongs to the producers as they have taken out a loan and their payment will only be channelled through the bank where the initial loan was obtained after the cashew have been sold at auction. The buyer goes to the bank and pays the full amount for the consignment and the bank will then deduct the loan and any associated fees (such as interest) and the producer will be credited with the remaining balance. There is another process in which producers do not take out a loan and receive full payment. This is a new practise in Tanzania. Umoja wa Wakulima wa Korosho Tandahimba (UWAKOTA) is one such group.[53] Producers may take out a loan (or not) and pay for storage-related costs and the transportation of goods from their farm to the warehouse.

WRS ensures that farmers receive a constant price throughout the trading season and if the price is high enough, they then receive a bonus as a third payment. Farmers who adopt this system are also assured of receiving subsidized farm inputs (particularly pesticides and fungicides) that are provided through the primary society under the District Input Fund. The Cashewnut Board of Tanzania oversees the quality of cashew from the farmers and the warehouse to the buyers.

[53] Phone interview with Majogo crop officer, Tandahimba, 2 May 2011; Nipashe online 4 December 2010. To join such a group, a farmer must be producing at least 3 tonnes of raw cashew per season. The group does not require an overdraft from the bank and pays its members right after the auction after paying the transport costs and taxes. These groups became popular with the falling trust in the primary societies. In 2011/12 season these farmers' groups were banned from trading as they were alleged to auction cashew produce from non-members (Mwananchi, 20 November 2011).

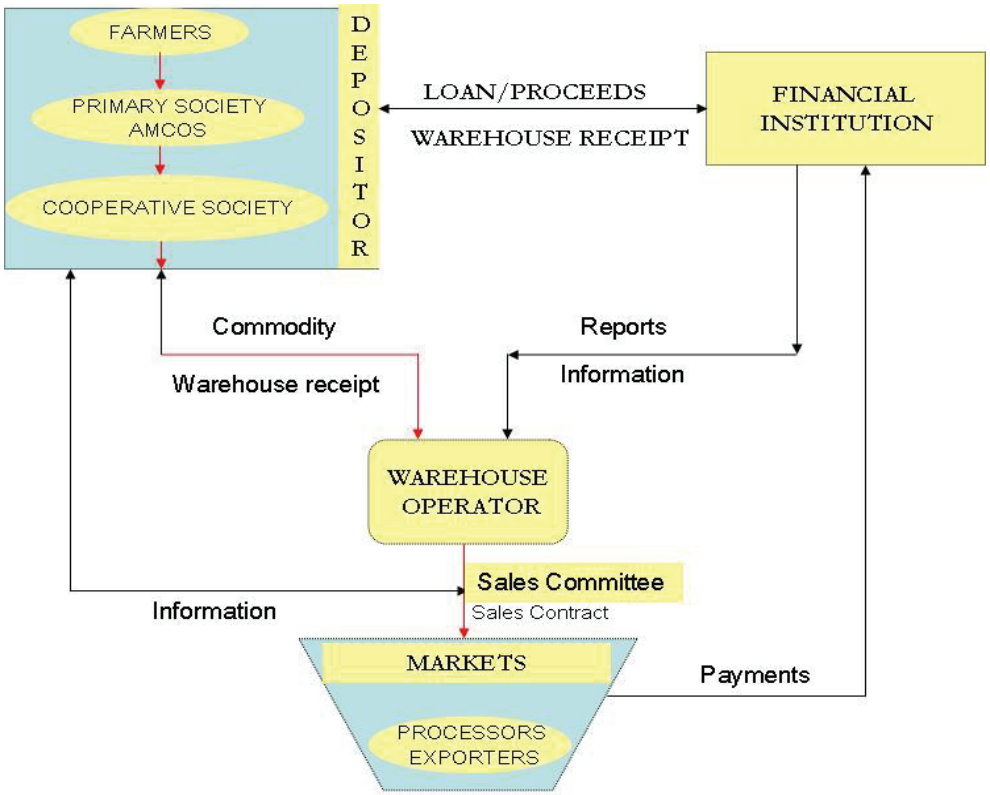

Figure 14: **The Warehouse Receipt System (WRS)**

Source: CBT and author

6.3.1.3 How the market works

The typical WRS in Tandahimba has been modified, as can be seen in Figure 14, allowing the movement of cashew (produce), services (inputs) and money. The arrows in the top left-hand box show how cashew move from the farmer to the primary society and then to the cooperative society before being auctioned off to exporters and processors.[54] At the same time, services are provided by the cooperative society to Agricultural Marketing Cooperatives (AMCOS) and eventually also to the farmer. These include the provision of inputs, storage bags, maintaining warehouses, money transfers and transporting the cashews. In the right-hand corner of the figure, the movement of money to and from the bank is shown. Initially, the primary societies apply for loans from banks to pay their farmers for their cashew before auction and, once the loans have been approved, the

[54] Cashews received from farmers are sorted either by grade or by standard grade. Initial grading is done by looking at the size and colour of the cashew.

cooperative societies are responsible for assisting the primary societies by supplying them with money whenever necessary.[55] Farmers are paid a proportion of the price indicated. Before the auction, various processes take place in the warehouse area (Photo 1). First, the trucks cars from the primary societies (AMCOs) are weighed and a sample of the cashew is taken for scientific grading to determine the quality of the batch.[56] The cashew are arranged in the order in which they arrived at the warehouse and a CBT quality certification is issued noting the batch's weight and rade. The warehouse officer then produces a receipt for the bank and a copy for the primary society.

[55] The banks do not supply the whole loan at once but whenever it is asked for. The maximum loan is applied for prior to the start of the season and is benchmarked by output from the previous year and the price indicated by the government.

[56] Cutting tests and moisture checks are done, and the CBT provides a quality certificate.

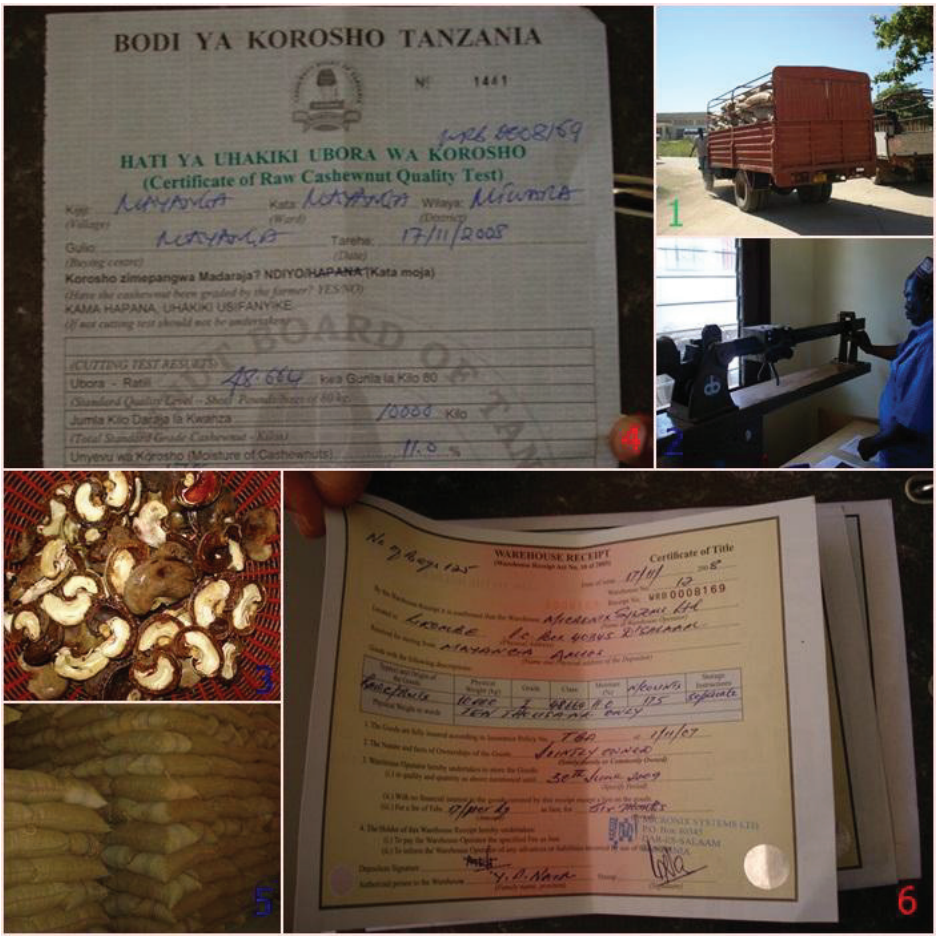

Photo 1: Procedures undertaken at the warehouse before auction

1. Vehicle with raw cashew arrives at the warehouse 2. Weighing of trucks (inside or outside the warehouse) 3. Samples are taken for a quality test 4. A certificate for a quality test is provided 5. Cashew is organized in accordance with the origin of their primary society 6. A warehouse receipt is issued

At the warehouse where the auction takes place, the cashew sacks are organized by the primary society. A raw cashew sales catalogue with the grades of batches for the different primary societies is provided for the bidders who jot down the prices for a batch and put them in an auction box. The auction is then conducted[57] and the winning (highest) bidder takes the

[57] Representatives from the primary society and the cooperative society are present at all times during testing at the warehouse and at auctions. Representatives from the Ministry of

warehouse receipt to the bank to arrange payment. After having paid, the bidder is provided with a permit and a levy for transporting the product, and then returns the original warehouse receipt that he used to pay for the batch at the bank. Given proof of payment from the bank, the warehouse manager provides the winning bidder with a release warrant. Bids must be high enough to cover any unforeseen additional costs associated with production. If they are too low, the auction is suspended and there is no winner. The minimum bid allowed is for 50 tonnes. After the auction, farmers receive a second payment that covers the full price indicated and if it is high enough, a third payment in terms of a bonus is also provided.

For the system to work, two conditions must be satisfied.[58] First, there have to be multiple bidders and, second, it is important that any other marketing costs are treated with total confidentiality. If the first and the second conditions are not met, bidders would bid the lowest amount just to cover the costs. The first condition ensures competition among bidders (traders) while the second one guarantees that (most) farmers receive a good price. Failure to meet these two conditions would mean that farmers would only receive the price indicated without any bonus.

The call for all farmers to belong to farmers' groups, in particular primary societies, is aimed at coordinating activities related to production. The case made for primary societies is set sequentially, following the order in which production occurs.

Firstly, the primary society tackles the problem of supplying inputs, which are important for pest and disease control. Cashew in Tanzania is a disease-prone crop and farmers need assurance regarding the delivery of inputs. As a result of the non-supply response that occurred after the liberalization of the cashew trade in the 1990s, the government came up with a solution for providing farmers with inputs as private traders were not interested in supplying them. A centralized system, the District Input Fund, was thus set up in 1993 to resolve the problem of farmers in the primary society not being provided with inputs.

Secondly, primary societies assist in distributing knowledge from research institutes. Selected representatives attend courses organized by the Department of Agriculture, the Cashew Development Centres (CDC) or the Naliendelee Agriculture Research Institute (NARI) where they learn

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Industry, Trade and Marketing and the warehouse manager are also present during the auction. Bidders must have certificates from the Cashewnut Board of Tanzania.

[58] The price announced to the farmers is given in relation to the expected C&F price in India per tonne and costs incurred in Tanzania. The estimated cost of transporting cashew to India, including shipping and handling, is computed. This includes administrative and marketing costs, the costs of funding and those of purchasing the cashew.

innovative ways of increasing productivity.[59] These include grafting, top work, gap filling and disease-fighting techniques like sanitation, thinning and pruning. Trained representatives are joined by community-based extension officers (CBET) who use the T & V (Training and Visit) system to provide services to cashew farmers. In addition, to curb the problem of travelling long distances with seedlings, community nursery groups, like the Jikwamue Group in Malopokelo village in Tandahimba, have emerged. Members are also trained in how to maintain their warehouses and grade cashew from farmers.

Thirdly, primary societies assist in finding cashew markets for their members. The elected leaders of the society represent members in different farming activities at the local, ward, district and regional levels. The leaders, and at times society members too, are trained by cooperative officers on how to run their society. These activities include giving information on bank accounts (how to open an account, write cheques and signatories), book keeping and the keeping of records of members and the sales and payments of their goods (cashews) and ensuring that members receive inputs according to the output harvested in the previous season. Gaining access to markets requires access to credit and farmers are paid part of their earnings before an auction.

Although the primary societies were established for the reasons stated above, there are registered shortcomings in the operation of a system that integrates the primary society with the wider trading of cashew output and inputs. Cooperative unions oversee these primary societies. With the WRS, the Cooperatives Union monitors the distribution of jute sacks and money to and from farmers. The case to be made for cooperative unions is set out sequentially below according to the order in which production occurs.

Firstly, the cooperative society assists in the coordination of cashew trading. To retain freshness, cashew is transported in jute bags and the cooperative selects the supplier and distributes jute bags to the primary society.

Secondly, the cooperative society offers a secure means of transporting money for the primary society. Farmers take their produce to primary societies and get paid part of the price indicated because the harvesting season is long, and the primary societies cannot be expected to have all the money required for an entire season. The cooperative union steps in and assists in distributing the money from banks too when this is required. In a single season, some primary societies might need five tranches of money.

Thirdly, the cooperative society acts as a quality check when transporting cashew from primary societies to regional warehouses where the auctions

[59] Interview with CDC Officer in Nanhyanga, Tandahimba, 19 December 2008.

take place. The cooperative union helps the primary society in selecting the trucks to transport the cashew.

Both the primary society and the cooperative union represent the interests of the farmers. Since the cashew stock still belongs to the farmers until the auction,[60] the primary society and the cooperative society both work for the farmers. In as much as it is good that marketing is being centralized to protect farmers, they still need more say in the matter, especially on issues such as jute bags, charges for shrinkage and transportation. There needs to be more competitive suppliers of jute bags and transport. Primary societies should be better educated about managing their finances. During fieldwork, it was hard to sense if all the parties were participating fully. There appeared to be a misconnection between the farmers and the programmes being implemented. Cooperatives unions had the upper hand but provided little room for flexibility regarding the participation of farmers in the whole process. Technicians and other stakeholders need to work together at all stages with the farmers.

The FOB prices of raw cashew ranged from US$ 745 to US$ 900 per metric tonne in April 2010.[61] The indicative price per kg was TSh 800 for the 2010/11 season, with the price received by farmers at the farm gate being a record at between TSh 1501 and TSh 2182 (equivalent to US$ 1.15 and US$ 1.67). At the time of fieldwork during the 2008/09 season, the expected price was TSh 675 and the farm-gate price ranged from TSh 700 to TSh 990 (*Ibid*.). This was at the time of the financial crisis and during a period of insufficient rain (*likaba*) which resulted in low production. The WRS protected farmers during the financial crisis even though prices were low (Kilama 2010). Without this organized market, traders would have taken advantage of the farmers and most of the farmers in the most remote places would have been stuck with their produce.

Apart from the primary society and the cooperative society, the Cashew Nut Board and the Naliendelee Agriculture Research Institute are crucial stakeholders that assist in the production and marketing of raw cashew in Tanzania. The CBT deals with coordination while the NARI handles innovation and new technology. Both the CBT and the NARI are facing a number of challenges (see Box 2).

[60] The stock that is in their warehouses is used as collateral for their loans.

[61] www.CashewInfo.com April 2010.

Box 2: Challenges faced by the cashew support system in Tanzania

The Naliendele Agriculture and Research Institute (NARI) face a number of challenges.

- The government adoption of SAP led to a hiring freeze from the 1990s onwards, which has created an institutional gap that is proving hard to fill. The NARI is faced with an aging workforce and a number of workers with more than 20 years of experience are on the point of retiring. This will result in a loss of institutional memory and no experienced personnel to take over.
- There have been cuts in current budget support to NARI. This has led to the dismissal of more than 60 workers, making it hard to conduct research, and a reduction in working inputs, bearing in mind that all the different stages of growth of cashew need different management and researching each stage of a tree crop takes longer.

The Cashew nut Board of Tanzania (CBT) emphasizes improved efficiency and effectiveness in the cashew sub-sector for different stakeholders. The CBT's main challenge is understaffing coupled with little budget, and it thus often operates only partially due to a lack of tools and machines. This has led to the organization concentrating on day-to-day activities like solving marketing problems. The CBT has had to police cross-border trading since the introduction of the WRS and this has taken resources away from their main task of coming up with strategic decisions to allow for the efficient and effective operation of the cashew sector. The CBT also faces difficulties in tracing goods.

Source: Visits to NARI and CBT in Mtwara, interviews with Dr Shomari, Dr Sijaona, Dr Kasuga and Dr Massawe. Also, with the late Mr Mhagama, Mr Simuli and Mr Hanga. Interviews and observations by the researcher as well.

In interviews, stakeholders commented on the fact that their challenges in improving the cashew industry seem to limit their suggestions and solutions to the particular department they are involved in. The cashew sector would benefit from better coordination if sectoral approaches were adopted and the existence of departmental challenges was acknowledged. The CBT would also benefit from a holistic approach that not only incorporated farmers and research institutions but also processors, who are important stakeholders in the cashew industry. For example, when cashew trees were suddenly attacked by powdery mildew disease (PMD), the research institutions discovered the clones that were resistant to PMD and drought. And when farmers complained about markets for their goods, the WRS was introduced to assist them in production. In addition, taxes were banned to provide incentives for farmers to increase production. As for the processors, the export levy on kernels was abolished in 2005 although the

export levy on raw cashew still exists to promote competition locally. One can see that farmers and research institutes have received incentives to encourage production by lowering production costs while the costs for processors remain the same.

For the cashew industry, price and non-price incentives are important determinants of supply. In Tanzania in particular, attention is given to price incentives and little is given to non-price incentives, as price-incentive reforms are easier to implement than non-price incentives. These non-price incentives tend to be structural constraints like bad roads and lack of access to credit. For the cashew sector to flourish, both price and non-price incentives are required. From 1991 to 2007 this was not the case although some adjustments had been made by 2007 to cater for non-price incentives like the monopsony of traders although some non-price incentives still remain. For instance, since 2007 the introduction and utilization of the WRS has aimed to provide farmers with predictable markets with better and stable prices for their produce.

With limited processing capacity, traders (local processors and exporters) are left to fend for themselves and, ideally, the cashew support system will focus on the farmer. This is barely being achieved in a coordinated manner and in a way that could improve the whole sector, including researchers, processors and desk officers. With such a set-up, low productivity is being reinforced due to farmers' passivity and lack of alternatives for income generation. On the whole, low production by farmers results in less cash/revenue being available for inputs, maintenance and other long-term investments. On the other hand, this generates unpredictable and more expensive raw materials that are required by processing plants.

The WRS was started to protect farmers but has unintentionally ended up hurting them because of not fully rewarding the personal effort involved as too much is being left to chance. For instance, there is a disputed double grading system in Tanzania; with visual grading at the primary society and scientific grading taking place at the warehouse. Since all the batches from the same primary society are put together, a farmer's final price is influenced by what others bring in. This approach is not fair on farmers or on buyers (processors/exporters) as the batch may be under-graded or over-graded. The combining of cashew from the same primary society at the warehouse introduces the generalized free-rider problem. In such a way, members belonging to the same primary society want to produce just the acceptable quality so that members of the primary society will offer the highest price. And once the cashew is taken to the warehouse for auction, the sample drawn would influence the pay-out of all members of a particular primary society. The unreliability of the quality for bidders and of prices for farmers increases the room for divergence and mistrust among farmers. This kind of a gamble encourages unsupervised negotiations because of a gap in information, i.e. asymmetric information. There is no

guarantee for farmers that the cashew of highest quality will receive the highest price.

Even with the WRS, the cashew sector in Tanzania is reminiscent of the Prisoners' Dilemma, where quality remains under-graded and the sector operates in a low equilibrium. This implies that the current set-up of the WRS[62] in Tanzania would improve significantly by allowing the creation of pressure groups to ensure on time delivery of inputs and services and if there was more cooperation between farmers and WRS officials.

The WRS approach favours farmers as the government offers assistance by providing inputs and marketing. Such procedural coordination goes up as far as the auctioning process where the excluded traders and processors are left to fend for themselves. The presence of a majority of traders in comparison with a handful of local processors at an auction implies that the assistance provided to farmers favours other processing industries elsewhere and suggests a significant presence of negative externalities. Having considered the marketing of raw cashew, the next section covers the marketing of kernels and inputs.

6.3.1.4 Marketing kernels in Tanzania

In addition to trading raw cashews, kernels are also traded although at a lower level. According to the Cashewnut Board of Tanzania (2010), 15,000 metric tonnes of kernels were exported in the 2008/09 season, which is less than 25% of the country's raw cashew production. There are two types of processors of cashew in Tanzania: small-scale and large-scale processors. Some of the smaller ones are organized in a group like the Kitangari Mivinje Women's Development Association (KIMWODEA) in Newala or processing simply takes place at the producer's home. For small-scale processors, additional investment is unpredictable as it depends on the good will of people and government. By utilizing their own networks and the personal efforts of group members, KIMWODEA has managed to establish a processing facility.

[62] The marketing of raw cashew in Tanzania exhibits characteristics of spot contracting. The WRS and farmers through their respective primary societies do not sign contracts although there is an implicit contract whereby selling through the WRS means that farmers are paid an indicative (± bonus) and provided with subsidized inputs. They have therefore already made investments and so are vulnerable and have to face the catch-up game of waiting. This is the hold-up problem.

Photo 2: KIMWODEA's processing facility in Kitangari, Newala, Mtwara

Box 3: KIMWODEA, a small processor operating in Tanzania

KIMWODEA (Kitangari Mivinje Women's Development Association) started operations in 1996 with 15 founding members. Today the group has 40 members, half of whom are aged between 30 and 40. The association started with a restaurant and weaving business and then 8 of the members were sponsored by the district office to attend a cashew-processing course in Mbinga about 500 km from Newala. When they returned, some members gave up and others started cashew processing seriously, with Mtwara town as their main market. One kg of processed cashew fetched TSh 10,000. As demand increased, the group needed to produce more.

It operates in groups of five, with each doing similar work but before the cashew are divided among the members; the raw cashews are boiled and then dried in the sun. Each member is given a 20-litre bucket of raw cashew to shell and peel and then prepare for roasting in large covered pots for varying lengths of time. After the cashew has cooled, grading follows, and the whites and slightly brown ones are separated. The cashews come in different sizes: large, medium and small. The group prefers processing large cashews as they fetch a higher price. Kernels are packaged in 1.5 kg plastic bags that are then ready to be sold. The group regularly participates in agricultural exhibitions in Mtwara and Dodoma.

The biggest challenge facing the group is access to credit that would allow them to buy machines and tools. The CBT assisted the group in making bags with logos on them, but it is crucial that small processors are linked with reliable tools and machines, such as machines that add gas while packaging. The president of the association laments the fact that if the group uses any other bags, the kernels start sticking to each other within a month. Using the correct packaging prevents this and the kernels can then remain fresh for up to six months.

Source: KIMWODEA Chairlady-Newala small-scale processing, interview by researcher

Small processors are self-initiated groups with affiliations as a result of being related to or living in the same neighbourhood. Small processors depend on urban centres around the country for their main markets. As can be seen in Photo 3**,** the processors simply perform their tasks in the shade of a tree, where the boiled raw cashew are cracked open using ash, a heavy cloth, a pipe as a hammer and a flat nail to protect their fingers. A small curved knife is used for peeling off the testa from the kernel. The quality standards required for exports are too high so small-scale processors resort to selling at local markets. The need to earn extra income initiated the formation of these groups. In 2008 prices received for a kg of kernel ranged from TSh 8,000 to TSh 17,500 (US$ 6 to US$ 13).

Photo 3: Small-scale (local) processing; 1. Boiled and dried cashew 2, 3 & 4 shelling nuts,5 & 6 peeling off the testa.

Large-scale processing includes processors with a more predictable formal channel of funding who have a plant and hire workers to operate it. Box 3 highlights the differences between small-scale and large-scale processors. Bigger processors operate differently (see Box 4**)** and use manual and mechanical processing. The majority of the labour force in these firms are women.

Box 4: Formal processors' operations in Tanzania

Processing enterprises started from trading or were previously government owned. Manual processing is common but mechanical processing is also used. Labour (or fuel in the case of mechanical processing) and power are the main costs involved in the production of raw cashews. Local women make up most of the work force and are in charge of shelling, peeling and grading. Machines used for cutting usually come from India, Vietnam or Italy although a few locally made spare parts and packaging materials are now available.

The processors face several expensive challenges. First, they have to compete with exporters to buy cashew at auction. Second, they have to store the raw cashew for a whole year. Coupled with this is the inconsistency in the quality of the raw cashew. And last but not least, poor infrastructure, in terms of roads, disruptions to power and water supplies, are major problems. Of all these issues though, the lack of affordable credit is the biggest challenge.

Source: Visits to PCI, BUCO and OLAM processing plants in Dar es Salaam and Mtwara. Interview and observations by the researcher.

Kernels produced by large processors are exported mainly to the US, Europe, Japan, Korea, South Africa and the Middle East although some are consumed locally. Large processors in Tanzania adhere to world standards regarding quality because any registered drop in quality is punishable by a negotiated reduction in price. The price falls steeply with every drop-in standard. For example, Whole Whites fetch the highest price, W320 was selling for US$ 6283 and W240 for US$ 6724 in April 2010, while SW 320 had experienced a 14% reduction in price compared to the W320 (Kilama, 2013). Interviews with processors confirm that none of their consignments had ever been rejected but when there is a perceived lower grade, the price initially agreed on is negotiated downwards.

The processing industry in the cashew sector in Tanzania was set up to utilize excess raw cashew, a forward linkage. In early 1970s when production of raw cashew was increasing, the World Bank assisted Tanzania in installing processing capacity. Creating capacity in Tanzania has remained a challenge due to stiff competition from more developed processors in India that are able to offer a better price than local processors.[63] This implies that, to have a flourishing cashew industry in Tanzania, a strategy for competing with the Indian processors is needed. The availability of credit is a constant demand from processors who find raw cashew more expensive given the competition from foreign traders and

[63] This is made possible by strategies set up by their government that banned exports of raw cashew and rewards the importation of raw cashew.

the additional transactional costs incurred by the WRS. Since local processors are competing with foreign traders to obtain raw cashew, it has become costly to store a year's stock.

There is a weak link between farmers, traders and processors which leads to an unbalanced value chain. Upstream actors are very strong both in terms of power and money and thus operate in a captive manner. The sector operates inefficiently as each actor has their own role to play without necessarily complementing the performance of the whole sector. As indicated earlier, this type of set-up means that domestic processors lose out to foreign processors, and so ultimately does the whole sector.

6.3.1.5 Marketing of inputs in Tanzania

As far as the marketing of inputs is concerned, the inputs required for cashew production include seedlings, fertilizer, pesticides and tools. In a disease-ridden area, pesticides and fungicide are crucial. As seen earlier, the need for pesticides and PMD-resistant seedlings occurred after the long-term neglect of farms. Furthermore, during liberalization, there was not enough supply response created in Tanzania and traders became more interested in buying raw cashew and less interested in supplying pesticides and fungicides. Due to the limited supplies of inputs over the years, the government intervened and started the District Input Fund in 1993. The current monopoly of input supply through the fund emerged as a solution to the lack of sufficient traders. There are several traders who sell inputs through registered shops in the district or at small kiosks in village centres. The latter, though considered illegal and labelled *Walanguzi*, assist small farmers who cannot sell their limited harvests through the WRS. *Walanguzi* also sell inputs from Tanzania and Mozambique.

Regarding the utilization of new methods, an agronomist from NARI observed that only '50% of the innovations developed reach cashew farmers in Tanzania'.[64] The Cashew Development Centres (CDCs) were developed through the integrated cashew management programme to improve communication with farmers who still go to the CDC when they encounter problems. There have been observed improvements, but challenges still remain in reaching farmers with new varieties.

6.3.1.6 Concluding remarks

This section on marketing in Tanzania has shown that raw cashew and inputs are centrally traded, while kernels are traded under free market conditions both locally and on foreign markets. There is free trading in cashew and inputs through *kangomba* and *walanguzi* but these practices are considered illegal although they are still widely used.

[64] Interview with NARI Officer, 17 November 2008.

This chapter also discussed the current operation of the WRS and the different challenges facing the system. It is important to note there have been many radical policy reversals in Tanzania. Whether centralization, private traders or re-centralization, these reversals have led to destabilization and the peasant has always been side-lined. The set-up has allowed for temporary bursts, erratic trends in production and low yields. These radical changes in policies have affected the institutional set-up of the sector. A common feature that is observed regardless of the policies is that the peasant is treated as being on the margins. Farmers have little room to manoeuvre because of the predetermined use of land and the residual payments received that aggravate their situation. In Tanzania, land belongs to the state, as does the decision to grow crops. This allocation of crops started when Tanzania (then Tanganyika) was under German rule and plantations were established in order to have strategic raw materials to satisfy demand and prevent being dependent on the US.[65] Though the Germans started with cotton, sisal, rubber and gold as strategic exports, other goods were also produced.[66] Peasants continue to use the land in accordance with directions provided by the state, a practice that started during colonialism and was never abandoned by the government after independence. The fact that the state regulates the use of land[67] provides limited freedom for peasants. This and earlier work[68] in Tanzania show that when fixed costs per unit go up, the farmer bears most of the burden. In addition, controlling rising mark-up costs[69] by prohibiting peasants from doing what they please is a challenge. Farmers are left with little flexibility and abandon or only hastily tend their farms when prices collapse. Quality then suffers as farmers receive lower-than-anticipated prices as payment only occurs after all the associated marketing costs have been deducted by the trading coordinators. With residual payments, an increase in price does not translate directly into an increase in the quality of the output produced but instead enhances the production of lemons. The power to defend their interests is taken away from the farmers, leaving them passive and with little motivation to increase productivity through new innovations as everything presented is pre-packaged. As farmers in Coast, Lindi and Mtwara regions earn most of their income from cashew, there is little flexibility with regards to choice in years of a bad harvest or low prices. There are campaigns urging farmers to tend their trees as required and not to cut trees down. Big farmers have resorted to finding their own marketing

[65] Rweyemamu (1973: 15).

[66] Rweyemamu, (1973: 15, Table 1.3). This went hand in hand with the appropriation of prime land for Europeans settlers and non-strategic cash crops, such as sisal, cotton and rubber, were allowed to be traded by Africans. In the south, there were retaliations like the Maji Maji War of 1905-1907 that led to less intervention by European rulers.

[67] Shivji (1998).

[68] Ellis (1979) and Westergaard (1968c).

[69] The evidence is presented in Table 3A3 in the Appendix.

solutions within the existing system. A genuine concern is the current trend of having big farmers forming their own associations like UWAKOTA, UWAKONE and WAKOMA with the implication that transaction costs by the likes of the WRS for those not in such groups will increase tremendously and defeat the reason for setting up the system originally. Having the big farmers using WRS for auctions alone threatens the existence of the system as a whole because running the WRS with small farmers alone will definitely fail. Large-scale farmers can afford to wait for the trading season to buy any required inputs and to operate their businesses. For instance, big farmers like UWAKOTA[70] have opted out of taking loans from a bank, which demonstrates the huge differentiation among farmers in Tanzania as small-scale farmers do not have power to defend their own interests. By implication, the observed rises and falls in production are mainly due to the changes encountered by the big farmers and not the smaller-scale farmers.

With already limited flexibility, this situation has worsened given the fact that the anti-poverty programmes are geared more towards social sectors and not the productive sectors. For instance, the first Poverty Reduction Strategy Paper (PRSP) completely ignored agriculture and concentrated on social sectors like education and health, rural roads and macro-economic stabilization.[71] Micro-level interventions were not considered. Unfortunately, increasing output and productivity are becoming a challenge as peasants are limited regarding credit for inputs.

This part of the chapter has shown that policy adaption in Tanzania is aimed at improving the peasantry in isolation and not the sector as a whole. Using contrasting economic history, this chapter has shown that a pure market with no state involvement implies no research or extension will be provided. The state is a contradictory phenomenon. Cooksey (2003) argued that partial liberalization was a hindrance to expanding production and a nuisance to farmers in Tanzania. Prices would allocate resources provided that there is formal coordination to overcome inefficiency. The case of Tanzania shows a vicious cycle where quality is vital but little or no effort is made to maintain it. During the multi-tiered system, quality was checked but then raw cashews were mixed with all the stock from members of the same primary society regardless of the efforts put in by an individual peasant. Accumulation that would lead to poverty reduction or eradication thus becomes the main challenge. And again, there is a challenge in the processing sector which has seemed to be considered an outsider with little if any support.

[70] There is a stronger differentiation among farmers in Tanzania. UWAKOTA and similar organizations find solutions with regards to marketing for farmers.
[71] URT (2000).

6.3.2 Vietnam

After seeing how cashew marketing operates in Tanzania, the next section discusses the proposition that an industrial strategy has reinforced performance in Vietnam. Market coordination is not necessarily the dominance of the state or the market but rather the complementarities that need to be undertaken to ensure the improved performance of a sector as a whole. Government intervention may lead to expansion associated with or the contraction of the sector. The cashew sector in Vietnam has experienced two kinds of marketing. Before *Doi Moi* in 1986, there were cooperatives and now there are private traders who are the main buyers of raw cashew from farmers (Kilama, 2013). The two kinds of marketing have treated the farmer differently, with the former a farmer was paid by residual payment with limited flexibility and the latter is as a core with more flexibility.

6.3.2.1 Adaptive efficiency in marketing cashew in Vietnam

Coordinating the cashew sector in Vietnam has been solved by adaptive efficiency[72] strategies that seem to be able to adjust to the changing environment and incentives. Strategic policy allows room for innovation, adaptation and efficiency in Vietnam. By encouraging the involvement of (many) other stakeholders, this leads to efficiency. With numerous players at all levels, the system keeps itself in check and everyone benefits. There are many traders for inputs and output. Production in Vietnam is on a large scale so the flourishing processing industry, with a turnover of over US$ 1 billion annually keeps both the government and the processors on their toes.

One of the main strategies undertaken was to have the country's industrial policy backed by a poverty programme. Anti-poverty programmes in Vietnam are linked to the productive sectors and for the cashew sector there is processor-led development. The policy considered setting up processing capacity first, then creating production by using imports and finally accessing raw materials domestically through backward linkage. Adaptive flexibility within the strategic boundaries became more effective in organizing the market. Research on processing has been undertaken since the early 1980s, with the hand-and-leg shelling machine being most popular in processing plants in Vietnam. This created employment for young men and women in the factories. To increase production of raw cashew, mainly poor farmers from the North were provided with land and credit to cultivate

[72] North (1998: 88). Adaptive efficiency is key to long-term growth. The more an organization allows for trial and error coordinating and leveraging resources, the greater the potential productivity will be of any given set of resources and the attendant prospects of successful action (Penrose 1959).

raw cashew in the South. This generated further employment. With limited land in the north, landless farmers were encouraged to migrate to the South. A processor in Dak O detailed how the people from the North have been accommodated:

> *Before having cashew, stieng (minority people) were very poor. Some workers in my company are stieng people. They are now cashew workers instead of picking Nhip leaves and digging bulbs of bamboo trees. Actually, they have to take care of their gardens [during] the harvest season [this affects the supply of labour at my company]. Once cashew is sold, we shell them thus stieng need not go to forest to pick Nhip leaves and dig bulbs any more…. Every hamlet has a small factory for stieng. When they are better, I will have a skillful team. There are many stieng people in my locale; [unfortunately] no one has trained them.* [73]

This led to a more equal land allocation utilizing land-saving techniques, while the engine-powered machines have led to increased productivity and yield in the sector. Actors, i.e. farmers, traders and processors, have a strong linkage and operate in a balanced value chain. Traders have mainly been employed by processors and play a mediating role between the farmer and the processor. This requires good coordination.

All actors in the sector face hold-up problems. With Vietnam putting processing capacity at the centre of its cashew sector, this implies that processors are more vulnerable. Initial processing was made possible by importing raw cashew and having a domestic supply. There are many local traders and processors (upstream actors) in Vietnam, and enough to provide competition in the domestic and foreign raw cashew market. Easy means of communication have made competition stiffer among traders than in previous years. 'Yes, in the past, it was convenient for trading because traders had not appeared much. five years ago, prices were almost stable; I made sure I did not incur losses. Then, traders didn't have cell phones, so they couldn't contact each other quickly like now. Traders decide by themselves about the price of cashew nuts to offer.'[74] This is how it happens. A farmer who produces cashew can receive either a high or low price and if he receives a high price, he can decide whether to take action or not. The same applies if a farmer receives a lower price. Farmers' actions range from continuing to produce cashew to switching to an alternative crop or neglecting or abandoning their farms, which are forms of inaction. In Vietnam, both farmers and processors invest in cashew, just like their Tanzanian counterparts, and so encounter a hold-up problem. Figure 15 illustrates how the Vietnamese cashew market operates. For simplicity's

[73] Interview with a trader from Thuong Hoai, 29 January 2010.
[74] Interview with a trader from Thuong Hoai, 29 January 2010.

sake, it is assumed that there are only two types of players: a farmer (F) and a processor (P).

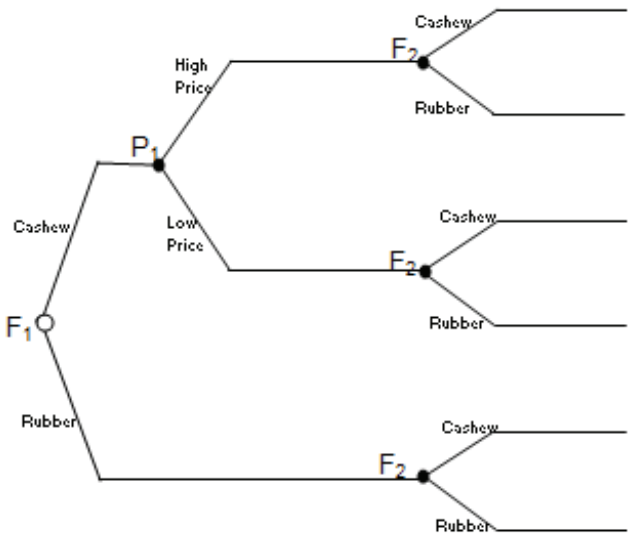

Figure 15: Cashew: Reputation game, Vietnam

Source: Kilama, B 2013:129

A farmer has a choice of producing either cashew or rubber and a processor can pay a high price or a low price for any cashew produced. In this sequential game, the subscript (n) shows the season. Thus, F_n means a move by farmer in season (n) while F_{n+1} means, a move by farmer in season (n+1).

The first move is made by the farmer (F_1) who decides to produce cashew or rubber. The second move is made by the processor (P_1) who can offer a high price or a low price for the cashew produced by the farmer (F_1). However, no offer is made by processor (P_1) if the farmer produces rubber. The third move in the second season is made by the farmer (F_2) who has the option of producing cashew or rubber, informed by the prior action in the first season (known knowledge) of the processor (P_1). If the processor provided a high price in the first season, the farmer (F_2) in the second season has the option of producing cashew or rubber. And if a processor provided a low price in the first season, the farmer (F_2) in the second season still has the option of producing cashew or rubber. And thirdly, even if the farmer (F_1) in the first season opted for rubber, the farmer (F_2) in the second season still has the option of producing either cashew or rubber.

As this is an infinite game, farmers in seasons {1, 2, 3...n} will produce cashew if, and only if, cashew offer a relatively higher profitability than rubber. In this reputation game, the processor wants the farmer to produce cashew and for this to happen, the processor has to pay a high price to entice the farmer to continue producing. Otherwise the farmer will take an alternative action and switch to rubber production if processors do not pay enough for raw cashew. This solution offers a high equilibrium because both the processor and the farmer know that this interaction is endless and so the processors would have to continue to offer a high price.

Increases in processing capacity and domestic production in Vietnam have meant that the sector has flourished, with processors preferring local raw cashew. A processor in Dak O reported her buying preference as follows: 'In my locale, cashew not only has a good quality but also fetches a high price. They're always more expensive than cashew nuts from Phuoc Long by about VND 1000 per kg [difference]. Because of their good quality, I don't want to buy from any other place. Cashew trees in my locale have the highest quality within the Binh Phuoc Province.'[75] Producers, i.e. upstream actors, offer a good price to encourage domestic raw cashew production. Farmers in Vietnam often choose to uproot their cashew trees following a period of low prices. For instance, the global fall in the price of raw cashew in 2000 affected farmers in both Tanzania and Vietnam but they reacted differently. Farmers in Tanzania continued to produce cashew following a season of high prices and started to neglect their farms after being paid a low price. Farmers in Vietnam continued to produce cashew following a season of high prices and switched to other crops after a season of low prices. Box 5 shows the important flexibility provided by rubber and pepper in Vietnam.

[75] Interview with a processor P1 29 January 2010.

Box 5: Rubber and pepper

Switching is made possible by accumulated savings from cashew and pepper. When farmers switch crops, they lose their cashew trees but can use some of the same tools if they change to rubber. The first harvest from rubber comes only in the fifth year. Farmers' preference for rubber is due to the fact that it can be harvested every other day for nine months, unlike cashew that is harvested only once a year. Maintaining rubber and pepper is more costly. A rubber tree gives about 0.5 litre of rubber and a hectare will have about 500 trees. A hectare of pepper has between 1100 and 1200 plants and about 6000 kg can be harvested in total from each ha. One kg of rubber sells for VND 16,000 while one kg of pepper goes for VND 195,000.

Farmer V1 has five people in his household and they have 10 ha of land: 3 ha are under rubber, 3 are under cashew, 3 more are under pepper and the other has fruit trees on it. The household earns VND 400 million annually from their 3 ha of rubber and make a monthly profit from pepper of about VND 70 m. Income from cashew reduces poverty, but rubber can make the same farmers rich.

Source: Farmer V1 of Duc Lap.

Photo 4: Rubber and pepper

The switch between cashew and rubber is not a simple. Even with the limitations of sunk costs, the cost of foregone income is spread over a period when uprooting is undertaken in stages and producers can fall back on pepper and their savings. This stage wise switch suggests a lower elasticity. Figure 16A1, Figure 17A2 and Figure 18A3 show that the production of rubber is not only a recent phenomenon picking pace after year 2000 and has been steadily increasing ever since. Enough to have

more land harvested than cashew. This flexibility is shown in Box 5 and allows for a more balanced value chain. When prices collapse, farmers have a flexibility to switch step by step to rubber backed by pepper. The choice provided by alternative crops means that farmers do not need to be as badly affected by the hold-up problem. In a sense, peasants are counter-balancing poverty programmes and ownership value.

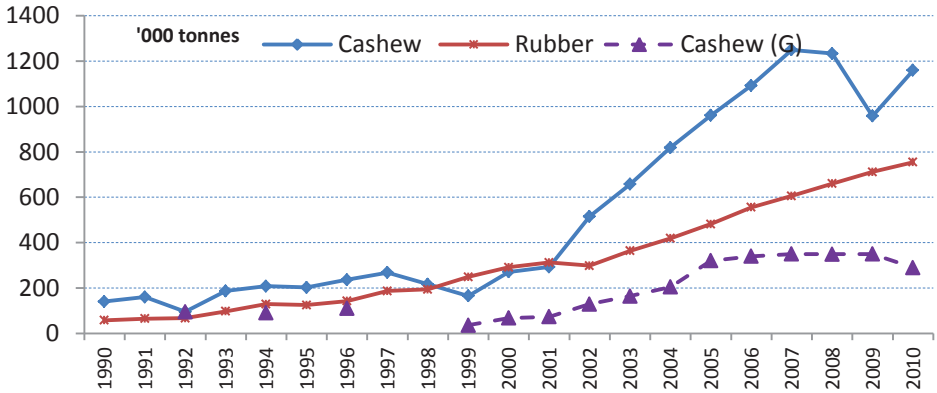

Figure 16A1: Leading natural rubber producers

Source: **FAOSTAT | © FAO Statistics Division 2012 | 14 April 2012**

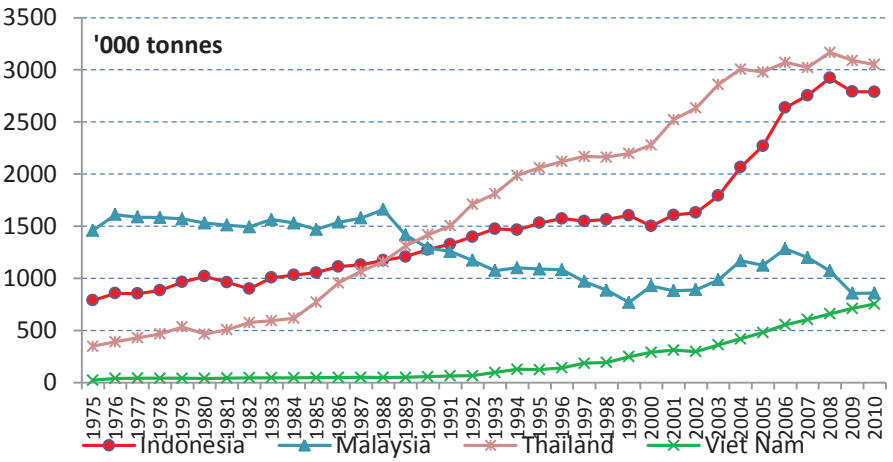

Figure 17A2: Production of raw cashew and rubber in Vietnam (various years)

Source: FAOSTAT | © FAO Statistics Division 2012 | 14 April 2012 production output for Vietnam; cashew (G) uses data from Vietnam Cashew Association (1990 to 2006) and General Statistics Office of Vietnam GSO (2007 to 2011).

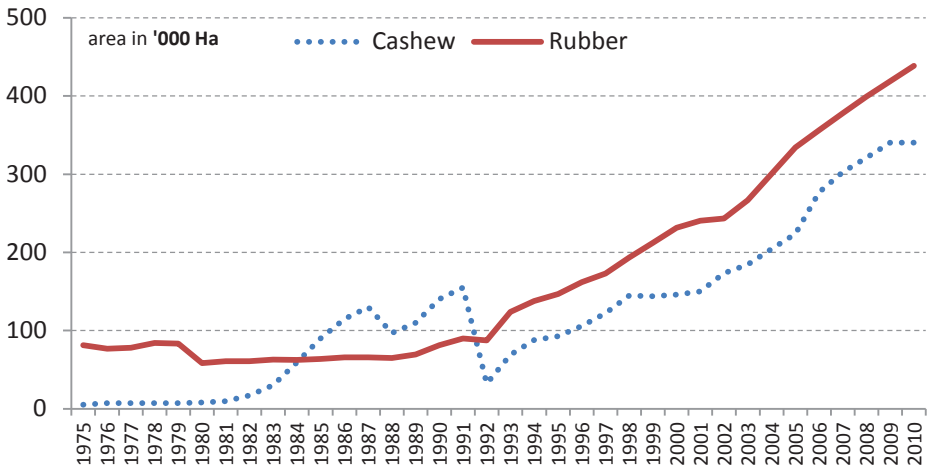

Figure 18A3: Harvested area of natural rubber in Vietnam (various years)

Source: FAOSTAT | © FAO Statistics Division 2012 | 14 April 2012

In Vietnam, the processor-led development of cashew was made possible by the presence of an effective industrial strategy. The cashew sector integrates all actors and, being inclusive, it operates as an out-grower system with coordination overseen by VINACAS. The next section illustrates how farmers and processors interact.

Photo 5: A farmer taking raw cashew to a trading centre in Binh Phuoc

The smaller traders offer lower prices and collect the produce from the farms, while the bigger traders offer better prices, but the farmers have to take their produce to them. 'I buy cashew from farmers in our hamlet, in Dak O [ward]. If cashew nuts are still raw, farmers will bring them to me,

otherwise, I will go to their house. If it's over 5 [or] 10 tonnes, I will hire a tractor to do that.'[76]

When looking at the cashew value chain in Vietnam, four main actors can be identified: farmers, traders, processors and exporters. Farmers sell their cashew to traders, who then sell them on to processors. Some of these processors maintain a special relationship with the traders by either hiring them or offering them credit. Differentiation in the prices offered to farmers depends on whether they sell dried cashew or normal raw cashew. Dried cashew fetches a higher price. No further grading is done, and all the cashew bought are paid for in full. 'I don't grade. Minh Tho company [a processor] grade by machine, rank A, B, C'.[77] This is different from Tanzania where there is a price differentiation by grade.

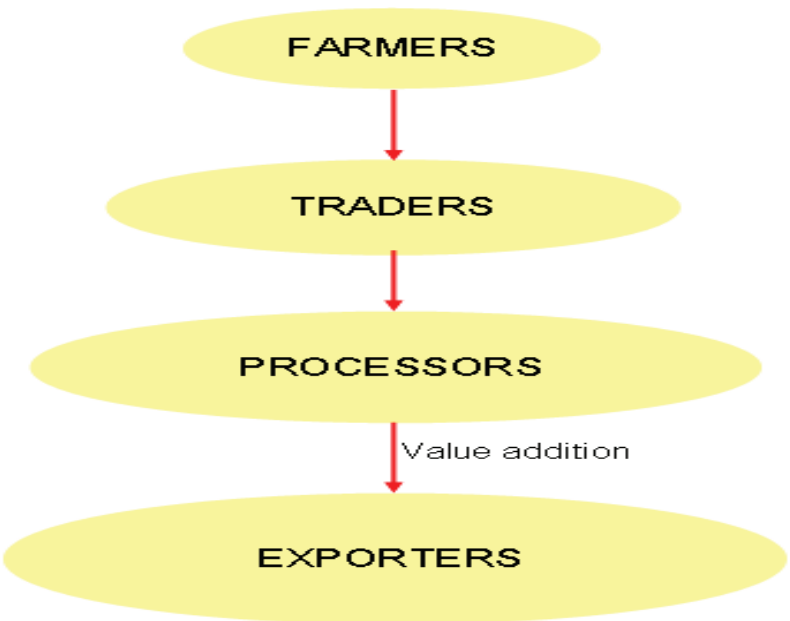

Figure 19: Cashew marketing in Vietnam

Source: Author

[76] Interview with a trader from Thuong Hoai, 29 January 2010.
[77] Interview with a trader from Thuong Hoai, 29 January 2010.

6.3.2.2 How the market works

Trading on Bugimap follows the value chain indicated in Figure 6.4, where there are many players at all stages. Small-scale traders either visit farmers at home or on their farms to buy cashew. Alternatively, farmers will take their (sometimes dried) produce to traders at the village centre where the cashew is weighed, and the farmers are paid in cash. Raw cashew is sold for VND 17,000 and dry cashew for VND 19,000.[78]

Photo 6: A typical trading centre in Binh Phuoc

Farmers work in groups. For instance, Tien Hung, a farmers' association follows the Syngenta[79] model that allows them to earn more from the increased productivity of raw cashew and processing. Elsewhere in Binh Duong, farmers have formed farmers' associations to access credit to purchase inputs.[80]

At a second level, smaller traders sell cashew to bigger traders within or outside the commune. Some of the traders are even hired by the processing

[78] Interview with a trader from Thuong Hoai, 29 January 2010.
[79] The Syngenta Model encourages increased productivity and income for small-scale farmers by assisting in innovation to increase yields and support value added technologies.
[80] Visit to Binh Duong, November 2010.

plants within the community.[81] There are different relationships between traders and processors as can be seen from the following. 'I [Smaller trader] and 'Big Trader' are relatives, so I only sell cashew to the Big Trader company. Only when they are full, I sell to others.'[82] The traders' capacity differs according to the amount of credit they have for each consignment. Traders that are linked to processing plants also sometimes work as staff at those processing plants. 'From the beginning to the end of the season I can handle 8 tonnes per day on average, [but] in the middle [of the season] demand is higher. For instance, in the middle of season, there are a lot of cashew nuts so Minh Tho Company [the processor] is often late in paying, about a day or two days.'[83]

Thirdly, processors may buy their raw cashew from traders. It is common for processors to work with several traders with whom they have established a good working relationship. These traders then buy raw cashew as part of their job and supply processors. Such traders are subcontracted and receive funding from the processing plant. These differ in size. Large processors have a capacity of more than 10,000 tonnes per year; while medium-sized firms have a processing capacity of between 5,000 and 10,000 tonnes annually with a daily average of about 20 tonnes. Box 6 shows how processors operate in Vietnam.

[81] Doan Nghiep Tu Nhan Minh Tho in Dak O is the only processing plant in Bugimap. There are more than 300 processing plants in Vietnam.
[82] Interview with a trader from Thuong Hoai, 29 January 2010.
[83] Interview with a trader from Thuong Hoai, 29 January 2010.

Box 6: Processors' operations in Vietnam

Medium-sized processors (AMYCO), Long An and Thuong Hai, Bugimap

AMYCO is a family business that started 12 years ago as a trading company. It has always had a Quality Control Team (QCT). It has slowly moved into processing and currently has three branches. With about 100 workers, the company only processes about two or three tonnes of raw cashew a day. In March 2010, the company was operating at full capacity and processing 20 tonnes a day. This is equivalent to about 500 tonnes a month and 6000 tonnes a year. When the company receives more orders, two shifts are implemented. Workers involved in shelling and peeling are paid piece rate, while those in QCT are paid a monthly wage. Cashew is used as collateral at banks.

During processing, the raw cashew accounts for more than 50% of the total costs, followed by labour. 30% of the cashew is bought initially and more is purchased later due to a lack of storage facilities.

Large-scale processors (HA MYI Co Ltd: HAMYCO) and (MY LE), Binh Phuoc

Processing started five years ago in a number of factories. One processor has four factories with a fifth due to open soon (thanks to Japanese support). The company mainly processes raw cashew and tapioca. The owner was a cashew farmer, then a trader and finally moved into processing. The other company has its own cashew farm.

Though new to processing, the company has more than 1000 workers, producing 30 tonnes per day. 40% of their exports are sent to China and the rest goes to Hong Kong, the Philippines, South Korea, the US, Australia, Europe and Japan.

The processing capacity of the other company, with about 1000 workers, was around 50,000 tonnes in 2009.

Source: Visits to Thuong Hoai, AMYCO and HAMYCO processing plants in Long an Province and Binh Phuoc Province. Interview and observations by the researcher.

These processors differ in size and capacity. Some use mainly manual labour to perform their tasks and others are mechanized. And some firms perform all the tasks themselves while others outsource or subcontract shelling and peeling to smaller processing plants. A number of companies combine both manual and mechanical ways of processing. Foot- and hand-operated nut-splitting machines are used for shelling in all the processing plants visited. Processed cashew from Vietnam is mainly exported to the

US, China and the Netherlands. The marketing of inputs in Vietnam is organized at village markets and ward and district centres.

6.3.2.3 The support system in Vietnam

Various economic reforms (*Doi Moi*) were undertaken in Vietnam in the mid-1980s in an attempt to move to a more incentive-led approach among producers and stakeholders. *Doi Moi* prioritized the implementation of three economic reforms concerning food staples, consumer goods and exports (Tri 1990). A comprehensive reassessment of policies related to agriculture and peasants was one of the measures planned to improve the relationship between the state and producers (*Ibid*.). In addition, the law relating to land gave ownership to the people (Wurfel 1994).[84] The *Doi Moi* reforms increased incentives for production, allocated land to farming families and limited the role of cooperatives.

Most of the initiatives in Vietnam came from producers, with some flexibility being provided in the on-going reforms. The call by *Doi Moi* to improve productivity was made possible by the efficient supply of farm inputs and the improved relationship between the state, farmers and other technicians.

Since *Doi Moi* and market reforms, farmers have had economic freedom regarding what and how much they produce. This offers producers more power as to what they produce but does not imply that the state takes a leading role. It is the farmers, followed by the producers, who have the power. For instance, the collapse of prices in 2000 saw farmers switch to rubber in Vietnam (see graph 6A3 to 6A5 in the appendix). This was possible due to their accumulated savings and the fact that pepper provided flexibility for farmers to switch between perennial crops (cashew to rubber) regardless of any previously incurred sunk costs.[85] Despite the continued importance of cashew in Vietnam, alternative crops and flexibility ensure that farmers receive a high price. As Graph 6A5 in the Appendix shows,

[84] The Politburo's resolution on renovation aimed at creating a new driving force to develop agriculture by creating favourable conditions for individuals and private sectors to develop production, processing, services and other trade in agriculture. In this resolution, only cooperatives that were operating profitably were retained and the rest of the land was given to work-exchange teams or private holdings. Peasants started acquiring land as the resolution encouraged them to have as much as they wanted. Protests followed, and this led to the Politburo's Directive No. 47 that was set up to assist in settling all land-related disputes in the South.

[85] Fieldwork was done from December 2009 to January 2010. Phone interview with Mr Duy, 23 November 2011. Cashew was commercially introduced in the late 1980s, while rubber became widely popular after 2000. See Graphs 6A1 to 6A3 in the Appendix that show the trend in the production of rubber, areas harvested and leading producers of rubber. Vietnam is still not a prominent player in this area.

there is an increasing trend in the harvesting of rubber, while that of cashew is rising at a slower rate.

As a result of improved relations with farmers, the state has a set-up that provides inputs (seedlings and pesticides). This relationship with the state is linked to that with processors and involves assured markets for farmers. The smooth co-existence between the state, farmers and processors has meant that for the state to continue receiving foreign exchange, it has to support both the farmers and the processors.

Processors however need to make a profit to continue production and have to keep down their costs if they are to enjoy better profit margins. The costs associated with processing are mainly raw materials (in this case, raw cashew) and labour. Processors require a supply of raw cashew throughout the year and it is cheaper to obtain raw cashew from domestic sources than to import it. Given the benefits accrued from the local supply of raw material in Vietnam, upstream actors attract downstream actors by offering a good price for their raw material. For this reason, processors are obliged to pay farmers a good price to ensure that there is a constant cheap supply of raw cashew from a local source. They know that farmers have the freedom to switch to other crops that are seen to pay better.

Maintaining a high level of productivity requires incentives for farmers to continue producing raw cashew. It is cheaper to use local raw cashew than to import from elsewhere. Thus, if the processing industry is to continue to flourish, they not only need to lobby and convince the government to provide better varieties, affordable inputs and tools for farmers but also to provide good price incentives for farmers. Better varieties produce more output and are more resistant to disease. The government plays a significant role coordinating research institutes and farmers to ensure that the processing industry is well served.

Farmers that dry their cashew earn higher prices. They do not become entangled in any of the issues related to grading as whatever is sold is paid for in full and it is up to the processors to grade the harvested cashew. In addition to supporting research to provide improved varieties, the government indirectly ensures high-quality cashew is produced. For example, a trader describes how local government is involved: ‘I'll report to the police and Minh Tho Company any person who sells cashew nuts of bad quality. And then we force them to pay a fine. It happened in the past. Now, they don't do that anymore.’

Given the scale of the operations and the economic freedom in Vietnam, farmers, and then processors, have the most power. The state plays a coordinating role and is left to provide incentives, while the operation of the whole sector is mainly in private hands and these players determine the rewards farmers receive and. in the end, earn foreign exchange for Vietnam. The presence of price and non-price incentives shows the

influence of positive externalities, as was observed by the Vice Chairman of VINACAS (see Box 7).

Box 7: Keeping the support system in check

Our success came because we care about our farmers, traders and processors, as there has to be collaboration and coordination with all the actors involved. The government must have the proper mechanisms in place to provide guidance. It should not be directly involved but communicate with and provide knowledge to farmers. The more knowledge there is given to farmers, the more power they have. There is a real need to increase productivity as we lack additional land so more technology and know-how have to be provided to farmers. In a way, the government invests in farmers and the farmer decides the price. The government invests in research institutes that then provide new (free) varieties that are more productive and disease-resistant. The government also subsidizes inputs and supports the agricultural bank that provides low interest rates for credit. And last but not least, the government invests in infrastructure, electricity and transportation.

Even with all this investment, farmers' returns need to be good to encourage them to continue producing. Farmers receive nearly 75% of the price as there is no middleman. Though the cost of maintaining cashew trees is lower than other trees, farmers' total profits are about US$ 1000 and if they earn less than US$ 3000 per ha they will likely switch to other crops.

Source: Vice Chairman of VINACAS / Director of Tan An Company Mr Nguyen Duc Thanh. Interview by the researcher.

This section on marketing has shown that both countries have non-complex networks for cashew where there are only a few steps from production to the final product. Most of what is produced is for export. Output from Tanzania and to a lesser extent from Vietnam still needs value addition, i.e. processing, roasting and flavouring before reaching its end consumers.

The support systems in Tanzania and Vietnam differ, as do the value chain segments. Farmers in Tanzania are provided with inputs through the District Input Fund and outputs have been sold through the centrally controlled WRS since 2007. There are few players in input provision in Tanzania and a single legally recognized buyer of cashew. In Vietnam, inputs are sold at village markets and output is bought by traders who then sell it to local processors. There are multiple players in the provision of inputs and output trading in Vietnam.

6.3.2.4 Understanding Tanzania's performance

From the above discussion, three points can be highlighted to explain production performance in Tanzania.

- Weak coordination among the different actors has led to exclusive interventionist approaches and radical reversals in policy. These top-down solutions with negative externalities relying on standardized messages that allow the state to be both a regulator and performer are overwhelmingly evident.
- Price fluctuations coupled with a lack of economic freedom have led to neglect or the abandonment of farms in periods of low prices, with quality suffering the most. Farmers have been left in the margins and continue to receive residual payments.
- Coordination by the state contradicts and restricts the efficient involvement of other actors. Coupled with this, a poorly funded support system means it is difficult to pass on innovations to farmers.

6.3.2.5 Understanding Vietnam's performance

Three different points explain Vietnam's production performance.

- Economic freedom: the power is with the farmers who can choose what to produce (cashew, rubber or pepper) and how much they produce.
- Economies of scale allow for market clearance prices that satisfy farmers and processors with support from the government and research institutions. The continued high prices imply that raw cashew production is both of high quality and quantity. The reputation involved provides conjuncture between raw cashew and processors.
- Coordination by the government goes beyond what meets the eye. Adaptive efficiency: Vietnam has only liberated its economy and not its politics, and decisions are still taken centrally by the Communist Party.

The nature of implicit contracting determines the overall performance of the sector. Radical reversals of policies in Tanzania have resulted in low quality and quantity, while adaptive efficiency in Vietnam has resulted in high quality and high quantities of raw cashew.

6.3.2.6 Conclusion and Recommendations

Vietnam looks at policy holistically and differently from the intrusive Tanzanian state and is seeing improvements in production, productivity and the well-being of its citizens. Tanzania's position has not improved and there are still noticeable erratic changes in production, no or even declining changes in productivity and stagnating well-being.

Marketing in Tanzania has resulted in low-quality produce and low prices. This means that hold-up works adversely in Tanzania with farmers being locked in a Prisoners' Dilemma that leads to a low-productivity, low-quality equilibrium. In Vietnam, however, adaptive efficiency has resulted in farmers producing high-quality produce and high prices being offered by processors. This means that in Vietnam, hold-up is not only confined to cashew producers but also applies to cashew processors (with their own sunk costs) who have to confront the fact that farmers may opt out of cashew in favour of a competing crop (rubber). This is a credible threat and thus promotes a balanced value chain focused on higher productivity, yield and quality.

It used to be believed that for Africa to develop, it had to mimic institutions like those in place in the West.[86] This literature, as Tendler (1997) pointed out, tended to draw conclusions in support of the superiority of market forces for solving government and economic problems and even poverty. Seeing the free market working in Vietnam, this case study of cashew has shown that a lot happens behind the scene that can act as a catalyst to enhance the entire sector through adaptive efficiency. Freedom of choice for farmers provides alternatives and is a credible threat to processors. While involvement of the state with the inclusion of a single stakeholder and the exclusion of the others restricts expansion of the entire sector, as is the case in Tanzania. Vietnam shows that markets that are strategically supported by the state perform better.

Cashew is more a cash crop by name or default in Tanzania as farmers who produce it seem not to be in control of their own efforts. Residual payments to farmers in Tanzania discourage an effective or efficient reduction in the transaction costs associated with marketing. Credit is important for maintaining trees and money is needed not only to buy inputs but also to hire labour and tools. The compatibility of machines between cashew and rubber allows farmers in Vietnam to escape the fallacy of sunk costs. Cashew farmers in Vietnam are gradually switching to rubber with the help of earnings from pepper and their own savings.

When looking at the Tanzanian case, it is easy to single out the involvement of the state as an impediment to the expansion of the cashew sector. The Vietnamese government is also heavily involved in the cashew sector and provides new varieties, improved roads, electricity, and research and development, and also regulates standards for processors. A strong state with a strategic industrial policy provides a favourable environment for the private sector to operate in and allows adaptation to new environments in a sustainable manner. In Tanzania, the state allocates resources to minimize the costs of production for only one group, i.e. the farmers in the short term, with limiting multiplier effects. The marketing of

[86] Ellis (2011); Booth (2010) and Tendler (1997).

cashew and inputs in Tanzania is centralized, with the state playing a leading role. The market for kernels has, however, remained on the free market, while raw cashew, kernels and inputs are all on the free market in Vietnam.

The issue here is not the involvement of the state *per se* but rather the role it plays. When the state operates as a catalyst and involves other stakeholders, backward linkage through vertical integration and economies of scale are encouraged. But when state investment seems to provide incentives that support only some stakeholders, i.e. forward linkage, this limits the benefits to those stakeholders and results in diseconomies of scale for the entire sector. The latter acts, in fact, as a subsidy to foreign actors in the cashew value chain that are happy to obtain raw cashew and process them elsewhere. This loss of added value via other stakeholders can be tapped if the state reorganizes its processes and offers incentives to all stakeholders involved in cashew production. The case of cashew shows that 'the specification of the market mechanism is essentially an incomplete specification of a social arrangement' (Sen 1985).

The support system for cashew in Tanzania faces challenges, especially regarding resources and insufficient and aging staff. The inability to create a strong private sector forces the support system to act defensively and provides little to no room for manoeuvre with regard to the provision of inputs. There has never been a supply response regarding inputs, but the support system should seek ways of increasing competition among the providers of inputs, like jute bags and transport, and transfer some power to the farmers. There is the threat of farmers wanting to form or join groups like UWAKOTA[87] that would make running the WRS and the distribution of funds more difficult.

In Tanzania, spot contracting works through centralized marketing and results in low-quality produce and low prices. This means that hold-up in Tanzania works adversely, with farmers being locked in a Prisoners' Dilemma, which leads to a low-productivity, low-quality equilibrium. In Vietnam, on the other hand, relational contracting has resulted in high-quality produce by farmers and high prices being offered by processors. This means that hold-up there is not only confined to the cashew producer but also applies to the processors who have to confront the threat that farmers may opt out of growing cashew in favour of a competing crop,

[87] Others include (i) Masasi Farmers and Marketing Association (Mafama), (ii) Namajani/Mlingula wakulima wa korosho (Namwako Masasi)., (iii) Umoja wa wakulima wa korosho Newala (Uwakone), (iv) Unasemaje Farmers Association (Mtwara) and (v) Wakulima wa Korosho Masasi (Wakoma Co Ltd). http://www.mwananchi.co.tz/news/5-habari-za-siasa/17164-wakulima-kuishitaki-serikali-mahakamani.html [3 November, 2011].

such as rubber. Promoting relational contracting is thus focused on higher productivity, yield and quality.

The problem of spot contracting is solved by creating trust, which is cemented through reputation. The issue of trust in Vietnam is at a different level. With economies of scale, farmers who already have economic freedom need to be paid fairly to avoid the collapse of the whole system. At the same time, big processors need to adhere to standards and act as an example for other processors. The government would ultimately find it easier to control a few big processors, but they might have to subcontract part of their work to smaller processors. Trust and reputation matter a great deal in relational contracting.

Vietnamese relational contracting is an example of vertical integration/backward linkage. Showing that scale matters and that the 'presence of aggressive private sector suppliers of improved inputs or shifts in relative prices, or changes in access of farmers to local market and inputs – all of which would affect the expected returns from new technology'[88] may explain the differences in productivity.

The hold-up problem is solved in Vietnam by farmers having an alternative crop, namely rubber, which is a credible threat for processors who badly need domestically grown raw cashew. Here again, farmers do not sign any contract with processors but there is the ever-present threat of them switching crops. The case of cashew in Vietnam represents a reputation game in game theory.

The areas for further research would include understanding of complexities of labour incentives, flow of inputs to allow bigger production and trading near global hubs efficiently.

[88] Bindlish & Evenson (1993) cited in Tendler (1997: 99).

CHAPTER SEVEN

SUCCESSFUL COLLABORATION BETWEEN GOVERNMENT AND CIVIL SOCIETY ORGANIZATIONS FOR POVERTY ALLEVIATION IN TANZANIA: TWO CASE STUDIES

Paschal B. Mihyo

7.1 Introduction

In the previous chapters agricultural policies have been implemented by state actors mainly MDAs coordinated by the Ministry responsible for agriculture. Some of the shortcomings that have been identified seem to emanate from the top down approach and lack of involvement of non-state actors in the design, implementation and evaluation of these policies. This is in spite of consistent emphasis by government leaders that the involvement of farmers and grassroots organizations is essential for the success of these programmes. The involvement of such organizations unless spelt out in key policy documents such as governing legislation or implementation strategies of particular policies, has not been robust in many developing countries.

However, Civil Society Organizations continue to search for space and roles in local and national development issues but in most cases the relations between them and their governments are strained. Some governments tend to think of foreign funded CSOs as agents of foreign policies and agendas of developed countries. This is aggravated by the failure of some CSOs to develop a reliable membership to which they are accountable. They tend to be more accountable to donors who in effect fund almost all their activities. Notwithstanding this shortcoming however, trade unions and producers' associations in Africa in general and Tanzania in particular have existed and performed critical roles in poverty reduction and the provision of voice and services to their constituencies.

They are grassroots based with elective positions which are filled through democratic processes as per their constitutions. While other non-profit non-state bodies find it difficult to build lasting partnerships with government bodies, in Tanzania Mainland and Zanzibar farmers' associations have managed to establish effective partnerships through which they have provided platforms for their members to lobby government, share in the benefits of land utilization, make contributions to policy reform and review and generally contribute to poverty reduction. This chapter discusses the traditional barriers to CSO-Government partnership in Africa and how two farmers' associations one in the fishing and eco-tourism in Pemba, Zanzibar and another one on Tanzania Mainland dealing with the needs of

smallholder fishing communities and farmers, have managed to create space and voice for their members through partnerships with the governments on both sides of the republic.

Their success is attributed to their inward-looking policies, their capability to mobilize visible and reliable membership, their grassroots orientation, democratic leadership and organizational structures, linkages with local authorities and departments of government relevant to their needs and activities and their inclusion of policy actors in their decision-making bodies at the top level. It is recommended that governments and CSOs in the region need to look for ways of increasing synergies between them and reducing the dependence of CSO on foreign funding.

7.2 The Significance of Civil Society Organizations in Tanzania's History

In Tanzania, as in many other economically challenged economies, the state has always depended of various sectors to contribute to the provision of social protection and social services. Civil society organizations have therefore been significant players in these two areas before and after the colonial era. In the pre-colonial era, guilds, welfare societies and mutual aid organizations were used for pooling resources, savings and credit to meet the needs of their members. Hunters, fishing communities, salt and trophy traders had mutual aid groups and associations that supported their collection, production, consumption and distribution needs. A good number of historians and anthropologists have documented these practices and associations in various communities of Tanzania (Koponen 1988; Gwassa and Mbwiliza 1976, Austen, 1969, Kadimala 1961, Bennet 1963). The concept of civil society is therefore as old as Tanzanian societies.

During the colonial period these organizations continued to play their role of supporting the distribution of resources for trade and other forms of production. But the onset of colonial systems of power and production and resources exploitation brought on board new types of social movements or changed the initial objectives of some of them. The changing nature of marketing of agricultural products and the wage system led to the formation of farmers' associations in the cash crop growing areas and trade unions in urban areas (Ndumbaro and Kiondo 2007, Shvji 2007). Since political power and the colonial systems of wages and marketing of crops were aimed at labour exploitation and the extraction of surplus from producers, these organizations became part of the nationalist movement and mobilized support for political movements which were fighting colonialism in the 1950s. As a result, the colonial regime decided to control and regulate them through laws governing registration and management of trade unions and cooperative societies.

Immediately after independence trade unions continued to play a significant role in the politics of the country. Sensing that they were likely to form basis of opposition politics, the state decided to affiliate them to the ruling

party which in 1965 was constitutionally mandated to be the sole party in the country (Mihyo 1982). In 1977 the ruling party by law annexed all major mass movements including the youth, women and parents' associations. This turned the mass movements into quasi-governmental organizations (Ndumbaro and Kiondo 2007:13). In the post one party system era which started in 1985, these movements have been distanced from the state although those of the youth and women have remained affiliated to political parties with each of the major ones having a wing of its own. Trade unions and producer cooperatives and other associations have gone back to their former and traditional roles as brokers between the state and their members, advocates for the fair income distribution between the state and their members regarding products of their labour and mobilizers of resources for the enablement, empowerment and social protection of their members. Other types of civil society organizations have also developed alongside these traditional ones. They include pressure groups dealing with policy issues and trying to influence policy through advocacy, special interest groups dealing with various human rights and entitlements in the areas of social policy, the environment, education, health, land and other social and economic issues. They also include professional associations and think tanks.

7.3 Objective of this Study

This study aims at interrogating the concept of 'civil society organizations' as it is applied in Tanzania and which types of organizations are depicted as such organizations. Then it examines relations between the state and these organizations, what enhances or reduces efforts towards their possible cooperation in the delivery of services and promotion of rights. It uses two case studies of farmer's associations one based in the mainland and another based on the island of Pemba in Zanzibar in order to show factors that encourage both parties to work together in the fight against poverty. The conclusion emphasizes the need for a broader definition of the term 'civil society organizations' and the further democratization of NGOs in the country.

7.4 Methodology

The study was based on publications, reports and other sources of information on civil society organizations in Tanzania and specific information on the two case studies. Two farmers' associations were chosen because Tanzania is composed on two states one on the mainland and the other on the islands that make up Zanzibar which together form the United Republic of Tanzania. One farmers' association was chosen from each side of the union. On the mainland the Mtandao wa Vikundi vya Wakulima Tanzania (MVAWITA) meaning in English National Network of Small-Scale Farmers' Groups in Tanzania was chosen and the Misali Conservation Association (MICA) on Pemba Island was chosen to represent Zanzibar. These two associations are new and were formed after political reforms of 1985. In addition, they were chosen because they fully

meet the criteria set by the NGO Resource Centre and the Tanzania Association of NGOs (2008) on what makes an effective civil society organization. These criteria constitute of eight pillars.

The first is governance based on capacity for leadership, oversight and implementation of the vision and mission, capacity to mobilize and maintain membership and partnerships and capacity to design and maintain dynamic organizational structures and ensuring sustainability. The second pillar is management capacity based on ensuring established structures work; making and following up on decisions; coordinating and controlling the use of human and other resources properly. The third pillar is human resources development through training and retention and ensuring staff has adequate capabilities to undertake their tasks. The fourth pillar is transparency and integrity attained through proper financial management, reporting and accountability to members and other stakeholders. The fifth is proper and professional programme development and management which ensures goals and results are aligned. Sixth is capability and systems to measure achievements. Seventh is infrastructure and logistics and eighth is capacity for networking. This is a short summary of the detailed criteria which NGOs in Tanzania are using to assess themselves. Not many of the new organizations can meet all the eight standards. Think tanks such as REPOA and ESRF, cooperative societies, producers' associations and trade unions also meet all the criteria and we can add democratic election of leaders and these two case studies fall within this category.

7.5 The Uneasy Relations between the State and Civil Society Organizations in Tanzania

The concept of civil society has suffered the same fate as that one of globalization. Since the days of the Greek, Roman and Ottoman Empires, globalization has been a continuing process and for Africa it was fast tracked by colonialism and the current global streamlining of political and economic policies. In contemporary discourse, globalization is linked with the current neoliberal agenda of the WTO driven liberalization of trade and investments. Things become global when they affect those who have traditionally benefited from their effects. When international slavery was pounding the African continent through the Atlantic triangular trade on the one and on the other by the Indian Ocean trade in human beings, this was never considered to be globalization because its victims were weak. Colonialism came and devastated countries in the Southern hemisphere for centuries ensuring all the routes, boats and flights went to the capitals of the industrialized world. At no point in time was it labelled globalization. Only when the corporate powers and their representatives decided that markets had to be shared and monopolies had to be broken and only when the former beneficiaries of the protected market systems began seeing that there was now a chance the jobs in their neighbourhoods could migrate to a developing country and goods could freely enter their markets from Brazil, China, India or any African country unhindered, that is when they

began to feel globalized and fights began against globalization in some quarters.

When Europeans migrated in millions to the so-called new world and slaughtered people and animals as they settled, no one saw this as migration of terrorism. Only, when people of the South and now those from conflict countries began migrating in search of asylum and shelter, the cry is globalization of terrorism arose (Nassar 2010). All these developments are being seen as globalization because they are now affecting those who for long were immune from the negative impacts of global expansion. For Africa and indeed the whole world, the whole process of human development has involved globalization. That is why Greewald and Kahn (2009) have said it is news, but it is not new.

The same thing has happened to the term civil society. Mutual support and welfare organizations have been around since African societies began being organized. In Tanzania the most effective, democratic and inclusive civil society organizations are trade unions and producers' organizations. These are not treated as Non-Governmental Organizations (NGOs) even after their traditional links with the state were cut in the process of democratization and political reforms. Recognition by the outside world primarily goes to NGOs funded from outside some of which were formed recently as pressure groups mainly dependent on donor funding and in the majority of cases without a reliable membership and only accountable to their management bodies and funding agencies. Farmers' associations, cooperatives and producer organizations in industry, trade, transport and other activities are sometimes left out of the coverage of NGOs let alone civil society organizations. That is why the civilian content and participation of civilians in some of these organizations has become questionable leading some critical thinkers in the region to consider NGOs funded by the development partners as stooges of their funders. Issa Shivji (2007:30) has argued that the NGOs which emerged during the process of political and economic liberalization in Africa in general and in Tanzania in particular, were born out of an anti-state stance and were meant to weaken the state in the neo-liberal agenda.

The notion that they compete rather than complement the state is manifest in the nature of projects and activities that most of the First Ladies in Africa engage in. More often than not, they compete with existing NGOs for the same constituencies and instead of governments putting funds in NGOs they put them into these parallel activities. On the other extreme, it is not unusual to find a presidential project competing with projects of local NGOs for the same donors locally or internationally. In Botswana for example, when former President Ian Khama launched a Housing Appeal Project, NGOs complained that he was exposing them to unfair competitions as local donors were diverting contributions from NGOs to the President's project (Geleitse 2011). One would assume that if leaders such as first ladies or the President in this case was really convinced that

NGOs were locally owned and genuine partners in development, they would not launch parallel activities or projects in competition with them.

It is also possible that CSOs which are supported by development partners are assumed to be anti-state. While the west was disillusioned with governments in Africa in the eighties and nineties and therefore encouraged CSOs they supported to detach themselves from the state, in the new millennium they have been encouraging governments and CSOs to work together. However, for some, having had a false start with the eyes off the state, they are finding it difficult to adjust. One researcher on African NGOs has observed that, 'While many questions about NGOs reflect concerns about their legitimacy and accountability, others come from the very agencies that have been targets of NGO advocacy or grow out of the problematic behaviour of some NGOs themselves' (Blagescu 2007).

It is true that when NGOs become whistle blowers, they irritate state officials whose transparency credentials are shaky as was the case when Earthlife, an environmental NGO in South Africa raised the issue of the safety standards of the Pelindaba Nuclear Plant in Pretoria. The state overreacted by suggesting a bill to be passed curtailing the freedom of whistle blowers (Penderis 2006). In Africa the harassment of journalists and NGOs that touch on issues of transparency and accountability is very common. However, as was noted at the 'Wilton Park Conference on Strengthening Democratic Governance: The Role of Civil Society' held in June 2006 and attended by representatives from all continents, as long as CSOs keep on trying to make governments accountable while they themselves have accountability challenges, their legitimacy will remain questionable (Jacques, 2006).

Questions about the civilian content of NGOs is not only limited to CSOs in Tanzania. In the United Sates, the government does not give grants directly to CSOs except those involved in research, defence studies or advocacy, education or any other activities which are essential for the national development or survival. It avoids being involved in what may be considered politically motivated funding (Prinzel, 2011, Dumon 2016). Even some CSOs such as Greenpeace do not accept grants which may be seen as politically motivated (Folger 2016). When in 2012 Rajiv Shah the USAID Administrator proposed that more funding for development abroad should be channelled through US NGOs, the Coalition of International Development Companies put up a big fight on the grounds that NGOs lack transparency and account to themselves and not to the tax payers (Norris 2012). Also, in a study jointly undertaken by the University of Nottingham and Stellenbosch University it was noted that accountability failure was behind donor and other stakeholders' disillusionment with NGOs in the East African Region and blamed the delayed response by donors to the 2010 famine in the Horn of Africa on this accountability deficit (IRIN, 2011).

7.6 Successful Partnerships between the State and Civil Society Organizations in Tanzania

In the preface to a very incisive study of partnerships between CSOs and government in Tanzania (NGO Resource Centre and Tanzania Association of NGOs 2007) Richard Holloway says, 'The relationship between government and civil society in many countries of the world is complicated: each side often has ideas about the other which get in the way of a smooth and mutually supportive working relationship. Sometimes this is reflected in the laws and regulations which do not produce an enabling environment for the growth and effective functioning of civil society'. No matter the suspicions and pre-conceived ideas that each side may have of the other, both need each other. During the colonial period the nationalist movements needed social movements for mobilization of support and resources and the social movements needed nationalist movements for advocacy about the goal of inclusive development. During the one-party state system in Tanzania, the government needed social movements to exert total control over politics and policy and the social movements needed state support for survival within limited political space. After multiparty politics and during the current era of liberalized political systems, government needs NGOs for monitoring and evaluating its policies, correcting it on issues of social and economic policies and mobilization of the population to respond to policies on health, education, the environment, climate change etc. Therefore, even where the government takes tough positions on the activities of civil society organizations it still needs them and their involvement and role in many areas of policy.

The study by the NGO Resource Centre and Tanzania Association of NGOs (ibid) had indicated that think tanks such as REPOA, Economic and Social Research Foundation (ESRF) are involved in public expenditure review, sit on development assistance committees and prepare national human poverty reduction and human development reports. NGOs dealing with youth, women and children are involved in policy formulation, monitoring and evaluation and are regularly invited to give advice on government's implementation of international, regional and national policies related to issues in their domain. Other NGOs providing services in education, medication, adult literacy and those taking care of the needs of people living with HIV/AIDS, physically, mentally and otherwise challenged people get financial and other support from the government. In the study cited above concrete evidence is provided on how partnerships are initiated, the modalities of cooperation and accountability structures in place to ensure smooth partnerships. However apart from think tanks such as REPOA and ESRF which generate knowledge, enrich policy and are normally contracted by the government to do research on policy and economic and social development, farmers' associations also have structural partnerships with the government.

As mentioned earlier, the links between government and producer cooperatives has a long history in Tanzania. As a result, the partnership between them is institutional and statutory. The Cooperative Societies Act made cooperatives autonomous. At the local level, District Councils have a responsibility to support cooperative development. The Ministry of Agriculture and Cooperatives supports the Tanzania Federation of Cooperatives. The Cooperative Audit and Supervision Corporation which audits cooperative societies' funds used to be a government department but now it is a state-owned enterprise. All producers' cooperatives and associations use its services, but they are not bound to do so. The Moshi University Cooperative and Business Studies is a joint venture of the Tanzania Federation of Cooperatives and the government. The government and the cooperative movement are partners in the marketing of agricultural produce. The government has worked with this university very well linking producers with the global fair-trade associations. Cooperatives since the early sixties have played a key role in supporting young people to study in local universities or abroad through scholarships. They are therefore critical government partners in international trade, provision of social services and poverty reduction. Farmers' organizations are also very active partners with the government in Mainland Tanzania and Zanzibar in the formulation and implementation of policies. To illustrate this, two case studies of farmers' associations are analysed below in terms of what they do with government and why they succeed where others have failed.

7.6.1 The Case of the Mtandao wa Vikundi vya Wakulima Tanzania (MVIWATA) (National Network of Small-Scale Farmers' Group in Tanzania)

This network was initiated by the Sokoine University of Agriculture (SUA) to mobilize small scale farmers in five regions of Tanzania with the objective of strengthening farmers' networks and cooperatives at village, ward and district levels. The network has facilitated partnerships between these farmers' cooperatives and associations with district and regional marketing boards. Members of the group sit on village and district committees and participate in the Agricultural Sector Review Process (NGO Resource Centre and Tanzania Association of NGOs 2007:49). The network is democratically managed, holds annual general meetings at which all key decisions are made. It organizes courses for farmers on technology and innovation in partnership with SUA and on management and cooperative development in partnership with the Moshi Cooperative University College. It is funded by the District Councils Agricultural Development Programme (DADPs) and international development partners (ibid). Its meetings are attended by key district and central government leaders.

MVIWATA advises government on local, national and international issues. At their Annual Meeting in 2013 which discussed among other things the WTO, members said they did not see any benefits accruing to them from

the WTO agreements. They criticised the government for not consulting them before making commitments and not giving them feedback on implementation. They also urged the government to prepare them adequately for participation on the East African and international markets (MVIWATA 2013). The representative of the Ministry of Trade and Industry who was present at the meeting agreed that they needed incentives such as subsidized inputs to raise productivity and quality in order to compete on international markets.

Photo 7: MVIWATA Mtandao wa Vikundi vya Wakulima Tanzania

"We don't see benefits of WTO," say smallholder farmers.

Source www.mviwata.org/wp-content/uploads/2016/01

Further action by MVIWATA includes an appeal they made at their Annual Meeting in 2014 to the government to revoke the law that allows the production of GMO seeds and the manufacture of GMO products for children's foods. The same annual general meeting asked the government to consider the following:

- The protection of local seeds, forests, and reserves land.
- To implement the CAADP Maputo commitments of investing at least 10% of the GDP in agriculture.
- To provide reliable and accessible basic services to rural areas.
- To strengthen freedom of expression and democracy.
- To ensure the benefits of the green revolution reach all farmers and not only the commercial farmers.
- To help fight the stigmatization of small farmers as the cause of poverty and environmental degradation.
- To take measures to resolve land conflicts.

This was a very strong message and statement and the local authorities responded by promising to take measures to address some of the demands within their powers. The land disputes have been prevalent in Morogoro Region where clashes between farmers and cattle herders are frequent. As can be seen from the picture below, the farmers' statement was more of a set of demands than simple requests. Knowing that national elections were due in 2015, the local government leaders did not take this statement lightly. The statements made by leaders are very strong. For example, speaking to the participants recently in Morogoro, MVIWATA chairperson Mrs. Veronica Sophu said that farmers who are the main producers of national food and cash crops and who contribute to national income are less valued by the government'.

Photo 8: MVIWATA Chairperson statement on Smallholder Farmers Demands

MVIWATA Chairperson Mrs. Veronica Sophu reading statement on Smallholder Farmers' Demands

Source: www.mviwata.org/wp-content/uploads/2016/01

The network has also addressed issues of corruption and transparency. At a meeting with agricultural experts on the theme, 'The opportunity for local farmers in the agricultural sector', members complained about government officials who were delaying delivery of inputs and the lack of clear procedures on the delivery of such inputs. At the same meeting the chairperson of the joint government-farmers' committee for tracking public expenditure reported that the committee had discovered instances of embezzlement of funds earmarked for irrigation in Kilosa District (MVIWATA 2015).

MVIWATA is a new player in the world of mobilizing support for small scale farmers and working with the government to fight poverty and social

exclusion arising out of the implementation of land reforms and trade liberalization policies. In its short period of existence, it has achieved a lot. Some of its achievements according to it reports (MVAWITA 2016) and assessment by the African Centre for Biodiversity (2015) it has managed to secure a place in the structure of governance and decision making at village, ward and district levels. It has managed to get funded by district authorities and to be part of the institutional budget and other structures of local governments. It has secured a place on Regional Advisory Boards. It has improved credit access for farmers and raised living standards. It has constructed six markets for farmers in Dodoma, Iringa, Morogoro and Tanga regions. It has raised awareness of international trade issues among farmers and opened dialogue with the government on the negative and positive aspects of regional and international trade related agricultural agreements. Their concerns about the marginalization of small scale farmers in the design of land policies and the bias in favour of big investors has led to the formulation of the project known as the District Agricultural Sector Investment Project (Mradi wa Uwekezaji Katika Sekta ya Kilimo Wilayani) funded jointly by the African Development Bank and the Tanzania Government through District Authorities designed to support farmers' groups at village level to improve productivity through training and credit facilities (Ministry of Agriculture and Cooperatives 2012a). It was followed by a government directive providing guidelines on the implementation of the agricultural input subsidies for the period 2013-2015 (Ministry of Agriculture and Cooperatives 2012b). It extended the policy on subsidies and provided that they would be based on vouchers for up to 80% of the amount and loans would be given to registered farmers' groups that would qualify for such loans. The target was to give 932,000 vouchers in ten districts. The village committees on which MVIWATA members sat were mandated to form voucher committees which would select households eligible for subsidies and ensure they get agricultural inputs. They were further given the responsibility to ensure subsidies were directed at the targeted activities and not diverted or sold to big farmers. The rights and duties of distributing agents of fertilizers were also defined and a fixed price provided for under the directive.

From these and other achievements, it is crystal clear that when the farmers talk the government listens and we can see why. First these associations have a visible and ascertainable membership. This is a big attribute missing from the majority of NGOs. The voice of the members cannot be ignored because they have a vote as a group in local and national elections. When they organized across the country, they become more effective.

Photo 9: MVIWATA Members and Guests forum on Smallholder Farmers' Demands

MVIWATA members and guests listening attentively to Smallholder Farmers' Demands.

Source: www.mviwata.org/wp-content/uploads/2016/01

Most NGOs have weak or vague constituencies and do not have a forum at which they can resolve and make demands as an organization that can later translate their demands into votes at local or national elections. Secondly, they engage governments. At all meetings of MVIWATA government leaders are present not only because the local authorities fund the network and work with it on their committees but the network itself ensures the government leaders are invited in time to ensure they attend. When such leaders come to the meetings, they make statements and respond to views, requests and demands. Some NGOs do not bother to engage government officials in this manner. Third MVIWATA has created a partnership with local authorities and through them the government. There is no feeling on either side that the network is anti-government or competing with it for membership, resources or influence. Fourth is the network's autonomy. It was initiated by Sokoine University of Agriculture. It is funded by district authorities and development partners. It sits on village and ward development committees etc., but it is autonomous and independent, and it has kept itself away from partisan politics even on land issues that are the epicentre of party politics. It is this autonomy and independence that has kept it attractive to partnerships with government and governmental bodies. Finally, MVIWATA has succeeded to mobilize and retain government recognition, respect and support because it is transparent about sources of funds and expenditure. It presents reports and accounts for audit and it elects its leaders and changes them through democratic processes. That is why it has been more successful where other NGOs have failed.

7.6.2 Cooperation between Misali Conservation Association (MICA) in Pemba and the Government of Zanzibar

Misali is a small island which is located North of Pemba endowed with lots of fish resources. Initially it was a fishing site for about 1640 fishermen (women are not allowed to sleep on the island according to traditions because of its religious attributes). The beneficiaries were 29 coastal communities. In the early nineties the Zanzibar government began leasing out land on the islands to tourist companies for the development of tourism. Fishermen working through the Ministry of Fisheries and Agriculture lobbied against wholesale leases of such areas and the government agreed to make the island a community managed eco-tourism area (Ali et.al 2000). The lobby succeeded not only because the fish resources provided for livelihoods of 29 poor communities but also because the island has religious attributes. According to Mwangi (2002), 'Legend has it that Misali got its name after the Prophet Mohamed appeared and asked for a prayer mat- or 'msala' in Kiswahili language of Africa's eastern coast. When none was available, he is said to have declared that the teardrop shaped island that points to the east to Mecca would be his mat'.

Misali Island is uninhabited, and no one is allowed to settle on it. Because of its religious attributes, women are not allowed on the island. Conservation of the environment on this Island combines scientific and religious methods, theories and ideology. Teachers and religious leaders are given training and provided with posters on the Islamic values of environmental preservation. The Teachers Guide Book for Islamic Environmental Education (Khalid and Than (2007) is distributed free of charge to all persons in charge of mosques and schools on the island of Pemba in particular and Zanzibar in general. The island has traditional healing sites taken care of by certain families and it is treated as a holy place in Islamic traditions (Abdullah 2000).

Photo 10: Fishing Boat on Misali Island

Source: Misali Conservation Association website (www.mica.org)

Misali was declared legally to be a communal property and became the Misali Island Marine Conservation Area on the 22nd May 1998 under the Fisheries Act No. 88 of 1988 and the Forest Resources Management and Conservation Act No. 10 of 1996 of the Government of Zanzibar. As a conservation area it had to be managed jointly by the state and the community. The Misali Conservation Association (MICA) which was formed by fishermen from all the fishing communities became a partner in this venture. MICA was formed to ensure the voice of the communities was heard through an organization. Committees for joint management of the area were formed at three levels: village or 'shehia' in local language, district and at the level of the Misali Island Management Committee which is national. The total membership of the latter is 15 out of who nine represent the District committee.

MICA is a membership organization and its executive committee comprises of representatives elected by the village (sheha) committees. It has a board of trustees with representatives from the government, other NGOs, the environmental agency, the tourism industry and the district committee in charge of conservation. The supreme body is the general assembly which includes all members of the village committees in charge of conservation and district committee members in addition to members appointed by government and invited members. The total number is restricted 150

(Abdullah, ibid:7). The purpose of joint management is to preserve the environment and prevent overfishing and promote use of dangerous fishing techniques and practices. MICA works with the Commission of Natural Resources and the fisheries authorities to ensure users of the fishing and tourist cites comply with all the laws and regulations. A study sponsored by Frontier Tanzania undertaken by Fanning and Redding (2003) indicated that MICA and the Commission have worked together in zoning the island into non-extractive and extractive areas. Together they ensure the fishing rules are complied with. There are two areas earmarked for camping fishermen. Community residents work with MICA to ensure the fishermen observe all the regulations applying to the camp sites. A study by Lim (2007) indicated that working relations between MICA and the Commission were very smooth.

Given the recent waves of privatization and commercialization, it is not easy to find areas where the management of natural resources is joint and beneficial to the government as well as communities. The partnership between MICA and the government has had a lot of benefits for the communities. The first of these is benefits sharing. The visitation fees which are paid by tourists are shared between the government and MICA and out of what is collected 40% goes to the community development projects such as schools, dispensaries, mosques, roads and wells and 60% goes to infrastructure including; shelter and upkeep for rangers who patrol the island to enforce rules and best practices. Funds were distributed by the Management Committee every three months with representation from all village committees (Brooks 2013: 77). However, it was noted that this money was not always enough to pay the wages of rangers and there are times they would go for months before getting paid. Noting this problem, MICA teamed up with CARE and proposed the formation of the Misali Island Conservation Development Programme (MICODEP) which supported the formation of village credit and saving societies which began mobilizing resources to provide loans to people in the community. This helped to raise living standards among the people and to make them less dependent on earning from tourism alone for local development.

The second achievement of this partnership was conservation of the octopus's species. Octopus is very popular on local and export markets. A study by Howe (2010) indicated that although there were still some elements of over-fishing in Misali conservation area, in the non-extraction zone the size and weight of octopus species was almost double that of the same species in the extraction zone. She even concluded that, 'Misali island is probably the only area of Pemba (and much of Unguja) where a non-extraction zone is 'enforced' albeit to a limited extent' (ibid:5). This is to the credit of MICA and its rangers and the members of the community. However, Pharaoh, Fanning and Said (2003) noted that in spite of the vigilance on the part of community members and rangers, the population of turtles was on the decline due to harmful fishing practices which has also been confirmed by Muir (2005). On the whole however, given the level of

development in the area and the potential of the communities to abuse the environment, the responses of the communities have been overwhelmingly constructive (Levine 2006). The third benefit of this partnership is the development of social capital which is built around the reinforcement of spiritual and cultural values propagated by MICA and the strengthening of trust which according to Brooks (ibid: 55) enhances 'expectations of mutual obligation, honesty, reciprocity, mutual respect and helpfulness. In this environment, if there is a perceived need, cooperative action is likely to occur.' This has been further strengthened by religious values which have been built into conservation culture. Mwangi (ibid) noted that before MICA and the government launched the project only 34% of the Misali fishermen believed religious practices impacted on marine resources use and behaviour. After MICA began linking conservation and teaching of the Holy Quran 66% of the fishermen indicated they believed there was a link. Finally, it is also important to note that the Misali island conservation experience has been replicated elsewhere as in the whole of Zanzibar each of the four protected areas has an inbuilt community participation component.

7.7 Conclusion and Recommendations

MICA and MVIWATA share common characteristics that attracted them to government bodies for partnerships. They are producers' associations with the aim of raising the living standards of their members. They are mainly dependent on local funding with development partners supporting them. They have organizational structures that are representative and democratically elected. They are grassroots based with committees at village, ward and district levels. They provide voice to constituencies that matter in local and national decision making and politics and therefore they have a bargaining leverage which cannot be ignored. They are aware of their identity and with that their limitations. Therefore, they do not perform the roles of political parties or other political bodies and because of this governments in Tanzania Mainland and Zanzibar do not consider them to be anti-governmental. These are a few attributes that have made these two associations able to enter into effective partnerships with government, deliver on their mission and influence policy. Their experiences are worth following up if other civil society organizations want to have more impact on policy and poverty alleviation. It is recommended to governments and civil societies in the Tanzania and beyond to:

- *Examine carefully* factors that bring them closer and that pull them apart and try to maximize the former and minimize the latter.
- *Look for ways for increasing CSO dependence on local resources* including government funding through contracts and grants and reducing their dependence on foreign funding.
  Review legislation related to CSOs and ensure all categories of non-state not for profit organizations are included.

- *Organize reform of local government* policies and laws to incorporate producer organizations in the decision-making structures of local governance.
- *Jointly assess methods used in measuring performance* of CSOs so as to develop common indicators of what makes an effective CSO in order to enhance possibilities of cooperation and partnerships.
- *Undertake studies* on how CSOs in developed countries work with governments and what modalities are sued for CSO in those countries to access funds.
- *Create platforms* at which CSOs and government meet at least once every two years to discuss common issues and look for ways of working together to advance the poverty reduction, democratization and producers' empowerment agenda

CHAPTER EIGHT

CONCLUSIONS AND RECOMMENDATIONS

A HOLISTIC APPROACH TO RURAL DEVELOPMENT FOR POVERTY REDUCTION IN TANZANIA

Paschal B. Mihyo

8.1 Issues Raised in the Book

This book set out to assess a selected number of programmes and projects mounted by the Government of the United Republic of Tanzania to address the problems of small holder farmers with the objective of transforming their lives and livelihoods. It has been acknowledged that a lot has been achieved but more is possible within the Agricultural Sector Development Strategy II and the Second National Development Plan 2016/2017 – 2020/2021. The book has assessed the major thrust of Ujamaa socialism and its impact on rural development between 1965 and 1985 and the efforts to improve agricultural production and productivity through input subsidies and tiller technology in the period 2000 to 2015.

In chapter 2 on 'Education and Farm Productivity in Rural Tanzania' it is argued that formal education does not seem to have been viewed as an input into agricultural productivity but rather as a conduit to formal employment in urban areas. It is indicated educated farmers are likely to make better managers, adopt more modern farm inputs and prefer risky (high-return) production technologies. Based on concrete examples from the continent it also argues that more educated farmers are more likely to respond and adjust to technological disequilibria than those who are less educated. It concludes that achieving self-sufficiency in food production and the much-desired growth in the agriculture sector of the economy will continue to elude Tanzania if problems of accessing formal education among farming communities are not properly addressed. While formal education seems to be an important input to farm productivity, informal education seems to have even a bigger impact.

Chapter 3 presents a case study on the introduction of Power Tiller Technology in the implementation of Kilimo Kwanza. Like the Ujamaa programme the supply of power tillers was driven by the government. Neither the farmers nor the experts who conducted training for the farmers were adequately prepared for the utilization and diffusion of this new technology. The author notes that political and administrative dexterity prevailed over technical considerations. He also notes that while power tillers were introduced in many districts through administrative directives, the technology of choice regarding types of machinery and spares was determined by farmers' decisions mainly based on price rather than appropriateness of the technology especially and some of these technologies were not suited to the ecological conditions where they were

deployed. Technical capacity for servicing them was limited and most of them became dysfunctional. The author concludes that the initiative failed because power tillers in Tanzania were introduced using top-down, state-induced innovation that was not adequately informed by technical and agro-ecological differences in Tanzania.

Chapter 4 examines 'The Impact of Agricultural Input Subsidies on Poor Smallholder Farmers: Lessons and Challenges for Implementation of National Agricultural Input Voucher Scheme in Tanzania'. The author traces agricultural subsidies through various stages of post- independence agricultural policy in Tanzania implemented through cooperatives and state-owned enterprises. He argues that delivery through these two institutional channels did not lead to desired outcomes leading the government to the adoption of alternative systems the National Agriculture Input Voucher Scheme (NAIVS) to smallholder farmers. The findings show that the implementation of NAIVS has not contributed to significant change in overall agricultural productivity and outputs as the growth rate in the broad agricultural sector has shown rather stagnant trend of growth on an average of 4 per cent. According to the author factors behind the limited effect of NAIVs include low land productivity, the limited span for project implementation, the requirement that beneficiaries pay 50% of the cost which for some is too high and encourages them to sell the inputs to farmers who are not targeted by the programme and lack of transparency in the selection of beneficiaries. The author concludes that outcomes could improve if the programme duration was longer, capacity for its administration improved and subsidies linked with the broader challenges' farmers face such as climate change.

Chapter 5 on the 'Analysis of the competitiveness of the tobacco value chain and exports' focuses on tobacco and the tobacco industry which is one of the world's most profitable with a markets and millions of people that include smallholder farmers, retailers and others employed in the tobacco supply chain. The authors note that Tobacco use is a major risk factor for many preventable diseases and cancers, particularly, those affecting the heart, liver, and lungs and the adoption of the World Health Organization's Framework Convention on Tobacco Control (FCTC) in 2003 (which Tanzania ratified in 2007), has been a game changer for the future of the tobacco industry. Although the Convention makes provision for countries dependent on the crop to phase it out over time by developing substitutes the author notes crop substitution has been challenging and tobacco production has been getting a disproportionately high allocation of modern agricultural inputs at the expense of other crops, especially cereals. However, they observe that the future of the tobacco value chain faces challenges from environmental consciousness due to its impact on forests; its high preponderance of use of child labour, environmental and health challenges, inefficiencies in the marketing system, low productivity, the poor management governance of primary societies and unions and corruption. The authors conclude that while searching for a substitute for

tobacco in order to support livelihoods of tobacco growers, the quality of tobacco leaf has to be improved and factors affecting the market of Tanzania's tobacco addressed.

Chapter 6 on Contrasting tales of value chains: Tanzania and Vietnam, raises the importance of marketing, coordination and support to farmers using the experiences of Vietnam. It deciphers lessons that can be learnt from this experience by Tanzania in order to strengthen cashew production, productivity and competitiveness on global and local markets. The key lessons include state facilitation as well as coordination instead of mere regulation; promotion of competition, liberalization and deregulation of crop purchase and the distribution of inputs; the promotion of diversification of cash crops to protect farmers from shocks likely to arse out of price fluctuation, crop failure and natural disasters. It also makes a strong case for the promotion of advanced skills and knowledge of international standards in processing which it argues has been marginalized in the policies of Tanzania.

Chapter 7 on 'Successful Collaboration between Government and CSOs for Poverty Alleviation in Tanzania: Two Case Studies' discusses factors that support and those that limit cooperation between governments and civil society organizations in policy development and implementation. On the part of CSOs the author opines that recognition and support to them by governments is undermined by their assumed dependency on donor funding, absence of ascertainable constituencies to which they are accountable, lack of reliable membership and positioning themselves as adversaries rather than as partners of governments in the development process. The author uses two case studies one from Tanzania Mainland and another one from Zanzibar to show that where CSOs develop clear developmental strategies, establish clear and transparent management systems, build alliances between themselves and government agencies in their areas of focus and when they source and secure local funding from governments, cooperation in policy implementation becomes possible and effective, strengthening implementation of rural development policies.

From the findings of the various chapters of this book it is clear that the Government of the United Republic of Tanzania has consistently put rural transformation at the centre of is development strategy. It has launched several agricultural development programmes such as Kilimo cha Kufa na Kupona (Agriculture as a Matter of Life and Death), Siasa ni Kilimo (No Politics without Agriculture) and Kilimo Kwanza (Agriculture First). Under the Second National Development Plan 2016/2017 to 2020/2021 the real growth rate in the agricultural sector is expected to rise from 3.4% in 2015 to 7.6% in 2020 and 13.1% in 2025. The share of the sector of GDP is expected to rise from 29.7% in 2015 to 29.4 in 2020 and 32% in 2025 while its share of export earnings is expected to increase from 20.4% in 2015 to 24.9% in 2020 and 36.7% in 2025.These are achievable goals but to reach them there is need to increase the level of production and productivity by

small holder farmers. This requires intensifying existing efforts, building upon existing strengths and addressing perceived weaknesses. Below we present a few suggestions by way recommendations on how to do this.

8.2 Strengthening Land Reforms beyond Titling

The on-going process of issuing titles is very important as it provides a basis for farmers to have tenure based on land titles which they can use for transacting on the land. But titling will be more supportive of production if it goes beyond recognition and addresses inequities and inequality in land ownership patters. This may require the following measures:

- Giving titles to those who occupy land but also ensuring women and the youth who are excluded from land ownership by customary law systems are also included. This may require a reassessment of the usefulness of customary land tenure in the Tanzania we aspire to see in 2030.
- Ensuring titling and land allocation does not lead to the disappearance of the commons such as common water sources, common forests and common grazing grounds.
- Strengthening transparency in the recognition of rights of occupancy to ensure that ethnicity and systems of exclusion based on religion and other negative factors do not undermine the whole purpose of social inclusion.
- Promoting transparency and protecting land owners issued with titles from corrupt practices at village, ward or community level.
- Ensuring land use regulations are in place that will preserve the environment and curb land fragmentation, deterioration in the quality of land and the advance of encroaching bushes.
- Ensure the preservation of indigenous knowledge systems through farmer education and training on land use and environmental conservation.

8.3 Adaptation of Holistic Strategies to Rural Development

From the various chapters in the book, it seems that policies have continued to be designed and implemented through a top down approach using the high modernization drive discussed in chapter 1. What is clear is that as the African saying goes, ‘you cannot teach a child to walk by holding its hands’. Farmers are normally assumed to be less knowledgeable and their skills and systems are normally assumed to be inferior. As chapters 2, 3 and 4 have indicated lack of formal education is a stumbling block to the acquisition and diffusion of technology and proper utilization of knowledge by farmers. However, farmers have their own indigenous knowledge on which formal education and skills imparted from experts should build. What is required is that experts have to be aware of the indigenous knowledge and upgrade it in order to create hybrid knowledge instead of destroying or marginalizing the local and indigenous knowledge that has sustained rural communities for centuries. This interface between modern

and indigenous knowledge could be achieved by adapting the following approaches.

- Using rural research institutes especially those under the Tanzania Agricultural Research Institute (TARI) to promote more research on indigenous knowledge, develop hybrid between indigenous and modern technology and promote advances in modern and indigenous biotechnology, bio-vaccines, bio-safety and information technology.
- Upgrading capacity for agricultural extension services by reconsidering the re-introduction of subject matter specialists in agricultural training so that experts are sent to areas where crops or livestock on which they specialized are grown or common.
- Building and enhancing capacity and capabilities for agricultural officers to identify compatibility between certain inputs and technologies on the one hand and ecological, cultural and other interface conditions on the other.
- Increasing support for institutional innovations in critical issues that impact on farmers' productivity such as land and water management, cooperative societies' management, managing collectives of men, women, youth, physically, mentally and health challenged persons.
- Facilitating learning by farmers from each other through exchange programmes organized by crop authorities or farmers' associations.
- Reviewing, mapping and supporting rural off farm activities and allocating resources and facilitating their development as a bulwark against youth and women unemployment and income shocks at household and community levels.
- Improving land productivity by linking supply of fertilizers with availability of affordable seeds; training on land reclamation and reviving indigenous methods of farming with positive impact on soil and fertility conservation.
- Assessing and addressing challenges that prevent women and youth from utilizing their potential on various agricultural value chains.
- Establishing community learning centres or revitalizing folk development colleges in order to ensure vocational and technical training captures knowledge relevant to the activities of farmers in areas where they are located instead of them offering generic courses for urban oriented jobs for which such skills are already supersaturated.
- Using these community learning centres as hubs for training farmers on disaster preparedness and as repositories of local knowledge, art, culture, shared values, and promoting games and preparing youth for community service and self-employment.
- Establishing pools for tools that can be used by farmers at low cost including agricultural equipment and animals such as oxen for farming and bulls for fertilization.

- Promoting and establishing risk reduction (shock management) facilities such as seed and cereals banks which can help poor farmers to deposit surplus at times of bad prices or low demand for reserves by the Tanzania Food Research Authority instead of selling the surplus to speculators only to buy it back in cash or in kind at exploitative costs during times of food scarcity.
- Promoting quality assurance by training extension officers on the quality standards of agricultural products under the regulations of the Tanzania Food Drugs Authority, the FAO and other standards applicable to agricultural imports on export markets.

It is our belief that if some of these recommendations are taken into account, some of the challenges identified in the studies that informed this book will be overcome.

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AGRICULTURAL POLICY AND POVERTY REDUCTION IN TANZANIA

This book focuses on a selected number of policy interventions in the agricultural sector with the view to determining factors that have supported or constrained the success of these interventions in poverty reduction which is the main objective of development initiatives in Tanzania. It analyses the success and challenges of Ujamaa socialism and the impact of education and access to finance and attempts to promote rural growth through subsidized inputs and tiller technology. It has case studies on coffee, cashew, sisal and tobacco in the contexts of market, Organization of production and productivity. It calls for integrated approaches that combine farmer education and increased access to credit as well as technology that can enable farmers to become less dependent on rain fed agriculture.

Prof. Paschal Mihyo is a holder of LLB, LL.M and a Ph.D. in Public Law from the University of Dar Es Salaam. He is a professor of Politics and Administrative Studies and a visiting Professor of Development Studies at the University of Namibia, and at the International University of Management in Namibia. Currently, he is a Senior Visiting Research Fellow at REPOA. Formerly, he was the Executive Director of the Organization for Social Science Research in Eastern and Southern Africa (OSSREA) between (2008-2014). He taught at the International Institute of Social Studies, Erasmus University Rotterdam in The Hague where he was Deputy Rector, Academic Affairs (1992-1995). Convener of the Labour and Development Programme and Deputy Convener of the Human Rights Programme. From April 2004 and September 2005, he served as Director of Research and Programs at the Association of African Universities in Accra.