UNIID Africa

UNDERSTANDING THE ROLE OF PUBLIC UNIVERSITIES IN COMMUNITY DEVELOPMENT IN MALAWI:

UNLOCKING THE NATURE OF INTERACTIONS

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Lead Research Institution:
Human Sciences Research Council (HSRC)
Private bag x9182
Cape Town
South Africa

Research Teams:

Glenda Kruss, Michael Gastrow (HSRC-gkruss@hsrc.ac.za)

M.M.M. Bolaane, I.N. Mazonde, A. Neba, M.B.M. Sekhwela (University of Botswana-UB-mazondei@mopipi.ub.bw)

John O. Adeoti, Andrew Onwuemele, Yetunde Aluko, Oluwakemi Okuwa, Augustine Osigwe (Nigerian Institute of Social and Economic Research- NISER- adeotij@yahoo.com)

Timothy Esemu, Samuel Mafabi, Simon Peter Ojok and Peninah Arecho (Makerere University Business School- MUBS- tesemu@mubs.ac.ug)

Patson C. Nalivata, Joseph Uta, Kenneth Wiyo, Fanuel Kapute (Lilongwe University of Agriculture and Natural Resources- LUANAR-patienalivata@yahoo.com)

Astrid Szogs, Lugano Wilson and Ludovick Manege (Tanzania Industrial Research and Development Organization –TIRDO-luganowilson@yahoo.com)

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ACRONYMS

ADD	Agricultural Development Division
AEDC	Agricultural Extension Development Coordinator
AIDS	Acquired- Immune Deficiency Syndrome
AVO	Assistant Veterinary Officer
BVM	Bachelor of Veterinary Medicine
CARD	Centre for Agricultural Research and Development
CARP	Community Action Research Programme
CBO	Community Based Organization
CIDA	Canadian International Development Agency
CSOs	Civil Society Organizations
DADO	District Agriculture Development Officer
DAHLD	Department of Animal Health and Livestock Development
DAHLDO	District Animal Health and Livestock Development Officer
DAS	Development Assistance Strategy
DFO	District Fisheries Officer
DST	Department of Science and Technology
EPA	Extension Planning Area
ESIP	Education Sector Implementation Plan
EU	European Union
FAIT	Farmer Artificial Insemination Technician
FBOs	Faith-Based Organizations
FICA	Flanders International Cooperation Agency
FIDP	Farm Income diversification Programme
FISP	Farm Inputs Subsidy Program
FUM	Farmers Union of Malawi
GoM	Government of Malawi
GERD	Gross Expenditure on Research and Development
GDP	Gross Domestic Product
HDR	Human Development Index
HIV	Human-Immuno Deficiency Virus
HIS	Integrated Household Survey
IDEAA	Initiative for Development and Equity in African Agriculture
IDRC	International Development Research Centre
IPP	Intellectual Property
ICT	Information, Communication Technology
ICT4D	Information, Communication Technology (ICT) for Development
LDF	Local Development Fund, Malawi
LUANAR	Lilongwe University of Agriculture and Natural Resources
MDGs	Millennium Development Goals
MGDS	Malawi Growth and Development Strategy
MIRTDC	Malawi Industrial Research and Technology Development Centre
MOEST	Ministry of Education, Science and Technology
MTEF	Medium Term Expenditure Framework
MUST	Malawi University of Science and Technology
MZUNI	Mzuzu University
NAC	National Aquaculture Center
NARS	National Agricultural Research Stations
NBBP	National Biotechnology and Biosafety Policy
NCHE	National Council for Higher Education

NCST	National Commission of Science and Technology
NEPAD	New Economic Partnership for African Development
NESP	National Education Sector Plan
NPK	Nitrogen, Phosphorus and Potassium Fertilizer
NGOs	Non-Governmental Organizations
NRCM	National Research Council of Malawi
NSI	National Systems of Innovations
OECD	Organization for Economic Cooperation and Development
OPV	Open Pollinated Variety
PCO	Programmes Coordinating Office
R&D	Research and Development
RFN	Regional Fish Node
RIU	Research into Use
RUFORUM	Regional Universities Forum for Capacity Building
SAC	Scottish Agricultural College
SADC	Southern African Development Community
SAETS	Support of the Agricultural Extension and Training Services Program
S&T	Science and Technology
SRUC	Scottish Rural Agricultural College
STI	Science and Technology Innovation
SWAPs	Sector Wide Approaches
TA	Traditional Authority
TAPP	Trustees of Agriculture Promotion Programme
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNECA	United Nations Economic Commission for Africa
UNEP	United Nations Environment Programme
UNIID	Universities Innovations for Inclusive development in Africa
UNIMA	University of Malawi
UK	United Kingdom
USAID	United States of America International Agency
WATSAN	Water and Sanitation Project
WFC	World Fish Center
WUSC	World University Service of Canada

Preface

With the economic crises, contestation about the role of universities in industrial and other innovation processes has shifted. The emphasis in the pasthas tended to be on whether and how universities should support economic development and growth through industrial innovation processes, and what research, new knowledge and technology can contribute, particularly in relation to high-technology formal sectors. Much research centred on how to enhance technology transfer, establish effective incubation facilities, support patents and licencing, or other forms of profitable commercialisation of intellectual property.

Such a discourse tends to obscure a more inclusive and developmental form of engagement and interaction that could contribute to innovation and economic development. In countries that belong to the Organization for Economic Co-operation and Development (OECD), the recent economic crisis has shifted debate from innovation for global competitiveness, to consider how to mobilise shrinking resources to best address growing inequality, poverty and unemployment. In emerging economies, there are growing claims that science, technology and innovation-led growth can in fact result in higher levels of poverty and inequality *within* a country.

Thus, while in the recent past the link between innovation and growth was indivisible, recently a new debate has emerged, centred on the connection between innovation and social inclusion. Indeed, in transitional and developing contexts like those in southern Africa, for many years, universities were challenged to establish a new social compact where they became key agents for inclusive social and economic development. Greater emphasis is accorded to the roles the knowledge work of university academics play in poverty reduction and the ability of all social groups to create opportunities, share the benefits of development and participate in decision-making.

New study on innovation in southern Africa

Such an emphasis drives the focus of the present study, *Universities and Innovation for Inclusive Development (UNIID) Africa*, funded by the International Development Research Centre (IDRC). It seeks to build a stronger African empirical research base in collaboration with partners in four SADC countries - Botswana, Malawi, South Africa and Tanzania - as well as Nigeria and Uganda. The UNIID-Africa project seeks to address the limited attention paid to how universities contribute to innovation for inclusive development, specifically, to innovation activities that provide livelihoods to the excluded and disadvantaged.

The project aims to make a significant conceptual and methodological contribution to research on innovation, development and higher education. It challenges the focus of innovation studies - typically on science and technology, radical innovation and economic development in formal sectors - and extends the remit to encompass innovation that is incremental, takes doing, using, and-interacting modes, and is based in informal settings. In turn, the tendency of development studies to focus on top-down development is challenged in favour of inclusive development that focuses on participation by the marginalised as active agents. In taking such an approach, the project aims to contribute to a theoretical bridge between innovation studies and development studies that is under-explored and under-theorised.

Linking knowledge generation and the public good with innovation

Similarly, the innovation studies literature is often marked by a conceptual myopia towards the substantive knowledge-generation role of universities and their contribution to the public good. A corresponding myopia exists within the higher education literature, which has insufficient accounts of the role of universities in innovation, technology transfer and diffusion toward economic development. The project seeks to overcome this impasse by linking the knowledge imperatives of universities in relation to the public good and social justice, with those of innovation and technology transfer.

Based on such ambitious conceptual integration, the research aims to conduct empirical research in African universities, in order to make innovation that may be taking place visible; to make the nature of

university-community interactions explicit; and to highlight the university as an actor in the innovation system engaging the community. In terms of higher education governance, it addresses issues ofaccountability to social needs, and promoting scholarship that is more socially and economically responsive to (local) contexts. In terms of the implications for higher education management, the issue is how to create a stronger coherence between research, teaching and community engagement. Finally, the research aims to identify what kinds of incentives will be appropriate as drivers and to address bottlenecks.

Methods and mapping

An interlocking set of research and policy oriented activities commenced in October 2012, founded on a survey methodology to map forms of university interaction with the full range of possible social partners in each country – whether firms, farmers, communities, government, or social organisations. Such a process will provide an overview of the main kinds of partners, the main types of relationships, channels of interaction, the outcomes and benefits of interaction and the main barriers and blockages, across distinct types of institution in each higher education system. The analysis will draw on interviews with senior university management and academics, as well as analysis of institutional documents to understand the governance and management conditions within universities that support diverse patterns of interaction.

The mapping will provide a rich descriptive foundation of existing interactive practice within the universities in a national system of innovation, an empirically contextualised baseline for investigating specific cases of innovation for inclusive development.

We plan a set of comparative case studies in which universities and communities interact to innovate in informal settings to enhance livelihoods. For example, adaptations and diffusion of cell phone technology to inform small scale farmers' harvest and marketing practices or women market stallholders' cooperative practices; or exploiting local knowledge of local conditions in collaboration with university knowledge to establish commercially viable enterprises.

Comparing case studies within and across country contexts will provide an evidence base of the facilitators of and constraints on innovative and interactive practice in sectors critical to the informal livelihoods of marginalised communities. Such analysis allows for policies to be informed by insights from the local level and by the priorities of the poor.

Together, the mapping of university practice and the in-depth exploration of innovation in informal settings will allow us to interrogate critically the policy options and interventions typically proposed in the innovation systems literature. The research ultimately aims to inform better targeted policy adaptation and formulation in universities, and amongst the higher education, science and technology, and economic development communities in each country, towards inclusive development.

This report presents an in-depth exploration of universities' roles in innovation in informal settings to enhance community livelihoods in Malawi.

Glenda Kruss
Project Leader, South Africa team leader
Isaac Mazonde, Botswana team leader
Patson Nalivata, Malawi team leader
John Adeoti, Nigeria team leader
Lugano Wilson, Tanzania team leader
Timothy Esemu, Uganda team leader

CHAPTER 1: INTRODUCTION

1.1 Economic context for Malawi – The livelihood/development challenge imparting the populace and efforts for remedy

Malawi is land locked country and relies mainly on agriculture for its economy. About 85% of the Malawian population live in rural areas and are poor resource farmers *i.e.* they are involved in non-diversified crop production, with an average family size of 6.5 people living on 0.5 hectares of land. The staple food for Malawi is maize and most of the land is grown to this particular crop intercropped with beans where necessary. Most of the rural farmers are subsistent; thus, to make any type of income people rely on piece-jobs, working on other peoples land, making charcoal, run small income generating activities or receive remittances from relatives in the city or abroad among others. Limited incomes means that people live in poverty, are food insecure, have low qualities of life and struggle to secure children's school fees. Furthermore, the heavy dependency on poor resource farming results in significant environmental problems including deforestation and rampant land degradation, which results in soil erosion and river siltation problems,resulting in lowpower generation.

In an attempt to reduce the poverty levels and bring Malawi to the path of development and prosperity, a number of strategies and policies have been developed and are being implemented. These include Malawi Vision 2020, the UN Millennium Development Goals (MDGs) and the Malawi Growth and Development Strategy II, which contextualize higher education (HE) as a vehicle to bringing change and improve quality of life as will be elaborated in the later chapters. Further to these strategies, Malawi has an array of policies which aim to operationalize these development strategies with respect to the National System of Innovation (NSI), *vis* National Science and Technology Policy; the National Biotechnology and Biosafety Policy; the National Intellectual Property Policy; and the National ICT Policy. It is noted that these policies were created to support research at different levels including in higher education. The policies are in line with the countries' development strategies in principle they are focused on addressing constraints to agricultural production and help in attainment of the Malawi Government's goal of increasing agricultural productivity.

1.2 Contextualization of National System of Innovation Framework and Innovation for Inclusive Development

The National Systems of Innovation(NSI) is a network of institutions and economic agents whose interaction generates the innovations that lead to realization of the national growth and development goals. Lundvall, (1992), in his analysis, identified the main elements of the NSI framework to include internal organization of firms, inter-firm relationships, role of the public sector, institutional set-up of the financial sector, R&D intensity and R&D organization. Education and training are critical elements of the NSI when analyzing the role of NSI in building technological capability in developing countries. The role of education subsystem in the NSI has been amplified by several authors and from different perspectives in recent years. The literature, (Kruss *et al*2012*;* Sutz, 2000; Kruss, 2005; Juma, 2006) provide evidence of growing concern that universities in developing countries should make their teaching, research and community engagement activities relevant to the needs of the society and promote innovation. The educational system, especially tertiary education, is therefore a critical element of the national system of innovation (NSI) framework. The role of knowledge and innovation as drivers of social and economic development has been well established. Anumber of empirical studies indicate that economic and social progress are increasingly determined by how knowledge resources are harnessed for the generation and use of innovation in the process of addressing pertinent development challenges (Malerba & Nelson, 2012).

The African continent has a huge potential for economic growth, if all its natural and human resources are well utilized. Currently, hundreds of millions of people in sub-Saharan Africa rely on agriculture for their employment and livelihood. Agriculture also contributes to export earnings as is the case of Malawi. However, as national populations continue to grow, food production has failed to keep pace as a result of various production constraints. Acombination of the use of technology and *innovative* approaches has the potential to overcome most of the production constraints (Ochola *et al.,* 2013). *Innovation is about doing something 'new', by using existing or novel information in new ways* (Davis *et al.,* 2008). Through research and training programs that foster innovation, higher agricultural education and training in sub-Saharan Africa is poised to contribute immensely to agricultural and rural development (Spielman *et al.,* 2009; Klerkx *et al.,* 2010). But there is an urgent need for universities to take up new approaches in order to provide the technologies and expertise as well as the required institutional innovation.

There is thus an emerging literature on what is loosely termed 'social innovation' (Soares, Cassiolato & Lastres, 2008) or 'grassroots innovation' (Gupta, 2003), 'below the radar innovation' (Kaplinsky, 2011), 'frugal innovation' (Tiwari and Herstatt, 2012; Zeschky *et al.,* 2011) within the ambit of innovation for inclusive development (IID). According to Cozzens and Sutz (2012:2), *inclusive development* is considered to encompass actions that are both by and for marginalized groups–communities and individuals excluded from circles of social and economic power. Marginalized groups are mostly prevalent in informal settings and under this concept they ideally should have involvement in all stages of collaborative projects (Gomez- Marquez, 2010). On the other hand, UNDP[1] defines *inclusive development* as "development that marginalized groups take part in and benefit from, regardless of their gender, ethnicity, age, sexual orientation, disability or poverty". The concept of inclusive development attempts to address the deepening inequality across the world that has arisen despite unprecedented economic growth. With respect to innovation systems, Lizuka (2013) defines innovation for inclusive development (IID) as an emerging concept which describes innovation addressing the poor and marginalized population/communities especially in developing countries.

Agricultural innovation systems,as in Malawi, present a broad, inclusive and holistic means to strengthen capacity for creation, diffusion and application of knowledge. However, capacity for institutional innovation is still very limited among organizations in sub-Saharan Africa (Davis *et al.,* 2007). There has been limited attention in the past to cultivating such skills and attitudes within agricultural departments of African universities, leading to a significant capacity gap of problem solving and rural development. This gap is further exacerbated by the lack of institutional acknowledgement of the importance of such skills. As for the formal sector economy, university's community engagement has laid emphasis on university-industry linkages, and there is often a mismatch between universities' and firms' perception of the imperatives of interaction (Kruss *et al.,* 2012; Etzkowitz and Zhou, 2008). However, the predominance of the informal sector economy in developing countries and the recent attempts at re-thinking development for inclusiveness have created the need to draw universities into examining how their teaching, research and community engagement can benefit the marginalized communities (Cozzens and Sutz, 2012; Kruss, 2012).

As we advocate for innovation for change, organizational change in universities will require interaction for different parties between administrators, academics, researchers, students and other university actors, which requires internal change champions, facilitation and coordination. Within the same framework, all these university actors interact with others in society like farmers, service providers, processors, traders and in a way in which this happens is an important part of innovation capacity development.

[1] http://www.undp.org/content/undp/en/home/ourwork/povertyreduction/focus_areas/focus_inclusive_development/ (accessed on 26 December 2014)

Among other factors, effective coordination for innovation occurs when:

i. Committed and capable leadership promotes the collaboration
ii. An organization offers appropriate (often new) positive incentives to individuals from cooperating organizations (such as researchers or farmers)
iii. Important stakeholders that coordinate their activities have the mandate, culture and freedom to participate, and
iv. Turnover of individuals participating in the collaboration is low (a relatively common problem with high level civil servants) (World Bank, 2012)

To facilitate an innovation process, the stakeholders must have a clear understanding of:

- How innovation comes about;
- The actors involved in the innovation system and their roles;
- The 'rules' (laws, regulations, traditions, customs, beliefs, norms and nuances) that guide the behavior and practice of actors in an innovation system;
- How smallholders are engaged in and affected by a process of institutional learning; and
- How universities and other actors can facilitate innovation for the benefit of smallholder farmers, the private sector, policy processes and employers of graduates (Ochola *et al.*, 2013).

By engaging policy makers to create an enabling environment for agricultural innovation systems to flourish, the change becomes achievable.

1.3 Forms of Interaction between Universities and External Social Partners

The *Universities and Innovation for Inclusive Development* in Africa (UNIID Africa) is a research project designed to examine how university types in selected sub-Saharan African countries interact through their teaching, research and community engagement activities with diverse external social partners. The external social partners in this context are regarded as actors that are often characterized by exclusion from formal sector economic activities and are vulnerable to poverty by reason of economic and/or social marginalization. In the analysis of Cozzens and Sutz (2012), universities in innovation for inclusive development should thus focus on innovation in informal settings, such that innovation results in economic empowerment of the actors in marginalized communities. The interactions between these actors can take different forms. The four possible modes of interactions between higher educational institutions (*e.g.*, universities) and industry are aptly represented in Figure 1.1. As explained by Kruss (2012), the drivers of interaction are either primarily financial with the aim of mobilizing resources for higher education institution or industry, or primarily intellectual with the aim of improving knowledge resources of the higher education institution or industry. The different forms of interaction are:

1. Entrepreneurial forms of partnership with a focus on commercialization of research results/outputs. This is primarily motivated by desire to create value and improvement in the finances of industry and higher educational institutions.
2. Service forms of partnership comprising of consultancies and contractual engagements between universities and industry. This is motivated by both financial and intellectual reasons, and often involves a consultant-client relationship where industry collaborates with academia to address industrial challenges.
3. Traditional forms of partnership comprising of sponsorships and donations by industry to universities. This is primarily motivated by intellectual concerns aimed at increasing basic and applied knowledge.
4. Network forms of partnership involving multi-stakeholder relationships and collaborations with a view of addressing perceived economic and/or social challenges. There are economic and/or social incentives for agents' participation in the networks, and the primary motivation for the

participation of higher educational institutions and industry can be either primarily financial or primarily intellectual.

Though all the four forms of interactions can generate innovation, Cozzens and Sutz (2012) and Kruss (2012) indicate that the network forms of partnership are known to be relatively more potent in generating innovation that improves the livelihood conditions of the marginalized communities.

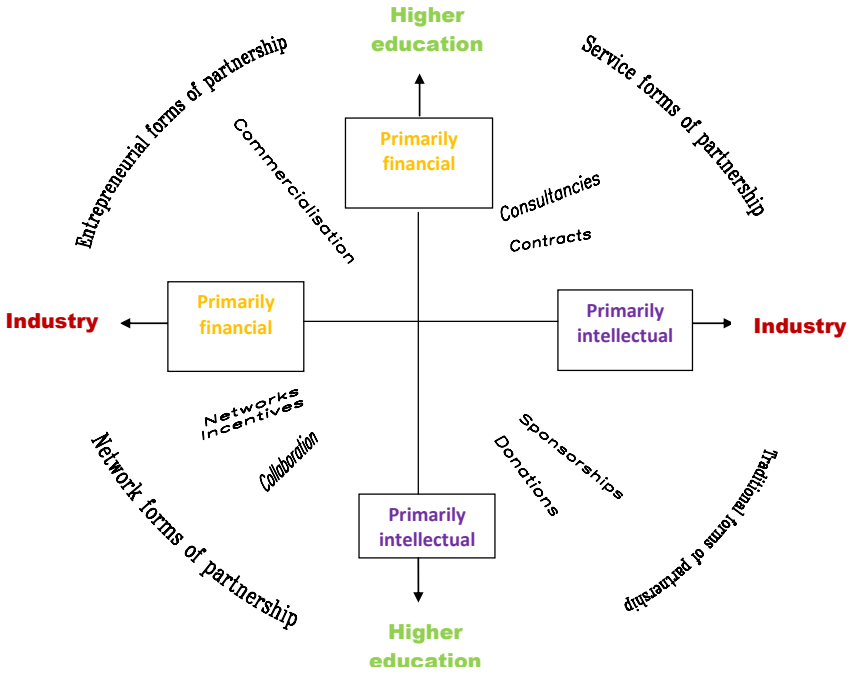


Figure: 1.1: Forms of interaction(Adopted from Kruss, 2012)

1.4 UNIID Research Questions and Objectives

The UNIID Africa project was hinged on overall dissatisfaction with the tendency to promote universities' economic role in innovation and competitiveness through a narrow focus on industry interaction. Contestation was whether the emerging systems of innovation can be understood sufficiently by focusing on industry and firms alone or if there is need to go beyond researching university-firm interactions by including development-oriented interactions between universities and other productive agents, such as those in informal sector, small-scale farmers or community cooperatives? Can this be more encompassing to include other social partners like non-governmental organizations (NGOs), community groups, local government and indigenous knowledge producers? The UNIID Africa project was aimed at promoting a more coherent understanding of the catalyzing role of universities in enabling innovation and creativity in Southern and sub-Saharan Africa, and in addressing bottlenecks to innovations oriented towards improved livelihoods and inclusive development. In addressing this aim, a consortium of six countries undertook this research including South Africa, Botswana, Uganda, Tanzania, Malawi and Nigeria. Among its many objectives, UNIID Africa project wanted to document patterns of university interactions with external social partners across the range of higher education institutions; investigate the nature of functioning of knowledge intensive innovation networks that involve universities and external social partners in different sectors; document interface structures, organizational

arrangements and motivations that support and facilitate interactions involving universities and broad range of social actors just to mention a few.

The Malawi research report presents the empirical evidence on the nature of interactions with external social partners in two case study universities; their implications for the national system of innovation and the potential role of universities in inclusive development in the Malawi context. Malawi has only four public universities. Broadly, universities in Malawi can be categorized into two: *conventional universities* and *specialized universities*. Conventional universities offer courses in the pure and applied sciences, the social sciences and humanities; while specialized universities are either universities of agriculture, mainly offering course programmes in agricultural sciences, or universities of technology, with course programmes mainly in engineering and other technology-related fields. Two universities were selected for case studies of mapping interactions between universities and external social partners in Malawi. Lilongwe University of Agriculture and Natural Resources (LUANAR) was selected which is an *agricultural university* set in a rural setting; and Mzuzu University (MZUNI), which is a conventional universityin a peri-urban setting.

With respect to the UNIID Africa research aims, the main research question for this study was: How do different types of universities interact for the benefit of external social partners, especially the marginalized communities, with the strategic aim of promoting innovation for inclusive development? The following are the specific research questions that were conceptualized for the Malawi study:

1. What is the role of universities in the national system of innovation?
2. What is the role of higher education system in development and bringing positive change to the marginalized communities?
3. How are different types of universities organized and structured to interact with external social partners, and marginalized communities?
4. What are the emerging instances of university-external social partner interaction to promote innovation for inclusive development that can be identified in these institutions?
5. What are the main enablers and constraints on the instances of innovation that enhance livelihoods in informal settings?

The overarching objective of the Malawi research component was to investigate the manifestation of universities' community engagement as they interact with external social partners, especially marginalized communities with the strategic aim of promoting innovation for inclusive development. The specific objectives of the study were:

1. To review the role of HE in Malawi in the NSI;
2. To investigate the role of higher education systems (universities) in marginalized rural communities;
3. To ascertain how different types of universities in Malawi are organized and structured for interaction with external social partners, and marginalised communities;
4. To highlight the emerging instances of university-external social partner interaction that promote innovation for inclusive development; and
5. To identify the possible enablers and constraints on innovation that enhance livelihoods in informal setting.

As Malawi's economy is agro-based, agriculture and natural resource management, value addition and promotion of agricultural innovation in general are key to growth and improvement of livelihoods. This background consequently prioritized the selection of the agriculture and natural resources oriented universities as case studies in analyzing and understanding the context under which university research, teaching and community engagement that involve interactions with external social partners manifest.

The report has six chapters. Chapter two situates the study by describing Malawi's economic growth performance, higher education system and potential for innovation for inclusive development. Chapter three presents the methodology of the study. The results of mapping of interactions of academics with marginalized communities for LUANAR and MZUNI are presented in Chapter four. Chapter five covers the analysis of case studies of innovation in informal settings selected from the two public universities in Malawi. The case studies included a dairy outreach project which is livestock based, and a fish farming project both from LUANAR, and a botanical pesticide case study from MZUNI. The final chapter draws conclusions and recommendations from the Malawi case.

CHAPTER 2: ECONOMIC GROWTH PERFORMANCE, HIGHER EDUCATION SYSTEM AND INNOVATION FOR INCLUSIVE DEVELOPMENT

2.1 Country background and economic challenges

Malawi is bordered by Tanzania to the North, Zambia to the west and Mozambique to the west, south and east(see map 2.1). Currently Malawi has a multi-party democratic system. It has a population close to 14 million and got its independence in 1964. Malawi's social indicators are among the lowest in the world. According to the Human Development Report (HDR, 2011), Malawi is one of the world's poorest countries, ranking 171st out of 187 countries in the world. Malawi has a Gross National Income per capita of US$ 753.00 compared to an average of US$ 1 966 for the sub-Saharan Africa region at 2005 constant purchasing power parity.

Map 2.1: Map of Malawi in relation to her neighbours

The mean number of years of schooling for Malawi is 4.2 years compared to 4.5 years for the sub-Saharan Africa region, and 11.3 years for countries in the very high human development index. Malawi's public expenditure on education between 2006 and 2009 was 6.2% of the GDP, which is almost the same as average of sub-Saharan Africa region at 6.4% (HDR, 2011).

Poverty is wide spread in Malawi with the majority of the population residing in the rural areas and predominantly working on subsistence farming. The current poverty head count of the population of Malawi stands at 50.7% while 25% are deemed ultra-poor (NSO, 2012). The consequence of the high poverty levels has led to degradation of the natural resources and deforestation as people attempt to find a means to earn a living. Similarly, the high population of the country has also reduced the land holding sizes to less than 2 ha per household, leading to continuous cultivation and increased land degradation. Lack of access to food during most times of the year is a major problem for the majority of the rural population. A recent integrated household survey indicated that about 41% of the rural population reported that they had inadequate food consumption (IHS3, 2010; NSO, 2012). With the majority of the population (80%) comprising rural farmers, the Government of Malawi realizes that economic growth prospects for Malawi will require increased investments in the agricultural sector to increase productivity and crop diversity. The competitiveness of the agricultural sector will form the basis for broad-based economic growth, increased incomes and significantly reduced poverty and food insecurity.

2.2 Status of the Agriculture Sector in Malawi

Malawi's economy is agro-based. Agriculture is the single most important sector of Malawi's economy supporting the ever-increasing population with a medium growth rate of 2.5% per year (NSO, 2008). It is estimated to grow at 3.2% annually between 2010 and 2015 which is higher than the sub-Saharan Africa region estimate of 2.4% for the same period (HDR, 2011). The high levels of poverty and the strong reliance on subsistence agriculture present key challenges to the development and focus of NSI in Malawi. Given the diverse and pressing needs of the people of Malawi, especially women and youth, it is unlikely that government revenue growth will match pace with the required expansion of social services and of public investment. Consequently, the country relies on external development assistance which presently contributes an estimated 18% to the gross domestic product (GDP). This scenario has serious ramifications to the investment of the government purse in innovation in the higher learning institutions.

The agricultural sector in Malawi employs about 80% of the country's total workforce, accounts for about 30% of Gross Domestic Product (GDP), and contributes more than 80% of foreign exchange earnings (GoM, 2012). Table 2.1 shows the contribution of other sectors to GDP.

Table 2.1: Sectoral percentage contribution to GDP at constant prices in Malawi

Sector	**%**				
	2008	**2009**	**2010**	**2011**	**2012**
Agriculture, Forestry and Fishing	32.9	31.6	27.6	28.3	28.3
Mining and quarrying	0.9	1.0	2.3	2.1	2.3
Manufacturing	8.0	9.9	10.5	10.3	10.1
Electricity, gas and water supply	2.8	1.2	1.5	1.5	1.5
Construction	4.5	3.5	3.2	3.4	3.0
Wholesale and retail trade	14.0	17.4	21.2	20.6	20.7
Transportation and storage	3.4	3.5	3.8	3.8	3.8
Accommodation and food services	1.7	1.7	2.1	2.1	2.1
Information and communication	3.4	4.5	4.2	4.4	4.4
Financial and insurance services	6.4	6.5	4.8	5.1	5.3
Real estate activities	4.1	3.2	3.5	5.5	5.4
Public administration and defence	3.3	3.0	2.4	2.3	2.2

Source: Computed from Government of Malawi (2012). Statistical Year Book, National Statistics Office.

The agricultural sector is divided into a smallholder sub-sector and an estate sub-sector, which contribute about 70% and 30% to agricultural GDP, respectively. The estate sub-sector is centered on four key crops of tobacco, tea, sugar and cotton (in decreasing order of importance) targeting the export market. With the exception of cotton, the sub-sector is dominated by commercial farmers with access to expertise, capital and markets. It has not been vigorously promoted by the agricultural ministry whose main focus is smallholder subsistence agriculture. This is unlike other countries like South Africa where the emphasis is on commercial large-scale agriculture.

The smallholder sub-sector is primarily subsistence-oriented with maize as the principal subsistence crop cultivated by about 80% of the smallholders. Other important food crops include rice, pulses, cassava, sweet potato, Irish potato, sorghum, and millets. Despite substantial investments in the sector over the last 30 years, Malawi remains food insecure on account of high population growth resulting in small land holdings and low agricultural productivity. Improvements are needed in input provision, food availability, access and utilization. *The government commitment to the attainment of self-sufficiency in maize as one of the central elements of country's development strategy* is threatened by among others, severe land pressure, loss of soil fertility, deforestation and erratic rainfall due to climate change. STI and employment of inclusive innovation could offer mitigation and relief to some of these problems.

Lack of access to affordable inputs has led to low productivity of maize. An agricultural input subsidy programme (FISP) pursued since 2005 has, however, resulted in strong growth in smallholder agriculture and improved household food security thanks to favourable rainfall. The main objective of the agricultural input subsidy programme has been to achieve food security and improve incomes of vulnerable households while focusing on maize production, the country's staple food crop and determinant of food security. The targeted inputs are maize fertilizer (NPK, Urea), improved maize seed (OPV and hybrid), cotton and legume seed and grain storage pesticides. While vulnerable households have been able to improve food security on average between 3 to 6 months, the subsidy program has come at a cost. Government, urged by development partners, is looking for alternative strategies to support smallholder farmers. Despite success, drought or dry spells during the season greatly reduce the impact of FISP program. Systems to build resilience and adapt to changing climate are in their infancy. For example, irrigation development is at less than 100,000 ha against a potential of over 500,000 ha. Nonetheless, in order to reduce agricultural dependence on rainfall, improve productivity and diversify the crop mix, the Government of Malawi (GoM) is promoting irrigation farming (MGDS, 2011) through the National Greenbelt Initiative. This will allow the growing of two or more crops in a year to boost agricultural production and climate-proof agricultural production in a year of drought or erratic rainfall.

NSI institutions are expected to play a vital role in increasing productivity of smallholder farmers, climate proofing agricultural production through irrigation, and in crop diversification while promoting the commercialization and mechanization of smallholder agriculture. Furthermore, industrialization through value-addition of agricultural products is the current focus of government. Tertiary institutions in Malawi are increasingly being viewed as centres of excellence in generating knowledge and innovations to drive the sector.

2.3 Role of research area of innovations for inclusive development

When Malawi ponders its economic challenges, there is now an increasing understanding that development strategies are more likely to be achievable with inclusive innovations of the base-of-the-pyramid (BoP) groups (Cozzens and Sutz, 2012). It is in this context that the UNIID project endeavours to build a research network on the role of the institutions of higher learning (universities) and public research institutes in inclusive innovation and development in sub-Saharan African region, particularly

the SADC. The history and economic dynamics of our region, focus on innovation and interactions needs to shift beyond formal firms to a wider range of social partners, and beyond a sole focus on R&D and global competitiveness to include equity and inclusive socio-economic development (= reduces poverty, enables all to contribute, share benefits and participate in decision-making). This is particularly important in light of the majority of the population which relies on agricultural production in Malawi and lives in the rural setting and drives the economy and food security of the country. It is therefore imperative to reconceptualise the role of the university in IID to *inform change in academics' practice and institutional policy* in HE sector in each of the participating countries. Policy dialoguebetween HE sector, innovation policy actors and public sector on complex ways academic scholarship can therefore contribute to IID resulting into improved *capacity* of African researchers to *communicate, disseminate and facilitate uptake of research results in field of IID.* This calls that the policy frameworks and sectoral policies in the regional countries create space for the high education sector to promote IID and interactions.

2.4 Road map to addressing Malawi's economic challenges

As Malawi grapples with the problems of producing sustainably enough food for its people and reduce poverty levels in the changing global climate, and divorce itself from relying on rain-fed agriculture alone, and jump start economic growth and prosperity, a number of strategies and policy frameworks have been put in place and operationalized in an effort to build an NSI to address the development challenges of poverty and a small-holder led agriculture based economy. The key policy frameworks include: (1) The Malawi Vision 2020, (2) The UN Millennium Development Goals (MDGs) and (3) The Malawi Growth and Development Strategy II.

The Malawi Vision 2020 was developed in the late 1990s, and it sets out a long-term development perspective for Malawi. It emphasizes long term strategic thinking, shared vision and visionary leadership, participation by the population, strategic management and national learning (GoM, 1988; IMF, 2007). The Malawi Vision 2020 document captured the long-term aspirations of Malawians in the development agenda. While Malawi Vision 2020 has a long term orientation, the Millennium Development Goals (MDGs) for Malawi are anchored to the UN Millennium Development Goals (Malawi Government, 2010). The 2010 United Nations country assessment indicated that limited resource availability, ineffective use of resources, insufficient targeting and inadequate national implementation capacity have been inhibiting the achievement of MDGs by 2015. This framework has made sure that Malawi development agenda is aligned to the global UN targets thereby helping the country streamline and focus its resources towards critical areas of development. In order to achieve the these two policy frameworks, the country developed the Malawi Growth and Development Strategy II for the period 2011-2016 *i.e.* it is the overarching operational medium-term strategy for Malawi aligned to the attainment of both the Vision 2020 and the MDGs. Its main objective is to reduce poverty and achieve the Millennium Development Goals (MDGs). It is designed to attain the country's Vision 2020 with the underlying philosophy of creating wealth through sustainable economic growth and infrastructure development. It presents a policy framework that articulates issues related to both economic growth and social development. At implementation level, the country boosts a number of sectoral policies which makes sure that the development of the country does not disadvantage any sector.

To be in line with the needs and current state STI, and the need to interrogate the role of the higher learning institutions to development, the Malawi Growth and Development Strategy (MGDS) incorporated issues raised in existing Science, Technology and Innovation related sector policies in Malawi. The current STI related policies include the National Science and Technology Policy (2002); National Biotechnology and Biosafety Policy (2008); National Intellectual Property Policy and National ICT Policy. Further, there is National Education sector Plan (NESP, 2008), The Malawi Local Government and Decentralization Policy as well as several Acts governing Public Universities. The strategies and policies which the Malawi government is following to deal with the economic challenges

are reviewed in detail in section 2.5. The review will look at the strengths and gaps of these policy frameworks in STI in Malawi and also find their specific roles in supporting the country's development and interaction in the higher learning institutions.

2.5 Overview of NSI and National Higher Education System in Malawi

This section analyses the major policy frameworks and their thrust relative to building an NSI to address the development challenges of poverty and a small-holder rain-fed led agriculture based economy. This chapter will further examine the structure of the public research and the STI in Malawi.

2.5.1National STI Frameworks and Sectoral Policies

2.5.1.1 Malawi Vision 2020

In the late 1990s, Malawi developed the Vision 2020, which was launched in 2000. This policy framework sets out a long-term development perspective for Malawi. It emphasizes long term strategic thinking, shared vision and visionary leadership, participation by the population, strategic management and national learning (GoM, 1988; IMF, 2007). The Malawi Vision 2020 document captured the long-term aspirations of Malawians. With regards to STI, Malawi Vision 2020 espoused a science and technology-driven agro-based economy with increased commercialization and a reliance on research and development (R&D); adaptation of new and emerging technologies; promotion of environmentally sound technologies; existence of effective science and technologies (S&T); and increased implementation and use of information technology (IT).

From this, it is clear that NSI institutions have a significant role to play. However, low capacity of the education and training institutions to meet the requirements of the country's technology development remains one of the strategic challenges in achieving science and technology-led development anchored on smallholder subsistence agriculture. The investment levels for industrialization are low (low R&D budgets, low staffing levels) due to limited resources and the prevailing poverty levels. The strategic options to address the challenges include introducing S&T achievements awards and setting up NSI frameworks to promote deliberate transfer of technology.

2.5.1.2 The Millennium Development Goals-Case of Malawi

According to the 2010 national MDGs report, Malawi remains on track to achieve five out of eight MDGs (Malawi Government, 2010). The 2010 United Nations country assessment indicated that limited resource availability, ineffective use of resources, insufficient targeting and inadequate national implementation capacity have been inhibiting the achievement of MDGs by 2015. These obstacles have also hampered further progress on goals on which the country is currently on track. The MDGs not likely to be met are: Goal 2 (Achieve universal primary education), Goal 3 (Promote gender equality and empower women) and Goal 5 (Improve maternal mortality).

However, Malawi has continued accelerating efforts towards attaining MDGs by 2015 through the implementation of the Malawi Growth and Development Strategy (MGDS, 2011). According to African Development Bank (2005), education is of key importance in helping to develop Malawi and reduce poverty levels. Since the introduction of free primary education in 1994, Malawi has made a tremendous progress towards attaining universal primary education. The net enrolment in primary school in 2011 was 80.2%, up from 58% in 1992, while the proportion of pupils starting grade one, who reach grade five, without repeating also increased from 64.4% in 1992 to 73.5% in 2010 (MGDS, 2011).

The free primary education resulted into a sudden huge enrolment of children into primary schools when government did not have enough resources such as classrooms, books, teachers. This has a ripple effect in that poor graduates from primary school system result in poor graduates at secondary and tertiary levels. This has had a negative impact on tertiary and vocational skill-based learning, which requires a supply of suitably educated secondary school leavers to train. This partly explains the low level of labour skills in Malawi (African Development Bank, 2005). Despite Malawi working towards achieving millennium development goal of universal primary education and implementing free primary school education, the quality of graduates entering tertiary education institutions, including universities, is poor, forcing public universities to further screen candidates through a university entrance exam, on top of the Malawi School Certificate of Education (MSCE).

Low primary and secondary enrolment ratios and gender imbalance means that the numbers accessing tertiary education are low, and biased towards boys. According to the University of Malawi Strategic Plan (2012), Malawi has the lowest levels of tertiary education in the world. Its current tertiary institution participation rate stands at 0.4% of the eligible population against an average for sub-Saharan Africa of 5%, developing countries of 17%, and world average figures of 24%. This has a bearing on the success and capacity of the NSI in the country. Despite these challenges, the Malawi Government realizes that education is the catalyst for socio-economic development, industrial growth and instrument for empowering the poor, the weak and the voiceless (MGDS, 2011).

2.5.1.3 Malawi Growth and Development Strategy II (MGDS II)

The Malawi Growth and Development Strategy (MGDS II), for the period 2011-2016, is the overarching operational medium-term strategy for Malawi aligned to the attainment of both the Vision 2020 and the MDGs. Its main objective is to reduce poverty and achieve the Millennium Development Goals (MDGs). It is designed to attain the country's Vision 2020 with the underlying philosophy of creating wealth through sustainable economic growth and infrastructure development. It presents a policy framework that articulates issues related to both economic growth and social development.

MGDS II is meant to serve as a single reference document for policy makers in Government, the private sector, civil society, donors, the international community and co-operating partners on the country's socio-economic development priorities. The MGDS II is a successor to MGDS I which came to an end in 2011. Agriculture and Food Security is the number one priority of MGDS II, while Education, science and technology is the second priority out of the nine (9) key priority areas. Rapid development in all sectors of the economy will require a highly skilled and educated workforce, and the application of science and technology in order to modernize and diversify the smallholder led subsistence agriculture. The nine priority areas of MGDS require a strong STI platform.

To strengthen the education system and promote science, technology and innovation, Government proposes to implement among others, the following strategies: increasing access to university education; constructing additional school infrastructure; training and recruiting additional teaching staff; improving scientific and technological infrastructure for research and development and strengthening innovation regulatory framework; and promoting adoption, transfer and utilization of appropriate technologies.

2.5.1.4 Malawi Sector Policies Relevant to STI

The Malawi Growth and Development Strategy (MGDS) incorporated issues raised in existing Science, Technology and Innovation related sector policies in Malawi. These are reviewed in detail in the sections that follow.

The goal of the National Science and Technology (STI) Policy is to attain sustainable socio-economic development through the development and application of science and technology in order to reduce poverty levels and achieve industrialization of smallholder led subsistence agriculture production by value-adding agricultural products. The goal is to improve the standard and quality of life of Malawians. The National Biotechnology and Bio-safety Policy (NBBP) was approved in 2008. The goal of NBBP is to attain sustainable socio-economic development through research, acquisition and use of traditional and modern biotechnology while protecting human and animal health, environmental safety, and international trade. In Malawi, the policy was developed in response to problems of low agricultural productivity, untreatable diseases, environmental degradation and low industrial output and lack of awareness on benefits and risks of modern biotechnology. The NBBP therefore aims at eliminating hunger, nutrition disorders, diseases, poverty and protecting the environment and natural resources.

There are challenges for the successful implementation of the NBBP. These include limited infrastructure to facilitate biotechnology research, development, and commercialization; limited human resource capacity for the development of biotechnology within government, research institutions, academic institutions, and the private sector; and insufficient and unreliable commitment to financing of biotechnology and bio-safety by government, private sector and other funding agencies. The NBBP states that tertiary institutions have a key role in the implementation of the NBBP through biotechnology human resource development and research.

The Intellectual Property Policy (IPP) goal is to ensure full integration of IPP in Malawi's policies in order to accelerate social, economic, cultural, scientific, industrial and technological advancement. A draft intellectual property bill is before parliament to replace the 1989 copyright act. Once enacted, the bill aims to enhance science and technology in Malawi by ensuring that intellectual property rights are enforced and regulated and thus enhancing technology and innovations development in Malawi.

The goal of the National ICT for Development Policy (ICT4D) is to attain innovative development and maximum integration of ICT in the socio-economic development process. One of the key problems that the ICT4D (2006) policy seeks to address is inadequate market information flow especially on small domestic agricultural markets and the development of commodities exchanges and a warehouse receipt system. According to NASFAM in ESFIM newsletter (2012), information asymmetry is one of the major hindrances to market access by smallholder farmers in Malawi. Whilst efforts in gathering and distributing of market information are present in Malawi, there has been little progress on getting appropriate information to the farmers in a relevant form and in a timely manner in order to facilitate their decision-making processes. Thus promotion of ICT in agro-industry proposes to solve this problem and enable farmers to realize better incomes, leading to reduced poverty levels. Further, the ICT4D also intends to strengthen the development, application and transfer of agro-based technologies using ICTs to support sustainable agriculture production and improve quality of agricultural produce.

The tertiary institutions in Malawi are facing numerous challenges in developing and implementing ICT programmes. These include inadequate resources, limited bandwidth leading to slow speeds, hardware and software availability, and lack of policy guidance in the development and exploitation of ICT, and limited ICT awareness and skills. Therefore, in order to realize the potential of ICT in tertiary institutions, institutional-level ICT policies need to be formulated, access to ICT promoted, staff and students trained on the use of ICT, and provision of a conducive environment where novel ideas on the use of ICT are harnessed and exploited.

2.5.1.5 Natural Disasters, Climate Change and STI Role

A 2010 report by the Poverty-Environment Initiative of UNDP and the United Nations Environment Programme (UNEP, 2010) estimated that unsustainable natural resources management costs Malawi 5.3%

of gross domestic product (GDP) annually. The major challenge is deforestation, leading to loss of forest cover, estimated at 3.5% annually. Population growth, lack of alternatives to wood energy and demand for wood for tobacco curing and poles are key drivers. Malawi is vulnerable to drought and flooding brought about by climate change. With a historic vulnerability to natural disasters, the likely impact of climate change will erode MDG gains by a combination of increased vulnerability to drought and floods, and a weak and uncoordinated national response. STI institutions are called upon to find innovative solutions to deforestation, reduce vulnerability to natural disasters, while adapting to climate change.

2.5.1.6 Local Government and Decentralization Policy (1998)

Decentralization in Malawi is a result of a situation analysis of poverty in the early 1990s, in which the question of an appropriate institutional framework for poverty alleviation arose. Recommendations arising out of this examination called for a participatory process in which the government, civil society, and the private sector would organize themselves to explore grassroots solutions to poverty. The result was that the government explicitly adopted decentralization as an institutional objective and a strategy for the implementation of the poverty alleviation efforts. Decentralization of power to local authorities was adopted in October 1998 as a vehicle for poverty reduction in terms of delivering better services to the Malawian population, but also as a means for strengthening democratic institutions and participation at the local level. Decentralization was expected to improve the delivery of public goods and services to people at all levels, especially in rural parts of the country where the majority of Malawians reside (GoM, 1998; Concern Universal, 2010).

The process of decentralization has been experiencing considerable setbacks, which have constrained the performance and influence of District Councils to emerge as sustainable, efficient, and accountable service providers (MGDS, 2011). Some of them include the non-functional nature of key institutions meant to drive the decentralization process, resistance to change, staffing problems at the district and sub-district levels, limited discretionary and donor funding to finance the district development plans, limited capacity of sub-district structures, weak M&E systems and practices, dwindling knowledge and awareness of decentralization among sector, district staff and political leaders, limited dialogue on decentralization, limited downward accountability, as well as limited coordination of non state actors support to the districts(MGDS, 2011) . These problems taken together have curtailed the potential of the decentralization process to institute district councils as integrated units at the local level, with substantial capacity to deliver services effectively and contribute towards improved rural livelihoods (GoM, 1998; Concern Universal, 2010).

Despite these challenges, the Ministry of Local Government and Rural Development and Concern Universal (2010) found that there are also some opportunities and other positive developments that are bringing fresh hope for a revitalized decentralization process. There is some enthusiasm and a widely held perception among many stakeholders and local citizens interviewed that decentralization is a useful and important principle for local level development. Since 2009, a number of opportunities have emerged. These include: the increase in the number of development partners willing to support district capacity building efforts and other areas at the national level that have constrained the effectiveness of the decentralization process; the introduction of the Local Development Fund (LDF); and the District service delivery Charters programme. Central to service delivery at the local level is the promotion of technologies and innovations in the construction of infrastructure and the use of ICT technologies for improved and accountable service delivery. Tertiary institutions through human resource development and research are players in capacity building of local assemblies and technology transfer.

The Local Development Fund (LDF) is a nationwide financing mechanism for local development that integrates government and donor assistance in a basket funding unconditional grant mechanism. The mission of the Local Development Fund is to improve community livelihoods and local service delivery

through mobilization and financing of socio-economic development interventions and local capacity enhancement at the Local Council and Community levels. The LDF is now the main means of channeling finances for infrastructure development in Malawi and between 2009/2010 and 2010/2011 the LDF channeled close to MK5.46bn (US$35m) (GoM, 2012). University involvement in the LDF is in the provision of human resources (graduates to fill vacancies) and in commissioned research (special studies, M& E, impact assessments and project evaluation).

2.5.1.7 National Education Sector Plan (NESP, 2008)

Education Planning in Malawi has since independence been guided by multi-year Development Policies and such an approach has made education relevant in addressing national agenda. The National Education Sector Plan (NESP, 2008), is responding to the Malawi Growth and Development Strategy, the STI National Policy and related international protocols such as Education for All and Millennium Development Goals. The NESP is thus aligned to MGDS, Malawi Vision 2020, the Local Government and Decentralization Policy and MDGs.

The National Education Sector Plan sets out Malawi's education sector goals, objectives and proposals on how such goals and objectives will be realized over the coming decade (2008-2017). The goals and objectives relate to expanded equitable access to education, improved quality and relevant education and improved Governance and management of the same education as three key factors for making a positive difference in education for its citizens and the nation. In turn the intervention in education is expected to lead to the realization of the Malawi Growth and Development Strategy.

The NESP has implications for education and national science and technology innovations (STI). The National Education Sector Plan forms the basis of all investment in the education. This means all the science and technology innovations initiatives and interventions have to be in line with the NESP objectives. This is largely the case. Education is seen as central to Malawi's development plans as outlined in the MGDS II as well as The Malawi Vision 2020. The sector wishes to ensure better access and equity, relevance and quality, and good governance and management in all institutions from basic to higher education.

The mission of the Ministry of Education, Science and Technology (MoEST) is to provide quality and relevant education to all Malawi citizens irrespective of race, gender, ethnicity, religion or any other discriminatory characteristics. To achieve the goal of free primary education, the government has constructed more primary schools in many parts of the country; it is expanding the number of secondary schools with prioritized girls boarding facilities and expanding the student intake of technical and vocational colleges, while training more teachers and tutors.

2.5.1.8 Identifiable Gaps in National Frameworks and Policies

It is clear from the national policies and frameworks that STI institutions are expected to play a major role in human resources development in order to fill existing vacancies at national and decentralized district levels. In addition, STI institutions are expected to carry out relevant research and provide innovative solutions to the challenges affecting ministries, districts and the non-state actors. Research may take the form of M & E, impact assessments and project evaluations. Despite this need, government and sector ministries have not provided adequate research funds to go into research and development in NSI institutions. The little research that is happening in Universities is poorly funded and in most cases is donor-driven. There are no line budgets in public universities for research and innovations. This limit the role public universities can play in the development of STI in the country.

In order to improve access to university education, student numbers have been increased without an increase in infrastructure and support services such as accommodation and staffing. One of the challenges is limited access due to shortage of classroom and laboratory space and low admission for special needs and female students (NESP, 2008). Consequently, classes are big and challenging to teach. Government has also introduced the concept of equitable access to education in the public university where there are set minimum quotas for all districts based on population while the rest of the places are competed based on merit.

To increase the numbers, the Malawi Government is planning to construct six new public universities in the next ten years, two of which are currently being constructed (MGDS, 2011) as well as increasing student intake of existing public universities by expanding classroom, laboratory and hostel infrastructure. The planned public universities are geographically spread throughout the country with a clear mandate, without duplication of programmes. The aim is to double student intake at public universities (currently at 0.4% of qualified candidates). As of 2013, student intake at public universities is now close to 3000 students per year (UNIMA, 2012). The Education Ministry has also granted nine charters for religious and private universities in the last eight years. Five of these are now operational.

2.6 Structure of Public Research and STI in Malawi

2.6.1 Background

The STI system in Malawi has been characterized by multiple players and disjointed efforts and low integration of STI issues in national development planning processes (NESP, 2008). Malawi is lagging behind in development and application of STI. According to United Nations Economic Commission for Africa (UNECA) report of 2008, Sub-Saharan Africa had 48 researchers per million inhabitants compared to the world average of 894 researchers per million inhabitants. The report also reveals that the Sub-Saharan Africa region has a Gross Expenditure on Research and Development (GERD) of 0.3% compared to a world average of 1.7%. The performance of STI sector in Sub-Saharan region is also affected by inadequate facilities and infrastructure. As a result, there is inadequate harmonization in capacity building, priority setting, resource mobilization and utilization (UNECA, 2008). The situation calls for a common and shared understanding to promote, support, regulate, coordinate and utilize science, technology and innovation to address Malawi's current socio-economic problems.

The Government of Malawi recognizes the important role Science and Technology Innovation (STI) plays in socio-economic development. It is in this respect that Government approved the National Science and Technology Policy of 2002 and enacted the Science and Technology Act of 2003 which provides for the advancement of science and technology; establishment of the National Commission for Science and Technology (NCST); and establishment of the Science and Technology Fund. The establishment of the National Commission of Science and Technology (NCST) in 2010 as an apex body for all STI matters in the country is an attempt to address current challenges.

2.6.2 Role of National Commission of Science and Technology (NCST)

The mandate of NCST is to advise Government and other stakeholders on all science and technology matters in order to achieve a science and technology-led development (NCST, 2011). The NCST derives its operational mandate from the Malawi Vision 2020 as well as the Malawi Growth and Development Strategy (MGDS, 2011). The NCST is repositioning itself strategically in order to shape and drive new research and developing an agenda for harnessing STI developments in the country. NCST Strategic Plan has identified eight key strategic issues, namely promotion of Research and Development (R&D); the management of Information and Knowledge sharing; promotion of innovations, technology transfer and

commercialization; improved networking, partnerships, and collaboration; improved regulatory framework for STI; improved human resource development and retention; enhanced STI planning, monitoring and evaluation; and improved STI infrastructure and resource mobilization.

The NCST aims to achieve these strategic goals through NSI networking with institutions of higher learning, promotion of science and technology in primary and secondary schools; support to science fairs and resource mobilization and support to research and technology development institutions in the country. The main stakeholders include the government, public higher education institutions, research centres, private sector and technology users (subsistence and estate farmers).

2.6.3 Role of Sector Ministries in STI

Key actors in STI in Malawi include line ministries (mainly education, health, forestry and natural resources and agriculture), tertiary public institutions (UNIMA, LUANAR and MZUNI), parastatals and the private sector. Each line ministry has research institutions geared to address the operational challenges faced by each sector. For example, the Ministry of Agriculture has the National Agricultural Research Stations (NARS) to carry out adaptive research and generate agriculture technologies. The Ministry of Health has the Community Health Sciences Unit to carry out research on diseases for the nation while the Ministry of Forestry and Natural Resources has the Forestry Research Institute and Geological Surveys Department.

In the past, the actors have tended to work in isolation and lack coordination and NCST is working to change this status (NCST, 2011). Institutions in government are funded by the national budget, mostly to meet salaries, wages and operational budgets. However, budgets for research and development are inadequately funded by government, to the extent that most research in Malawi is donor-driven. Institutions and individuals write research proposals to access donor funds for research. This is particularly the case with institutions of higher learning (UNIMA, 2012). As of now, the Government of Malawi only funds undergraduate training and not post-graduate training (masters and PhDs). Post-graduate training in UNIMA, MZUNI and LUANAR universities are externally funded. This is a serious shortcoming in that science and technology innovations are closely linked with post-graduate training. There is need to include budget lines for postgraduate training and research in public universities.

There are no systematic budget lines in the national budget for research, science and technology innovations even for these public institutions like universities and line ministry research institutes, apart from support to salaries and operational budgets. The type of research often undertaken is to address or understand specific challenges within each sector and not necessarily to generate STI and technologies that will make Malawi competitive on the international stage. For example, despite Malawi being a low cost producer of sugar and ethanol biofuel, it is yet to have a training centre in sugar production and ethanol biofuel. As such, basic research has not been emphasized in these line ministries research institutions but adaptive research to address a specific challenge. Basic research is a breeding ground for science and technology innovations and without emphasis on basic research, STI in Malawi has lagged behind (NCST, 2011).

Furthermore, there has been lack of collaboration between universities, the public sector and the private sector in research and technology development. The private sector is yet to recognize the important role universities could play in research and technology development to make Malawi products competitive and of high quality. As such, private sector in Malawi is yet to channel significant resources for research and technology development to the universities.

Recently, there has been a move by government towards sector wide approaches (SWAPs) in ministry planning and operations and several SWAPS have been established (health, education, agriculture and

water and sanitation). Within the SWAPs, there is recognition that research for innovation for that particular sector is key to unlocking STI challenges in that sector. Because of these emerging SWAPS, there is increased collaboration between line ministries and public tertiary institutions but it is still in the early stages. Line ministries are beginning to put budget lines specifically for research and STI work by public tertiary institutions as well as infrastructure development. This is a good development and a model for future collaboration between public sector and universities. It has yet to extend to private sector through public-private partnerships (PPPs).

2.7 Structure of Higher Education in Malawi

2.7.1 Trends in Higher Education in Malawi

There are three distinct types of universities in Malawi: the public universities; the private faith-based universities and purely private universities. Several trends are defining university education in Malawi. After several decades of developmental emphasis being placed on primary and secondary education, there is a growing recognition that tertiary education offers a critical and essential route to economic growth, international competitiveness and accompanying development (NESP, 2008). Consequently, university education is being promoted by government, faith-based organizations and the private sector.

Malawi is starting from among the lowest levels of tertiary education in the world as elaborated in section 2.2 (NESP, 2008; UNIMA, 2012). Given the growing population and the need to increase access to university education in Malawi, the government has committed to the creation of new public universities (MGDS, 2011). Currently, there are four public universities (UNIMA, MZUNI, LUANAR and MUST). The Public University in Malawi started with the establishment of University of Malawi (UNIMA) in the 1960s to spearhead development of an independent Malawi. It is a federal university with 5 constituent colleges (Chancellor College-liberal arts; Bunda-agriculture; The Polytechnic-Engineering; College of Medicine-Medicine and Kamuzu College of Medicine-Nursing). Mzuzu University was created in 1997 and Lilongwe University of Agriculture and Natural Resources (LUANAR) in 2011. The Malawi University of Science and Technology (MUST), another public institution, is scheduled to open in 2013. All these are public universities funded through government subvention. The three Universities (LUANAR, MZUNI and UNIMA) which are a target of the study are described in detail later in Chapter 4.

To respond to the growing need for university education in Malawi, a number of other private (4) and faith-based universities (4) have received their charters and more are at the planning stage. From the year 2004, four private faith-based universities have received their charters (Livingstonia, Seventh-Day, Catholic and Nkhoma). There are also four purely private universities accredited by government (Skyways, Exploits, Share World and Blantyre International). There are also several public and private medium tier technical colleges offering vocational and skills training in several fields. These are regulated by the Technical and Vocational Training Authority (TEVETA) which has legislative powers to collect a training levy for the running of technical and vocational programs.

The development of public universities in Malawi is occurring against: (i) a background of economic and political development across sub-Saharan Africa; (ii) a renewed interest in the expansion of tertiary education and research, especially in science and technology, and (iii) a substantive structural re-organization of the federal college structure of the University (NCST, 2011 and MGDS, 2011). The federal structure, whereby several colleges spread geographically under one umbrella, as University of Malawi, is being dismantled in favour of single college, autonomous universities, partly to allow for flexibility in decision making and reduce bureaucracy.

This will necessitate: (i) a major increase in student numbers at undergraduate and postgraduate levels in the next five years; (ii) an increased emphasis on research; (iii) enhanced infrastructure, ICT and human resource capacity to accommodate these changes; (iv) quality governance and management; and (v) sustainable finance and improved resource mobilization (NESP, 2008, UNIMA, 2012). Given the growing numbers of public and private universities, government has in 2012 created the National Council for Higher Education (NCHE) to improve supervision, coordination and accreditation of both public and private universities and colleges. There is also within the Ministry of Education, Science and Technology (MOEST) a department of Higher Education.

2.7.2 Challenges of Higher Education in Malawi

The Public Universities in Malawi are operating in an environment defined by growing demand for tertiary education necessitating equitable access to tertiary education, dwindling public resources; the need for relevant and responsive curricula; the need for reforms in university financing, governance and an emphasis of core functions (NESP, 2008; UNIMA 2012). At the same time public universities are required to contribute to the attainment of the Millennium Development Goals, the Malawi Vision 2020, as well as the Malawi Growth and Development strategic objectives (MDGS II) that include entrepreneurial graduates to solve youth unemployment by starting their own enterprises. These national policy frameworks have a considerable impact on the growth and development of public universities. Public universities must focus on the provision of quality graduates in sufficient numbers and relevant to national human resources needs, providing useful research outputs and playing an influential role in developing public policy.

As the number of public universities increase, there will be increased competition for limited public resources to run universities. Against this background public universities are required to generate additional income through tuition, research, development projects and consultancies and have been mandated to shed all non-core functions through outsourcing to improve efficiencies. Out-sourced services include security, landscaping, catering and accommodation. This new environment requires public universities to make some critical strategic choices in the coming few years to take advantage of the opportunities.

In addition, there are growing calls for equitable access to university education by all Malawi citizens and hence the need to widen university access. To do this, there is need to heavily invest in university infrastructure (hostels, classrooms, lecture theatres, laboratories and staff offices) and train more staff at PhD levels at a time when government and donor resources are in short supply (UNIMA, 2012). The need for financing of infrastructure development in public universities is key to increase student access. The critical success factors include resource mobilization for expanding teaching and learning facilities as well as acquisition and re-tooling of staff for quality output in research, consultancy and public and community engagement.

2.7.3 Remaining Relevant in a Changing Malawi

Given these challenges, the public university continuously encounters situations in which it needs to adapt its strategy. These include the need to admit an increasing number of qualified applicants; the need for effective governance systems and regulatory framework; changing stakeholder requirements emphasizing practical skills as well as knowledge in line with the rural subsistence nature of Malawi farming with small land holdings and declining fertility. Further, there are calls to add value to Malawi's subsistence production while promoting relevant mechanization in production and post-harvest operations.

There is a need to be competitive given the growing number of higher education institutions (public and private). The stakeholder clients (government, private sector and non-government organizations) want a multi-faceted graduate with both practical skills and knowledge and are ready to contribute to the needs of these organizations from start. Threats to the university include emerging universities and colleges competing for students, programmes and internship facilities, as well as poor quality of school leavers from primary to secondary school, and poorly trained teachers in secondary schools.

2.7.4 Research and Innovations in Public Universities

Public universities in Malawi have carried out some research and innovations largely through individual researchers' efforts. Lack of funding for research and innovations from the state has been the major limitation and not necessarily lack of ideas. Any research or innovations carried out by this group has largely been funded by funds from development partners, both bilateral, multilateral as well as charitable organizations (UNIMA, 2012). To get funding, the researcher or group of researchers write proposals in response to call for proposals and win competitive grants. The state has been absent in this until recently (NCST, 2011). Apart from meeting the researcher's salary and operational costs of public universities, the state has not provided systematic sustainable funding for any research and innovations in public universities (NCST, 2011).

Through these ad-hoc funding arrangements for research and innovations, some technologies have been developed or adapted for use in Malawi especially in agriculture and the private sector. For example, Malawi was one of the few countries in Africa to introduce blending of petrol with bio-ethanol from sugar molasses in 1978. It is now a major industry and expanding. The University of Malawi pioneered internet provision in Malawi and was behind the formation of Malawi net while Mzuzu University has developed a local rig for digging shallow wells. The Malawi Industrial Research and Technology Development Centre (MIRTDC) developed incubators for the poultry industry as well as leaf cutters (shears) for cutting tea in the field.

2.8 Innovation in the Non-Profit Sector

The non-profit sector, sometimes called non-state actors in Malawi, includes civil society organizations (CSOs), non-government organizations (NGOs) and faith-based organizations (FBOs). Malawi has a vibrant non-profit sector, given that development partners have preferred to channel their assistance outside the government machinery, in order to bypass government bureaucracy, concerns over governance issues and transparency. Since colonial and missionary times, FBOs have been at the centre of provision of primary, secondary and tertiary education. At tertiary level, FBOs have been active in vocational skills development through technical colleges. Recently, FBOs have opened their own universities complementing government (*e.g.*Livingstonia, Seventh-Day, Catholic and Nkhoma). These private FBO universities have tended to mirror programs offered by public universities by offering training in management, agriculture, communication and theology. They are not as yet research or science and technology universities.

International and local NGOs in Malawi are well funded by development partners, and they have been active in agriculture, education, health, water and sanitation sectors at the grassroots level. In general, NGOs have not been at the centre of generating technologies and innovations. Instead, they have been central in transferring existing technologies and innovations from country A to Malawi, or from region A of Malawi to region B of Malawi. Proven technologies and successful innovations have been introduced by NGOs from one area to another. Low-cost sanitation technologies like eco-san toilets and hand washers are examples (Water Aid, 2009). In limited cases, they have provided financial assistance from development projects to finance the development and up-scaling of proven technologies from universities and agricultural research stations to grassroots farmers.

Lately, we have seen increased collaboration in development projects between public universities and development NGOs. Public universities have taken the role of knowledge/technical partner in developing and up-scaling proven technologies while NGOs have taken the role of technology transfer and dissemination at grassroots level. For example, a juice extractor was developed in the public domain at Chitedze Research Station with collaboration of Bunda College, but was promoted at grassroots by NGOs.

Public universities are good at testing, evaluation and localization of such technologies. The challenge here is to have a two-way street whereby public universities can pioneer the development of a technology with financial assistance from NGOs, and not just the other way around. This would allow public universities to dream a little and provide innovative ideas on technology development. Further, public universities would like to participate at the proposal development stage/design stage of a development project with specific budget lines for the public universities to do specific tasks during the implementation period of a development project as a knowledge/technical partner. Public universities are not there yet. Often times, they are invited at the implementation stage to do baselines and evaluation studies.

2.9 Synthesis and problematization of UNIID

Malawi at 14 million people, is a highly populated country in Southern Africa. The Malawian economy is agro-based and is dominated by smallholder subsistence production with small land holdings. There are four key crops for exports (tobacco, sugar, tea and cotton) dominated by commercial farms with large holdings. Most of the STI research has been geared to solving smallholder farming and natural resources challenges.

Malawi has national policies and frameworks in place for STI development. It has a distinctive NSI which is multi-layered, not well coordinated and efforts often times disjointed. The NSI comprises of public institutions such as government ministries (*e.g.* agriculture, health, and education), parastatals and public universities (UNIMA, LUANAR and MZUNI). We also have vibrant non state actors (NSAs) comprising non government organizations (NGOs,) and faith-based organizations (FBOs). These play various roles in poverty reduction efforts, food security and the fostering of STI in the country. NSAs have been good at technology transfer transferring STI to and from Malawi and the region. NGOs do very little research on their own and thus are not in the main generators of STI. Instead, NGOs (as implementers) have increasingly partnered with public universities (as knowledge and technology partners). Consequently, public universities are key players in NSI and are at the forefront of STI. Public universities are good at testing, evaluation and localization of such technologies.

International and local NGOs in Malawi are well funded by development partners and they have been active in agriculture, education, health, water and sanitation sectors at the grassroots level. In general, NGOs have not been at the centre of generating technologies and innovations. Instead, they have been central in transferring existing technologies and innovations from country A to Malawi or from region A of Malawi to region B of Malawi. Proven technologies and successful innovations have been introduced by NGOs from one area to another.

The private sector is also involved in application of STI but is yet to foster partnerships with public institutions to promote STI and research. PPPs are in their infancy and Malawi public Universities are yet to benefit from PPPs. Very little Research and Development (R & D) are carried out in both public and private sectors. The major limitation is funding. Little research that is carried out tends to be applied and adaptive to address a specific challenge. Very little basic research is carried out, given its long-term and expensive nature. The little research that is carried out in public universities is donor driven. The coming

in of SWAPs is supposed to change this in that budget lines will now be included in sector ministries for research and innovations. This is still too early in case of LUANAR and the Agriculture SWAP.

As noted earlier, the period since independence has been characterized by policy documents that have been produced by the Malawi's government to guide the development path of the country's economy. The emphasis in these documents has shifted from poverty alleviation to growth with poverty reduction. *However, modern economic growth and development is a complex phenomenon that is increasingly dependent on innovation, science and technology*. Thus successive implementation of the MGDS II is crucial to the attainment of the MDGs, as well as the country's long-term development aspirations.Universities in Malawi have a key role in development of STI as part of national systems of innovations. Recognizing the role universities play in the different areas of countries development world over, this project was aimed at interrogating the roles the universities' faculty members in Malawi play in bringing change to the communities they interact with, and furthermore understand how these interactions manifest, and what policies support their manifestation. The next chapters have attempted to provide more detailed analysis of university activity against this context.

CHAPTER 3: METHODOLOGY OF THE STUDY

This chapter provides detailed information on the methods used to collect and gather information which was used to analyse the pattern of interactions taking place in the different universities in Malawi and furthermore led to the selection and in depth examination and execution of the case studies for this UNIID research.

3.1 Mapping interaction

The purpose of the primary data collection section of this study was to examine if and how two different types of universities in Malawi interact with local communities in order to innovate to address the communities' livelihoods issues. To achieve this, we analyzed policy documents from the universities, interviewed senior managers at two different types of universities, as well as conducted surveys with university academics at these two institutions. This chapter describes in detail the study's participants, methods used to collect the data as well as various challenges that arose during the data collection process.

3.1.1 Study Sites

In Malawi, there were two participating universities. These are Lilongwe University of Agriculture and Natural Resources (LUANAR), a specialized agricultural university and Mzuzu University (MZUNI), a conventional regionally situated university. These were selected because of their close links with agriculture and natural resources which are the backbone of the Malawi Economy. LUANAR is a public university that provides training in the field of agriculture and natural resources. According to LUANAR Strategic Plan (2012-2017), LUANAR has 1802 students and 150 academic staff, offers 16 BSc, 14 MSc, 5 PhD, 3 Postgraduate diplomas and 1 undergraduate diploma programmes. MZUNI offers training in a wide range of disciplines under its five faculties of Education, Environmental Sciences, Information Science and Communications, Tourism and Hospitality Management, and Health Sciences. Mzuzu University offers 21 undergraduate programmes for generic and upgrading students and 5 postgraduate programmes. Other colleges of University of Malawi (UNIMA) were not considered because LUANAR until recently was a constituent college of UNIMA.

3.1.2 Methods

Over the course of six months, data for this study was collected using three different methods. These included document analysis; interviews; and surveys. The following section outlines these methods in further detail.

3.1.2.1 Document Analysis

There were two different types of documents analyzed for this study. The first were policy documents coming from the national and international government level, which focused on Malawi's development in general, as described in chapter 2

In addition, we also analyzed policy documents from the two universities, which included LUANAR/UNIMA and MZUNI Strategic plans. We considered the strategic plans because these show the direction the institution intends to take, in this case, the vision and implementation of innovations and outreach activities. We also got information from LUANAR/UNIMA and MZUNI websites. The websites contain a lot of information on the operations, structure, projects and statistics of the universities.

3.1.2.2 Interviews with university senior management

There were two different types of participants for this study, universities' senior administrators and academics at these institutions. Interviews were conducted with various members of the senior administration staff, such as Vice Chancellors, Vice Principals, Registrars, Faculty Deans, and Directors of Research and Outreach centres. The senior administrators included three senior administrators from UNIMA, five from LUANAR and two from MZUNI. At UNIMA, the senior administrators were: The Vice-Chancellor, the Pro-Vice chancellor, and the Registrar. At LUANAR the senior administrators were: The Vice-Chancellor, Dean of Faculty of Developmental Studies, Dean of Post Graduate studies, Acting Director of Centre for Agricultural Research and Development (CARD), and Vice Principal (then Bunda College). At MZUNI we interviewed the Acting Vice Chancellor and the Registrar.

Interviews with senior management sought to find out how interaction with social partners fit into the mission of the university and if there are institutional policies and structures to promote interaction. The senior administrators were sought because they are responsible for strategic management and the policy environment of these universities, which affects engagement with external actors by academics. Senior administrators were also requested to provide information on incentive mechanisms for academics (if any) to interact, benefits and outcomes of interaction as well as challenges that academics face when engaging external actors. In addition, we also used questions about core background information on the university that would help to contextualize the patterns that were found with the interview with the university registrar. The registrar is the custodian of university statistics and records. The interviews were mostly face to face, except in a few cases where it was not possible to meet the administrator due to their busy schedule.

3.1.2.3 Faculty members Surveys

Surveys were administered to individual academics within the two selected university. The surveys were conducted concurrently with senior administrator interviews because it was taking a long time to finish senior administrator interviews first. The surveys were administered over a period of three months. The survey was administered by emailing as well as personally delivering the questionnaire to the academic. This took some time due to the heavy schedules of academics.

The surveys sought to find out if faculty members (academics) at Malawian universities are interacting with external social partners, and if so, whether and to what extent they are interacting with communities to address their livelihoods challenges. Specifically in the context of Malawi, we were interested to determine if these interactions were helping to address specific livelihood challenges in the country, such as those related to subsistence farming, deforestation, and climate change. One of the key reasons for conducting these surveys was to indentify three case studies that could be used during the second phase of data collection that investigated how universities and local, marginalized communities were interacting around a particular innovation to address the communities' livelihoods challenges.

3.1.3 Data Analysis for mapping interactions

To analyze the data, we compared and contrasted how the policy documents, interviews, and surveys understood university/community interaction, such as how the academics and senior administrators understand interaction, the key terms that promote interaction, the institutional conditions and structures that are intended to facilitate or constrain interaction, outputs, benefits and challenges of interaction.

3.1.3.1 Policy and Interview Data Analysis

To analyze this data, we looked for key themes related to university/community interaction and compared the ways in which they discussed these themes – were they or were they not similar? Why or why not? We then picked out quotes from the interviews that were showing the presence or absence of the themes of interaction, institutional policies and structures as well as output, benefits and challenges of interaction with external social partners.

3.1.3.2 Survey Data Analysis

According to LUANAR Strategic Plan (2012-2017), LUANAR has 150 academic staff. During this research, 37 academic staff were interviewed at LUANAR representing 25% of the total academic staff. In 2012, MZUNI had 150 academics, 32 were interviewed, representing 21% of total academics. The survey data were entered into statistical data management software, SPSS. The statistical tool used in the analysis of the survey data was the Weighted Average Index (WAI).

3.1.3.3 Weighted Average Index (WAI)

WAI involves the calculation of an average/mean weighted average index (WAI) for each item based on a Lickert scale response (Kruss *et al.,* 2012). We used the approach used by Kruss *et al.,* (2012) in computing WAI and explaining the importance of each item in the different themes. Kruss *et al.,* (2012) calculated averages for each item for each institution, and also for the total survey population. The averages were then sorted in descending order by dimension within each institution and within the total survey population in order to form an index of weighted averages. This was done to facilitate the exploration of the importance of each variable within each institution. The following dimensions/variables from the questionnaire were included in the analysis: types of external social partners, types of relationships, channels of information, outputs, outcomes and benefits, obstacles and challenges.

The weighted average index for each variable was calculated by dividing the sum of the responses for each variable (a value between 1 and 4) by the number of responses. See the formula below:

$$WAI = \frac{\sum_{i=1}^{4} F_i W_i}{N}$$

Where F equals the frequency of a specific value (between 1 and 4) selected by the respondents, W equals the actual value selected, *i.e.* the weight (value between 1 and 4) and N the number of Responses.

3.1.4 Challenges

The biggest challenge during this study was faculty members (academic's) unwillingness to take part in the study. Most of them said they are very busy. A few were just not interested and refused to be interviewed. Some even asked to be paid if they were to take part in the interview. This affected the number of completed questionnaires and progress of data collection. However, we used some channels to get some of them to respond. Firstly, we followed them to places where we could meet all the academics at once and make an appeal on the importance of this study to them as well as the institutions. We managed to get the filled questionnaires from forums such as curriculum review workshops for LUANAR academics. Secondly, we relied on the informal networks between the project team members to reach out to fellow academics and persuade them to take part in the study.

3.2 Case studies

This component of the study focused on identifying possible instances of research to serve as cases of academics' interaction with marginalized communities to enhance livelihoods in which the communities plays a role in design and intent of the projects as enshrined in the innovations for inclusive development paradigm. Important to note is that Malawi has only three well established public universities among which to shop the cases and that out of these LUANAR was emerging from the University of Malawi. This limited the choice of suitable cases from two public universities. This section discusses the methodology that was used in the selection and implementing the case studies. The study areas, participants that were interviewed, the sample size, and the research tools used.

3.2.1 Selection process of research cases of interaction

Triangulation and iterative means were used to arrive at the selection of case studies from the selected two public universities – one specialised in programs of agriculture and natural resources while the other university is more in Education and public service and hospitality programs. LUANAR is based in the rural settings outside the capital city whereas MZUNI is in a suburb of the city of Mzuzu.

The mapping process gave the initial platform from which a number of potential cases were isolated and further interrogated. A total of ten potential case studies were identified for LUANAR and four for MZUNI (see table 3.1). The research team was guided by a set of criteria upon which the right candidates of cases were to be arrived at, including that it displayed evidence of innovation within the context of university-community interaction, inclusive development, an informal setting, and an element of improving livelihoods. The team accessed the database of the research that has been and is being implemented by the academic staff and research units to further scrutinize the probable cases. Upon indication that a particular interaction could be suitable as a case study, preliminary interviews with the key academics involved were initiated, to ascertain that the engagement met the criteria of the UNIID research agenda. Fortunately for the research team, most of the active researchers were peers and it made life easy to extract necessary information and documentation for the potential cases and setting the next steps and dates for groundwork for further interviews. As the research team further engaged with the research academics, they were all conscious of the overall criteria related to inclusive development, as manifested by participative interaction with marginalized communities in informal settings as follows:

- Does the interaction contribute towards improved livelihoods?
- Do local communities participate in the identification of the problem that the interaction is seeking to solve?
- Can these communities be characterized as marginalized?
- Do local communities provide input into possible solutions?
- Do local communities participate in processes, including proposal evaluation, setting the terms of engagement, and monitoring and evaluation?
- Do local communities contribute their knowledge in a collaborative process of knowledge production?
- Is the case study set in the informal setting (economy)?
- Does the case study include the participation of marginalized households and communities located in informal settings?

Upon thorough investigation and scrutiny, three cases were selected, two from LUANAR (Dairy outreach project case study and Fish production and marketing case study)and one case from MZUNI (a Botanical pesticide case study) that met these criteria to some extent.

Table 3.1: Potential case studies of universities' interaction with marginalized communities

University Name	Potential case studies identified
Lilongwe University of Agriculture & Natural Resources (LUANAR)	1. Enhancing Fish Production and Marketing for Food Security and Rural Incomes of Small-scale Fish Farmers in Malawi 2. Participatory Technology Development and Transfer among Smallholder Farmers 3. Enhancement of Cassava Production, Processing and Utilization: A case of Manjawira Extension Planning Area 4. Breaking the unholy Alliance of Food Insecurity, Poverty and Environmental Degradation in Chitekwere EPA (Lilongwe ADD): Empowering Farmers with Soil, Water and Nutrient Enhancing Technologies for Increased Productivity 5. Conservation of Amaranth and Cleome (luni) through promotion of cultivation 6. The Pan African Bean research Alliance (PABRA) Bio-fortified Bean Project 7. Improved production and commercialization of pond reared fish in the Zomba basin and other high potential areas for aquaculture in Southern Malawi 8. Promotion of production and utilization of underutilized crops (Bambara) for human nutrition 9. Dairy outreach program to farmers surrounding Bunda College 10. Legume best bets to acquire phosphorous and nitrogen and improve family nutrition
Mzuzu University (MZUNI)	1. Development of high quality and affordable fish feed using locally available resources in Mpamba Area, Nkhata Bay District – Northern Malawi 2. Improving household livelihoods and quality of lives for individuals and communities through proper sanitation and hygiene 3. Improving living standards condition of slum dwellers 4. Botanical Pesticides Project

Source: UNIID Malawi Fieldwork data, 2013.

3.2.2 Sampling Design and Study Areas

A simple sampling design was used in carrying out the case studies and was based on the type of the case study. Since the research project was looking at academic interaction with various actors, the case studies had four categories of participants. These were the academic responsible for the project, students, the community participants (households), and the community leaders of the communities where the project took place. The sample size of the people interviewed on each case was based on the in depth qualitative interviews methodology and where the sample size was relatively small, all the members were interviewed. Prior to the interviews, background research and documentary analysis about each actor and the outcomes of their interaction was done. Fieldwork was done in project sites to engage with the beneficiaries of the projects and close the loop in understanding the full paradigm of IID.

The Dairy outreach project from LUANAR was implemented in communities of Mkwinda and Mitundu areas in Lilongwe district. These communities surround LUANAR. The Fish outreach project from LUANAR was done in Mchinji and Dowa districts in Central region of Malawi. The Botanical pesticide project from MZUNI was done in Rumphi and Mzimba districts in the northern region (Figure 3.1).

Figure 3.1: Map of Malawi showing districts where Case studies were conducted – Rumphi and Mzimba (MZUNI); Mchinji, Lilongwe and Dowa (LUANAR)

3.2.3 Participants and Sample Sizes

3.2.3.1 Dairy Outreach Project case study

Table 3.2 shows the outline of the participants in their respective projects. Semi-structured interviews were used with the aid of the checklist for different categories of the project's participants. We first interviewed one of the principle investigators (PI) in the Department of Animal Science at LUANAR (Table 3.2). Following the snow ball process sampling, he gave us a list of other actors that were involved in the project. We therefore went on to interview an officer from World University Service of Canada (WUSC). We also interviewed the Department of Animal Health and Livestock Development (DAHLD)

(both the District Officer and the Assistant Veterinary Officer based in the field), which is responsible for livestock management in Lilongwe district. Traditional Authority was interviewed as a community leader because the project was implemented in communities which fall under his jurisdiction. Finally, we interviewed community participants (project beneficiaries).

Table 3.2: Field work interviews

University Name	Social partner (Project)	Interviewee(s)
Mzuzu University (MZUNI)	Botanical Pesticide Study	• PI (MZUNI) • Community leader • 3 government agricultural extension workers • farmers
Lilongwe University of Agriculture & Natural Resources (LUANAR)	Dairy Outreach Project	• PI (Animal Science Department - LUANAR) • Official from World University Service of Canada (WUSC) • Department of Animal Health and Livestock Development (DAHI) (District Officer and the Assistant Veterinary Officer based in the field) • Traditional Chief Chadza • Community participants
	CARP Fish Project	• Technical Coordinator (NEPAD Regional Fish Node) • Research Fellow & Assistant Coordinator (CARP) • Research Fellow (CARP Coordinator) • CARP Field Officers • District Fisheries Officer • Fish farmers

The total number of primary beneficiaries who received dairy cows was twenty six and all were interviewed. In cases where students were involved, efforts were made to interview them.

3.2.3.2 Fish Case Study

Among the academicians that were interviewed at LUANAR are a Professor of aquaculture who happens to be the NEPAD Regional Fish Node-Technical Coordinator, a Research Fellow and Assistant Coordinator and a Research Fellow who also doubles as a CARP Coordinator (see table 3.2). We also interviewed CARP Field Officers in Mchinji and Dowa Districts. Equally important was that we interviewed the fish farmers who participated in the project. From the government side, the UNIID Team interviewed the District Fisheries Officer (DFO) for Mchinji district.

3.2.3.3 Botanical Pesticide Case study

In this study, the faculty member, who is also the PI of the project from Mzuzu University, was interviewed. In the field a community leader and three government agricultural extension workers were interviewed. In the two communities a total of 29 farmers that were using botanical pesticides were interviewed.

3.2.4 Research Tools

Semi-structured interviews were conducted with the four different types of project participants. There were different interview protocols for each of the four participants groups, *vis á viz* academicians,

community participants, community leaders and other actors (partners) in the project. Each tool comprised similar themes followed by a set of questions under a particular theme in order to address the specific needs of each type of project participants and their roles. Such similar themes included the main livelihood problem being addressed by the interaction (project), the drivers of interaction for each of the key actors, community participation; role of innovation in the interaction, and the benefits and outcomes of the interaction. We also paid a site visit to the locations of the projects to ground the existence and impressions of the projects and triangulate some of the questions and answers obtained. All interviews were audio-recorded and later transcribed to aid in the data analysis process.

3.2.5 Data Analysis for case studies

This was a qualitative study. We sought to hear the stories about how the particular interaction developed between the academics and external actors. The external actors included project beneficiaries and any other actors who were involved in the project. The analysis therefore looked at each theme and compared and contrasted between the actors. This gave us the understanding of the particular theme by the different actors and focused on the presence of interaction between the actors.

CHAPTER 4: RESULTS FOR MAPPING THE NATURE OF ACADEMIC INTERACTIONS IN MALAWI

4.1 Lilongwe University of Agriculture and Natural Resources (LUANAR) findings

4.1.1 LUANAR Emerging from the Shadows of UNIMA

LUANAR was born out of Bunda College, which was until then a constituent college of the University of Malawi (UNIMA). It was created by Act of Parliament in 2011 and it is provided for in the LUANAR Act No. 22 of 2011. The aim of the establishment of this university was to increase access to higher education and the university is specialized in Agriculture and Natural Resources. LUANAR will not be based on the college federal structure of UNIMA but will be faculty-based with one main campus. Since its inception in 1967, Bunda College has a strong history of interaction with outside parties. It was able to develop from its own resourcefulness in writing proposals to attract infrastructure and research funds from donors and NGOs, instead of 100 percent relying on subvention from government. Going forward, given its strong science-based programs and the agriculture-based economy of Malawi, it is anticipated these interactions will continue and will be strengthened. This is possible because of decreased bureaucracy and faster decision-making.

University of Malawi from which LUANAR grew was established at the advent of independence of the country in 1965. Prior to independence, during the colonial era, there was only one university in Southern Rhodesia (Zimbabwe) catering for Nyasaland (Malawi) and Northern Rhodesia (Zambia). UNIMA was established through a political decision in the post-colonial era in 1964, specifically because at that time, Nyasaland (Malawi) had only 6 graduates. Therefore, it was imperative to have its own university to move the development agenda which was paramount from the onset at gaining independence. At its genesis, there were socio-political strategic decisions made for the location of each specialized college. For example, the Polytechnic was located in Blantyre because of industry and commerce while Chancellor College was located in Zomba to take the place of the old capital, as Lilongwe became the new capital in 1975. Bunda College was located in Lilongwe because it has the best soils for agriculture in the country.

4.1.2 Vision, Mission and Core Values of LUANAR

The vision, mission, core values and programmes of LUANAR as well as the other public universities of MZUNI and UNIMA are in line with the national policy frameworks of Vision 2020 and the Malawi Growth and Development Strategy (MGDS, 2011). Further, the universities try as much as possible to align their programmes to sector policies of the line ministries in line with development challenges. All the four public universities in Malawi are part of national systems of innovation and are involved in the development and promotion of science and technological innovations.

Table 4.1: Vision, mission and core values of Lilongwe University of Agriculture & Natural Resources (LUANAR)

Motto:	Knowledge, Innovation and Excellence
Vision:	To be a world class University
Mission:	To advance knowledge and produce relevant graduates with entrepreneurship skills for agricultural growth, food security, wealth creation and sustainable natural resources management, through teaching, training, research, consultancy, outreach and sound management
Core Values:	All staff members shall strongly uphold to the following core values: innovativeness, integrity, excellence, environmental stewardship, openness, transparency and professionalism

Faculties:	Agriculture, Development Studies, Food and Human Ecology, Natural Resources and Veterinary Medicine

Table 4.2: Vision, mission and core values of the University of Malawi

Vision:	To be a centre of excellence in higher education for sustainable development of Malawi and the region
Mission:	To advance knowledge and to promote wisdom and understanding by engaging in teaching, research, consultancy, public and community engagement and by making provision for the dissemination, promotion and preservation of learning responsive to the needs of Malawi and global trends
Values:	UNIMA will reflect the aspirations of the Malawian society in which it is located. This being the case, the University of Malawi subscribes to the following values which are espoused by the Malawian Society
Integrity:	Trust and trustworthiness, together, must characterize words and actions as individuals and as a University. UNIMA believes that actions will be consistent with words that demonstrate honesty and ethical behavior and will address the needs of others, while being open and transparent about conflicts of interest
Commitment:	All should pledge to make wise use of resources available to them, including financial resources, time, ability and facilities that the institution provides
Professionalism:	All should treat UNIMA business with concern, commitment and a sense of responsibility and apply the best possible skills, knowledge and experience to all clients
Openness to diversity:	UNIMA must build a community that fosters a climate that is open and welcoming to diverse people, ideas and perspectives; that promote a constructive discourse on the nature of diversity; and that engages faculty, staff and students in activities that promote the University's core values
Responsiveness:	In today's fast-paced and ever-changing world of higher education UNIMA must become a network that links students, faculty, business, industry, government and community. UNIMA will 'think globally and act locally' in a timely manner to shape actions, in order to better serve its constituencies in its quest to realize the promises of a better Malawi and a better world
Entrepreneurship:	UNIMA, students and staff members should utilize the knowledge they have gained to undertake innovations and investments in an effort to be self-reliant and create economic opportunities for others
Faculties:	Applied Science, Humanities, Social Science, Engineering, Nursing, Medicine, Education, Commerce, Law, Public Administration

The vision, mission, core values of LUANAR and UNIMA are shown in Table 4.1 for LUANAR and Table 4.2 for UNIMA. From the mission of LUANAR, it is noted that it intends to engage and uplift the plight of the rural agro-based communities. It is explicitly indicated that the university will engage with the public and community in its manifestation. What need to be understood though is how this mandate will be promoted within the core research agenda and how the researchers will be incentivized. Critical to attainment of the mission of LUANAR is the quality and capacity of its staff base and the critical mass of the students it could produce. On the other hand, UNIMA with its collection of federal colleges embraces both strong science and liberal arts traditions without an explicit mandate to focus on the rural people. UNIMA does generate useful knowledge and innovations, but has no clear mandate to focus on the plight of the rural poor.

4.1.3 Indicative Data for LUANAR and UNIMA

Table 4.3 indicates that few researchers are active in research at LUANAR (20) as compared to UNIMA (40). Among other factors, this may be attributed to limited financial resources for competing university priorities, which also was cited by academics as a major constraint to their interaction (Figure 4.8) with

external partners such as the rural communities. This is also evidenced by very limited national funding for research (less than 1%) as shown in Table 4.3. In terms of levels of qualification for staff, there are more staff with PhDs at LUANAR and few at UNIMA. This illustrates the quality of the staff base at LUANAR *i.e.* high number of staff with PhDs which gives it an edge to delivery if fully supported for its mission. The difference is a reflection of the agriculture-based economy of Malawi and LUANAR's rural roots. Malawi will always need well trained agricultural scientists compared to humanities and liberal arts experts.

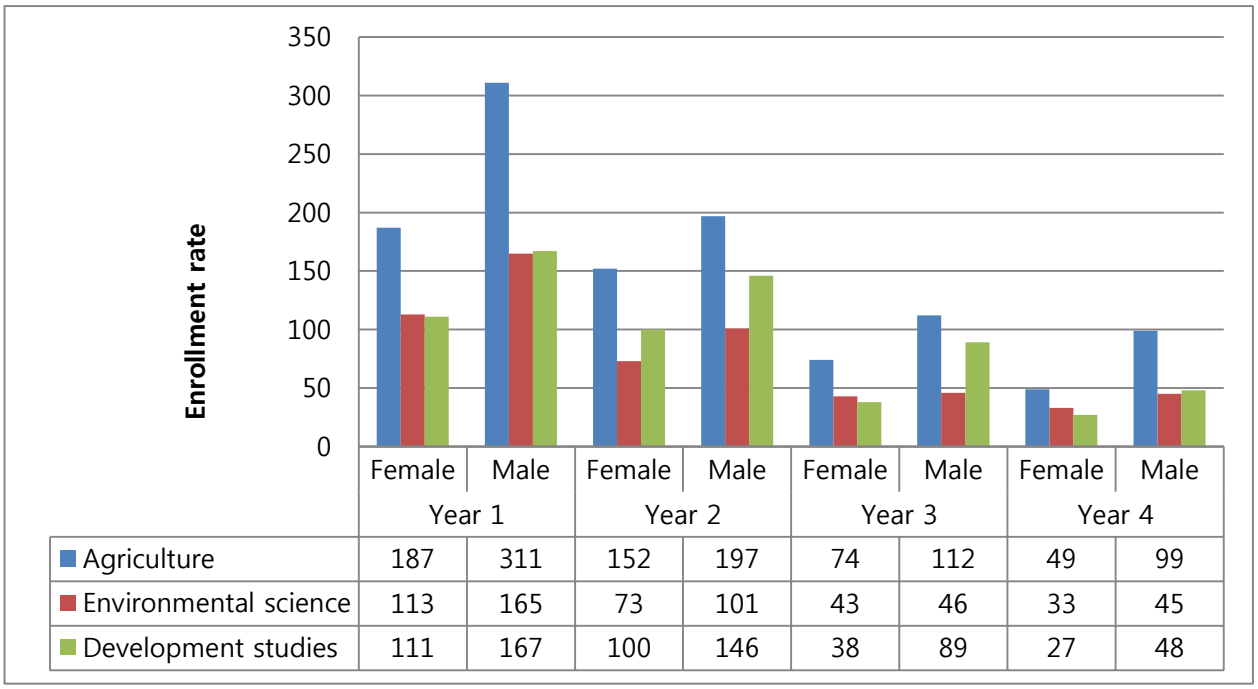
Equal to this is the effort to increase the numbers of students enrolled balanced by gender as shown in Table 4.3 and Figure 4.1. A gender-balanced graduate will go a long-way to reaching vulnerable rural communities since these graduates are front-line officers. However, increasing student population at LUANAR has the implications for more infrastructure for teaching (*e.g.* classrooms, libraries and laboratories). Currently, the infrastructure capacity is limited at LUANAR. The limited number of publications per year also links to limited research activities taking place at the two institutions.

Figure 4.1 shows that enrolment rate at LUANAR is dominated by the Faculty of Agriculture across the years of study. This may be explained by its being the oldest and biggest faculty in an attempt to respond to communities' needs. The faculty has five departments and offers a wide range of programmes of study ranging from animal science, crop sciences, soil science, horticulture, agricultural and irrigation engineering.

Table 4.3: UNIMA and LUANAR Indicative data

Category	**UNIMA**	**Bunda/LUANAR**
Number of Academic staff	800	160
Percent Staff with PhD	25% (N=800)	50% (N=160)
Number of Active Academic Researchers	40	20
Percent of GDP of Public Funded Research	< 0.5%	< 0.5%
Total Number of full-time students	8, 755	2,560
Undergraduate, full-time	8, 403	2,410
Post graduate (MSc, PhD), full-time	352	150
Percent learning under e-learning mode	1%	1%
Female enrolment, percent of total	40%	50%
Ratio of undergraduate students to staff	9 : 1	12:1
Staff Publications	<30 per year	< 50 per year
Research Budget as percent of annual university budget	< 1%	< 1%
Number of successful proposals in a year	< 5	< 10
Academic Vacancies	70 % filled	85 % filled
Annual university budget (2012)[1]	MK 8 billion	MK 2 billion
Self-generated income as percent of total annual university budget	25%	32%
Government subvention as percent of total annual university budget	75%	68%
Consultancy income as percent of total annual university budget	0.5%	5%
Number of Patents in a Year	< 5	< 5

[1]*one dollar equal to MK343, 2013. Source: University of Malawi and LUANAR Strategic Plans. Active researcher means those who regularly conduct research within the university and are able to publish in scholarly journals.*



	Year 1 Female	Year 1 Male	Year 2 Female	Year 2 Male	Year 3 Female	Year 3 Male	Year 4 Female	Year 4 Male
Agriculture	187	311	152	197	74	112	49	99
Environmental science	113	165	73	101	43	46	33	45
Development studies	111	167	100	146	38	89	27	48

Figure 4.1: Enrolment rate at LUANAR by faculty (2013). *Source: computed from data collected through senior management interviews with the assistant registrar (academics)*

4.1.4 Institutional conditions that sustain and promote interaction

4.1.4.1 Balance of knowledge functions

Here we analyze how LUANAR universitY in Malawi balanceS the key knowledge functions of a university *i.e.* teaching, research and community engagement. Teaching of students according to their study programmes have been the key activity of LUANAR. This is more so now that student numbers have been increasing. Research has been a close second given the need to publish journal papers in order to get promotions. Promotions in LUANAR are heavily tilted towards journal publications which one attains through research. Teaching is not weighted heavily. This is perhaps an anomaly in that those teaching many courses or big classes are not promoted on this basis.

Further, research while critical, has not been matched by financial support from LUANAR through budgeted government subvention. Instead, the little research that is carried out has been done through external support by way of writing proposals. Staff who write excellent proposals have been rewarded with research grant support from donors and international institutions allowing them to publish for promotions. We will explore later these themes on the role of government, donors, international and regional research networks and NGOs in providing funding for research. As of now government funding for research with or without an Agriculture SWAP is yet to trickle to LUANAR. Further we will examine the multi-disciplinary nature of the research done by LUANAR and MZUNI.

Lastly, community engagement has manifested itself through short courses training, participatory farmer research and community projects. Interaction with external social actors, especially communities, is encompassed in the mission of LUANAR given its agro-based and natural resources curriculum. Unlike private universities, public universities are designed to provide service to the communities. Innovations coming out of research have been passed to communities for adoption. For LUANAR, there is a culture

among academics to do outreach. We will examine how effective this has been in case of LUANAR and MZUNI.

The balance between the three functions varies from programme to program, faculty to faculty, department to department as well as individual academics. The nature of some programmes does not allow for community interaction. However, most programmes at LUANAR have room for community interaction. Thus certain disciplines by their nature automatically position academics for interaction with external social partners. The official intended balance for LUANAR is 60% for teaching, 30% for research and 10% for outreach. The reality however for the individual lecturer is that teaching can be overloaded (up to 80%), very little research done (due to lack of research funding) and outreach programs non-existent. While staff salaries do cover time for research, if one does not have funds for research, funded time for research will not be utilized.

4.1.4.2 The conceptualisations of interaction in relation to research, innovation and interaction with external partners in the university

Interaction at public universities in Malawi can be conceptualized in various ways. In an agriculture university like LUANAR, these are manifested in consultancies, dissemination workshops, seminars, conferences (by college or faculty), collaborative research, symposia, community engagement, extension, technology transfer as well as field days. Farmers, students, government officials and other key stakeholders interact and exchange ideas, knowledge and skills. Farmers interaction is mainly focused on exchange knowledge and passing on innovative technologies.

4.1.4.3 Organizational structures to promote and support interaction

The organizational structure of LUANAR is shown in Figure 4.2. LUANAR has the council to set university policies, senior management (VC, DVC, UR, and DoF) to operationalize the policies. At operational level, we have deans of faculties and heads of departments. To focus on particular research activities, we have Director of Research and Outreach (DRO) and research centres (*e.g.* Centre for Agricultural Research and Development, CARD) and project and outreach coordination units (*e.g.* Programmes Coordination Unit, PCO). CARD and PCO are headed by Directors and these structures are the focal point of university research and outreach programs through which faculties interact with external stakeholders.

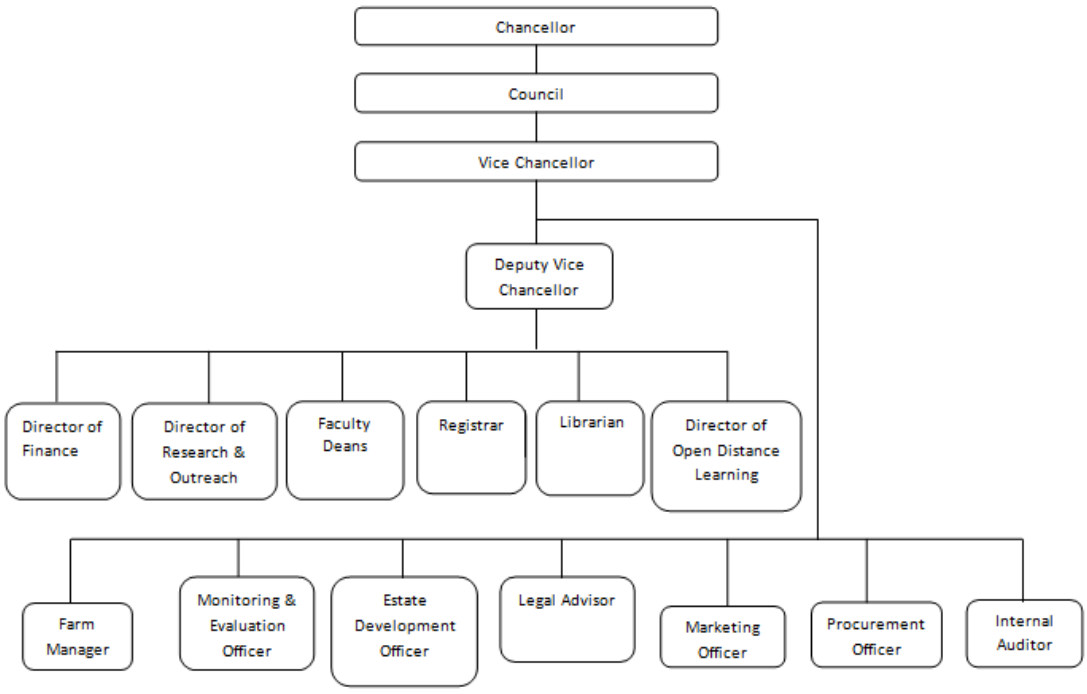


Figure 4.2: LUANAR's management structure

CARD is a research centre under Faculty of Development Studies while PCO is an external programmes coordinating office in the Directorate of Research and Outreach. According to the Director of CARD, it is within the mandate of CARD to interact with external social partners. Research fellows and staff from faculties form multi-disciplinary teams to conduct research. Most of the research is collaborative in nature drawing expertise from within LUANAR and outside. The type of research and community engagement is guided by university research and outreach policy. After the research is carried out, results are disseminated to policy makers and other key stakeholders using various forums. Local communities are engaged mainly through faculty departments and PCO.

The specific internal interface structures to support interaction include decision making structures such as the senate, committee of deans, faculty management committees and the office of the dean of post graduate studies. However, there is no deliberate office to promote transfer of technologies. If technology transfer is to be maximized, this is a gap in the university. There is need for a deliberate effort to transfer innovative technologies to its target audience of farmers since LUANAR is an agro-based institution. Through such an office, farmers would demand certain technologies to be researched and developed while proven technologies would find their way to farmers.

Despite the absence of the technology transfer office, there are processes that help transfer technology to the end users such as local communities. The faculty of development studies through the extension department helps other departments to transfer what has been developed to the external actors such as farmers. It also helps evaluate the impact of such technologies. The department of nutrition as part of students' practicals conducts trainings in the surrounding villages on how to process nutritious food from the farmers' usual produce such as pumpkins. The Extension Department runs a column in a national newspaper, Weekend Nation. In the column, the department disseminates information on several technologies being developed at Bunda and how they can improve the livelihoods of the farmers. Contacts for extra details are included.

The other external interface mechanisms include multi-disciplinary on-farm collaborative research involving staff, farmers and government officials. A case in point is the BT cotton trials currently underway at LUANAR. There is also staff and students exchanges with other universities in the region and internationally. These serve to introduce different approaches to teaching, learning and outreach activities.

4.1.4.4 Incentives for individual academics to interact with external partners

Due to lack of adequate funding, the university does not have special funds for community engagement. According to the vice chancellor, with the coming in of LUANAR, they will intensify interaction with the external social partners, especially the surrounding communities so as to improve their livelihoods. The vice chancellor wants to make community engagement more pronounced in LUANAR. He stated that 'economic empowerment of communities for self reliance' is one of the key goals of LUANARs strategic plan (2012-2017). LUANAR will set aside 1 percent of total funding to outreach activities and another 1 percent in research to be used as seed money for upcoming staff. The university is planning to set up a special fund for community engagement.

Nonetheless, there are incentives, internal and external, attached to interaction with external actors. Internal mechanisms at LUANAR include promotions and special recognition through awards by the university. A promotion criterion among academics requires contribution to community engagement. Thus for an academic to be promoted to a senior grade (senior, associate and full professor), they must demonstrate that they were involved in community engagement.

There are financial benefits associated with external interaction. These include allowances, transport and equipment for those who write research and community engagement project proposals. The incentives are part of the research and outreach projects undertaken by the academics. The research and outreach policy states that the fees and allowances of research, consultancies and outreach activities should be shared among the individual academic carrying out the activity (70%), the department (20%) and the faculty (10%). For LUANAR, research and outreach activities have contributed greatly to the development of infrastructure, vehicles and equipments for faculties and departments. Consultancies and short courses at CARD have also contributed to the operational income of the centre.

Lastly, LUANAR gives special awards to staff in the form of certificates for outstanding research and research activities. The external mechanisms to promote external interaction include the chance to publish in journals. Academics are encouraged to publish their research findings in external journals as a way to get a promotion. Academics participate in external conferences based on their research and publications. The other incentive was the chance to publish in faculty and university newsletters of LUANAR. The academics are also offered a chance to be involved in inter-university interaction through working as external examiners.

4.1.5 Patterns of interaction with external social partners at LUANAR

4.1.5.1 Most common external social partners of academics at LUANAR

Considering a Weighted Average Index (WAI) of above 3 (n=69), *i.e.* interaction on a moderate to wider scale, an examination of the WAI in Figure 4.3 revealed that the most frequent partners that academics interact with at LUANAR, in descending rank order, are small scale farmers (3.27), Non-Governmental Organisations (NGOs) (3.22), individuals and households (3.14), national government departments (3.11) and national universities (3.03). The highest WAI (3.27) with small scale farmers is not surprising considering the background of LUANAR which was initially established with the objective of producing

middle level extension personnel which deal directly with small-scale farmers and the promotion of small scale farming by government through the decentralized government extension system. This is in line with the agro-based economy of Malawi where smallholder farmers are the majority. The key development challenge for Malawi has been to reduce poverty levels, improve livelihoods and food security. All these are related to agriculture of smallholders of which LUANAR (in contrast with MZUNI) is a significant player in teaching, research and outreach.

According to the Dean of Development studies (Management Report 6) and the VC, interaction with external social actors especially communities is encompassed in the mission of LUANAR as outlined in the Strategic Plan for LUANAR. This is more pronounced in research and outreach activities. However, this interaction varies from department to department and from faculty to faculty. For instance, the Extension Department interacts extensively with the local community. The University farm at LUANAR also acts as an important external interface structure and a training ground for students. Field days are held annually where surrounding communities and stakeholders are invited to visit several technological developments at the farm such as fish farming, crops and animal growing etc.

Other partners which LUANAR academics interact with in isolated to moderate instances (WAI of between 2 and 3) are national regulatory agencies, funding agencies (international), African Universities, development agencies and local non-farmer communities. The social partners that academics at LUANAR least interact with are political organisations and trade unions (WAI of 0.84 and 0.97 respectively). This could be explained by the nature of LUANAR which is an agriculture university with no political or social science discipline. This is in line with findings of Kruss *et al.* (2012), who observed that some partners with low WAIs such as political organisations, trade unions, social movements, clinics/health centres and civic associations don't necessarily mean low interaction with these partners, but are outside the mission and mandate of that particular university.

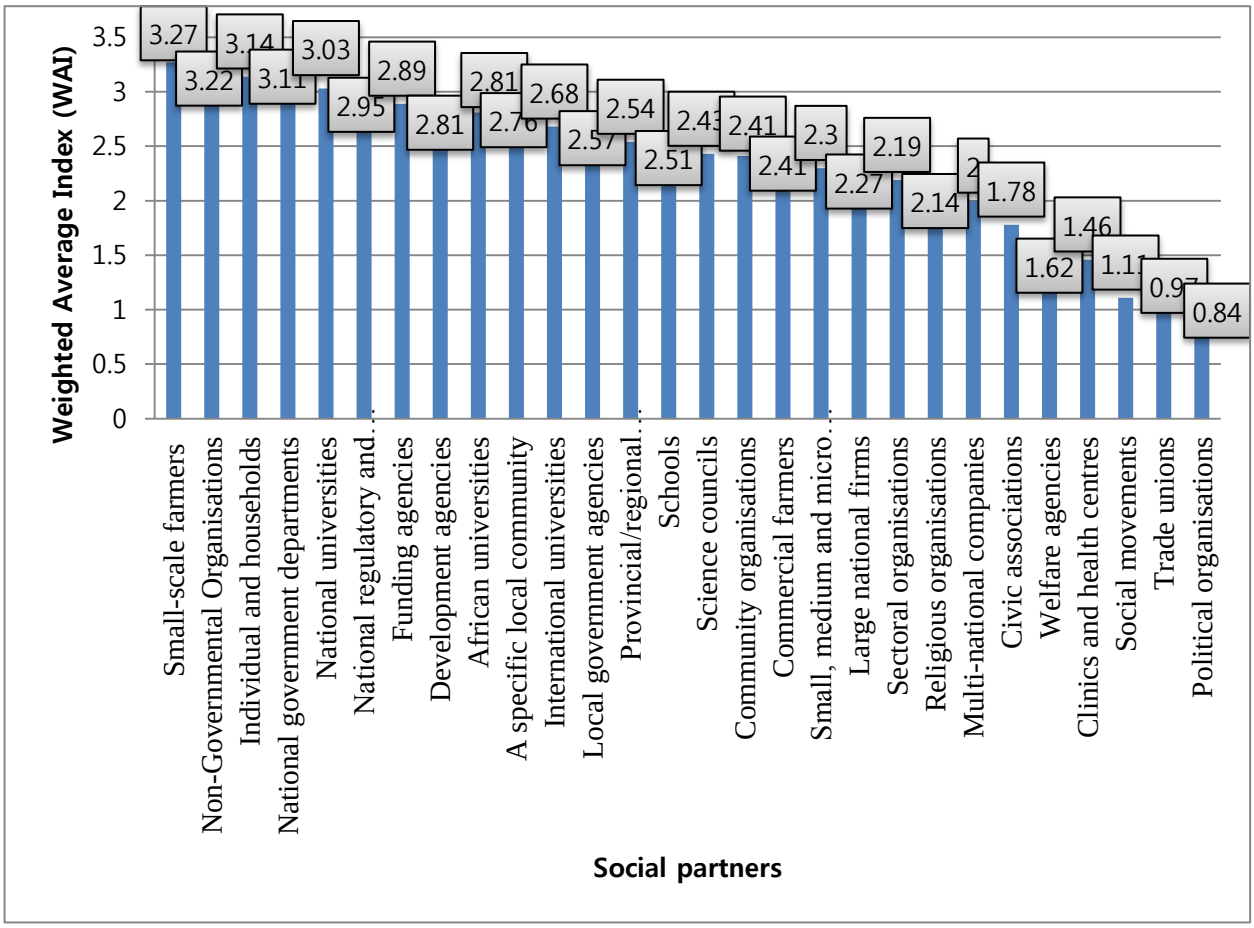


Figure 4.3: Weighted Average Index (WAI) of external social partners in descending order by WAI for the Lilongwe University of Agriculture and Natural Resources (LUANAR). Source: Survey Data (2013)

Notable among the interactions is the few links LUANAR and MZUNI has with private firms or industry. This is a result of low levels of industrialisation in Malawi. Even with an agricultural university such as LUANAR, agricultural private firms have not interacted extensively with LUANAR. Most of the agricultural firms in the country do very little research and development. As small branches of multinational companies, research and development are often done in other countries. As Malawi industrializes through value addition and mining in the coming years, this is expected to change.

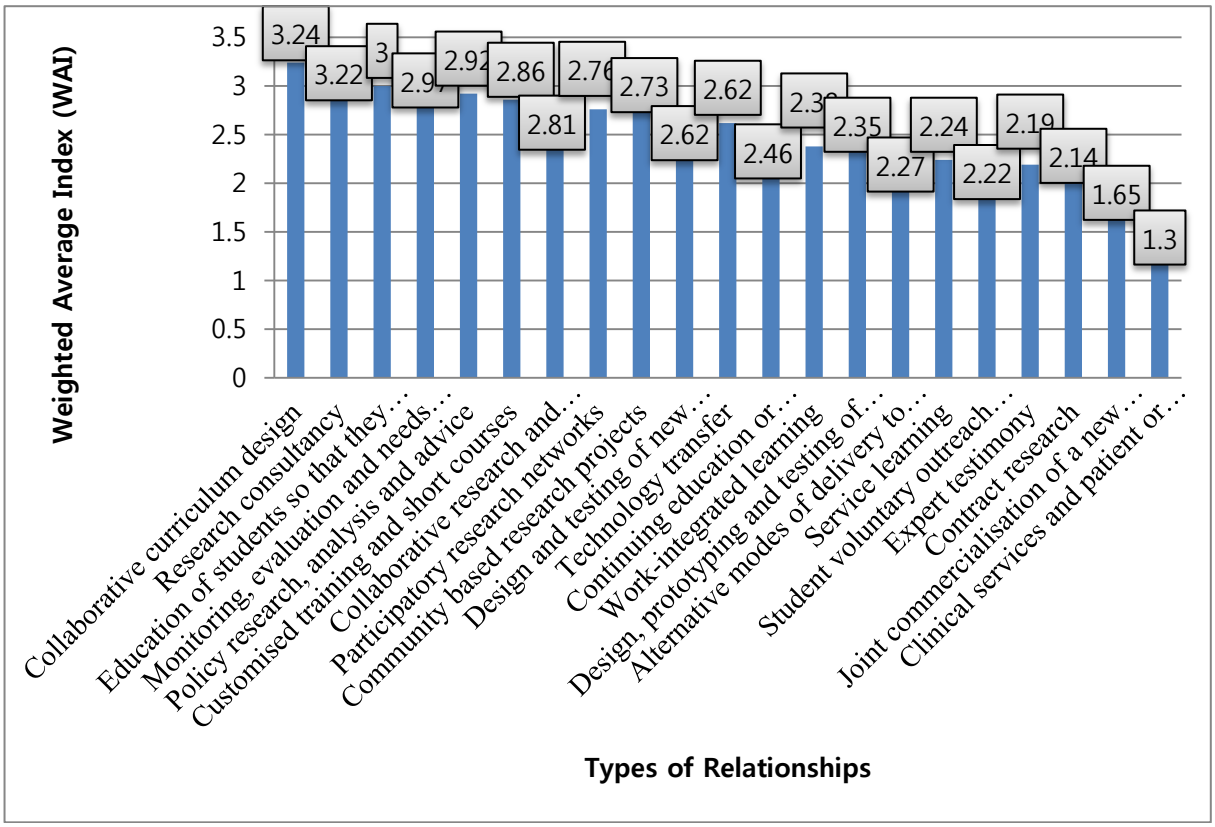


Figure 4.4: Weighted Average Index (WAI) of frequently reported ways of interaction with external social partners in descending order by WAI for the Lilongwe University of Agriculture and Natural Resources (LUANAR). Source: Survey Data (2013)

4.1.5.2 Types of relationship in general and associated types of partners

The key way of interacting is with regard to teaching, research, consultancies and outreach in line with LUANAR's mission and mandate which is to advance knowledge and produce relevant graduates with entrepreneurship skills for agricultural growth, food security, wealth creation and sustainable natural resources management. It is not clear whether the interactions with small-scale farmers embody training and outreach intertwined or fully outreach activities. This is because there are limited community infrastructure outputs, particularly because reports feature so high in the WAI analysis when compared to actual changes that could happen at the community level, such as community infrastructure improvement, business spin-offs, new processes (%).

Findings from the surveys with academics about their modes of interacting are in line with the mission of LUANAR as well as the interviews done with senior management, which is that interaction is happening during teaching, research, and outreach. Analysis of the WAI of the type of relationship (Figure 4.4) for LUANAR revealed that the most frequently reported relationship is collaborative curriculum design (3.24). This is where different stakeholders are involved in the design and development of academic curriculum. For instance, a recent review (2013) of the curriculum in which new programmes of study and new faculty such as degree in veterinary medicine and faculty of food and human sciences respectively have been introduced at LUANAR involved the participation of various government representatives, NGOs, private sector as well as the donor community. Other undergraduate programs like agribusiness, extension and a degree specifically for agriculture teachers were developed through

collaborative exchanges with key stakeholders. The advantage to LUANAR has been that the degrees developed are demand driven and in line with the needs of the sector.

Research consultancy was a close second (WAI = 3.22). Academic members of staff are doing consultancies for government departments, NGOs and development partners. Consultancies have potential to generate some income for LUANAR but currently, they are not despite the existence of a LUANAR policy on consultancies. The key issue with consultancies has been that they have not been formalized within the LUANAR university system. Most academic members of staff do not declare their consultancies and get paid fees as individuals (moonlighting) with little financial benefit to LUANAR. This is partly a reflection of the fact that the university does not fund research from its budgeted funds instead research is externally driven (donors, foundations *etc*). It is expected that in near future consultancies at LUANAR will be formalized within the university system where the individual, the department and the faculty benefits from the proceeds.

Outreach activities have a WAI of between 2.5 and 3.0 and vary across departments and faculties. Key outreach partners include government officials, farmers, individuals and households. For all faculties, there is collaborative curriculum development, consultancies, and participatory research with farmers. For the Faculty of Development Studies, outreach activities include monitoring and evaluations, needs assessment, policy research and short courses. For the Faculty of Agriculture we have on farm crop and animal breeding research, community projects while for the Faculty of Food and Human Sciences, they have designing and testing of new interventions and protocols, food product development and nutrition interventions.

4.1.5.3 Channels of interaction in general and associated types of partners

Figure 4.5 shows the results of the analysis of channels of information that academics use to exchange knowledge with external actors. Public conferences, seminars or workshops have the highest WAI of 3.49. This is on a wider scale *i.e.* the main channel of academic interaction through which knowledge and information exchange takes place with external social partners. Students were second most common channel of transferring knowledge, with a WAI of 3.3. Other channels with a WAI above 3 are informal information exchange, training and capacity development or workshops, reports and policy briefings and participatory or action research projects, in rank order of WAI. This is similar to what was observed in South African universities (Kruss *et al.*, 2012) that the most frequently reported channels of exchange are thus informal and largely indirect, in that they do not require a personal interaction between the academic and the external social partner.

The least frequently reported are patent application and registration, spin-off firms from the university, software development or adaptation and technology hubs and incubators. Among the channels that are reported on an isolated to moderate scale include oral or written testimonies or advice, cross-disciplinary networks with social partners, popular publications, demonstration project units and interventions and development programmes.

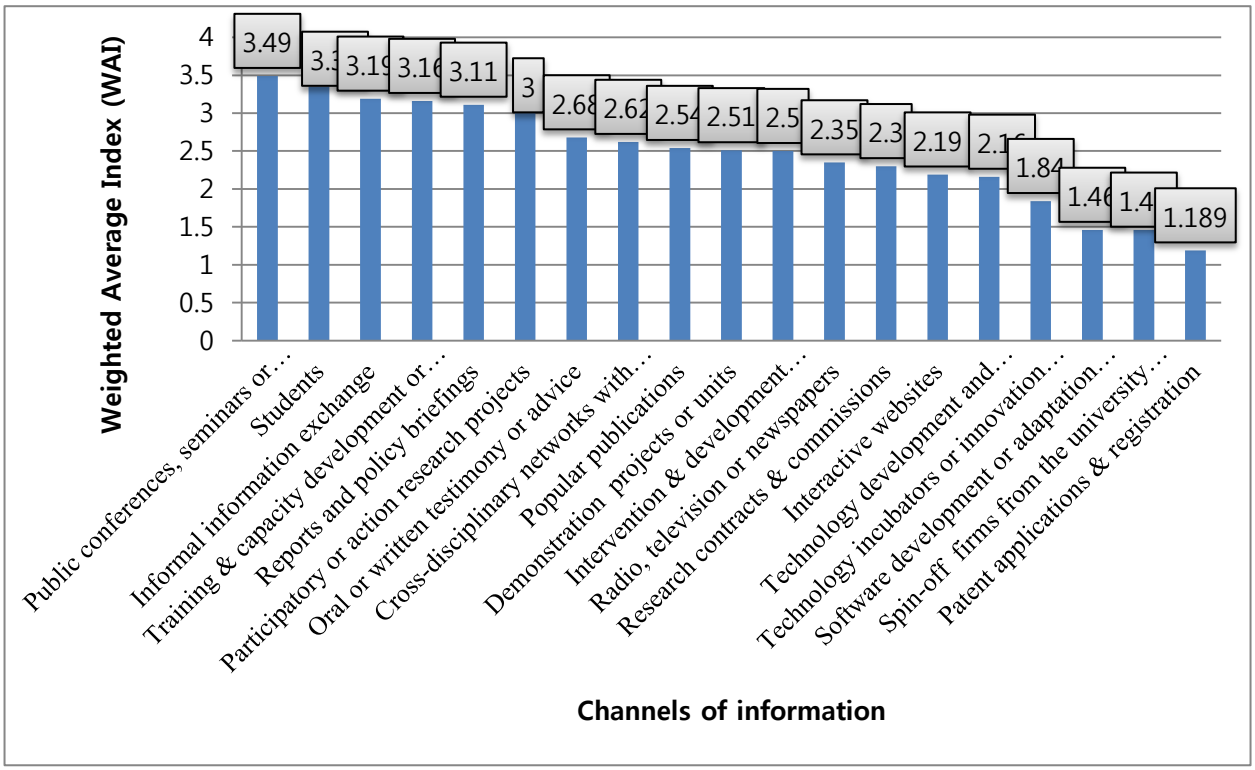


Figure 4.5: Weighted Average Index (WAI) of channels of information in descending order by WAI for the Lilongwe University of Agriculture and Natural Resources (LUANAR). Source: Survey Data (2013)

Although there is a very strong linear transfer of knowledge and expertise from the university to community, nowadays, the idea of conducting demand driven research has necessitated researchers from the university to learn much from the community and exchange knowledge. Researchers and farmers/communities discuss their problems and brain storm on solutions for solving those problems. It is interesting that communities know very well their problems even solutions but only need resources and guidance. The analysis of case studies revealed much of this information.

Take note that direct extension with farmers is not mentioned among outreach activities by departments and staff. This emanates from the fact that the mandate to do direct farmer extension services is with ministry of agriculture (throughout the country) and NGOs in their project areas only. LUANAR is yet to get this mandate from government and thus has to work closely with Ministry of Agriculture officials.

4.1.5.4 Outputs of academic interaction

Analysis of the WAI on outputs of interaction (Figure 4.6) indicated that the most frequently reported outputs of interaction were graduates with relevant skills and values (3.51). This is likely a result of academics spending more time on teaching than research and outreach. The other common output with a WAI of above 3 are dissertations, academic publication, academic collaboration as well as reports, policy documents and popular publications, all on a moderate to wider scale. As academic programmes, student population and class sizes increase, more staff of LUANAR are being overloaded on teaching duties with little time for research and outreach. This is reflected on low outputs of journal publications and scholarly books. Creation of spin-off companies by Public Universities is in its infancy. Licensing of technologies and innovations with private firms in return for royalties is preferred given the low administrative load to the universities.

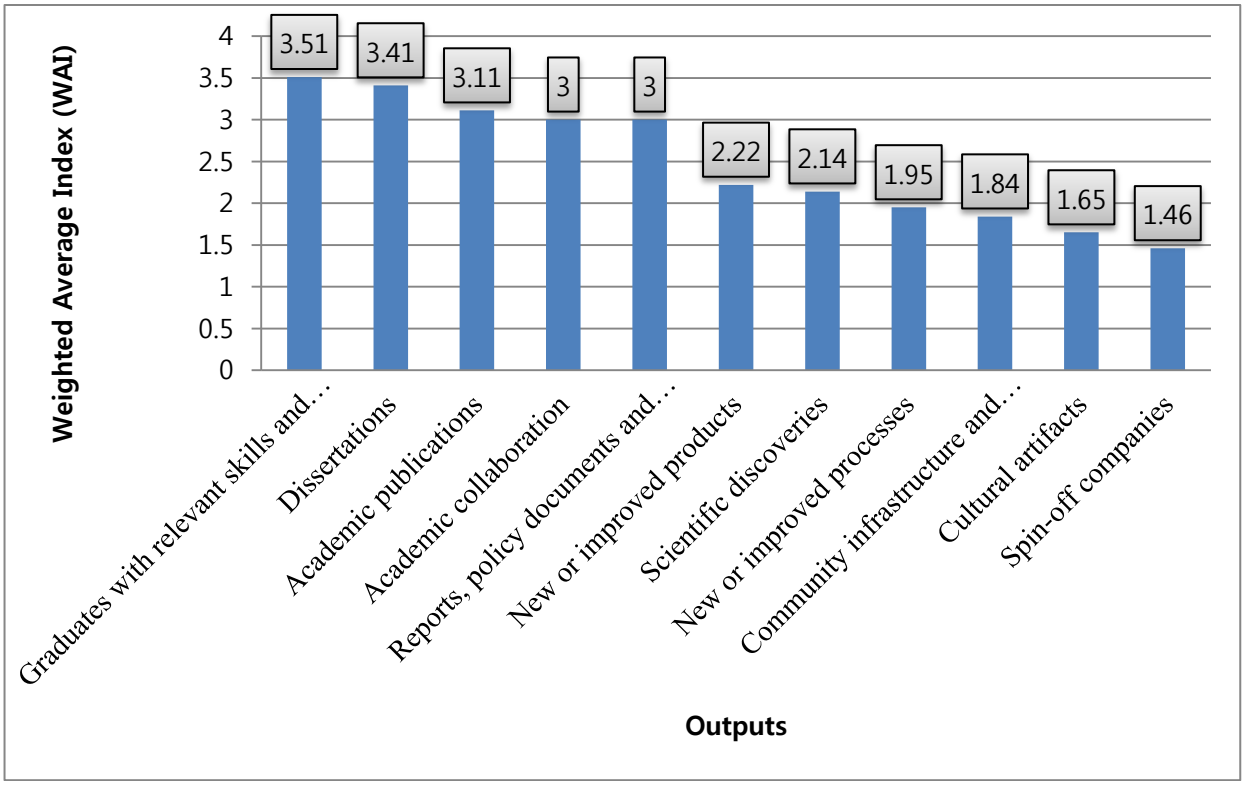


Figure 4.6: Weighted Average Index (WAI) of outputs of academic interactions with external social partners in descending order by WAI for the Lilongwe University of Agriculture and Natural Resources (LUANAR). Source: Survey Data (2013).

Spin off companies, community infrastructure and facilities and new or improved products, were amongst the least frequent outputs reported by academics. This is not surprising given the low levels of interaction with commercial firms and industry. Main outputs are in the academic arena with teaching monopolizing the time and to some extent research. The most frequent output reported (graduates) is a direct result of teaching aligned to collaborative curriculum design) in line with channels of interacting (public conferences and students).

4.1.5.5 Outcomes and benefits of academic interaction

Figure 4.7 shows the results of the analysis of the outcomes and benefits of academic interaction at LUANAR. The number one benefit is training and skills development (3.32) followed by academic and institution reputation (3.3), then public awareness and advocacy (3.22). Relevant research focus and new research projects (3.08), improved livelihoods (3.05) and improved quality of life (3.03) for both individuals and communities were also mentioned.

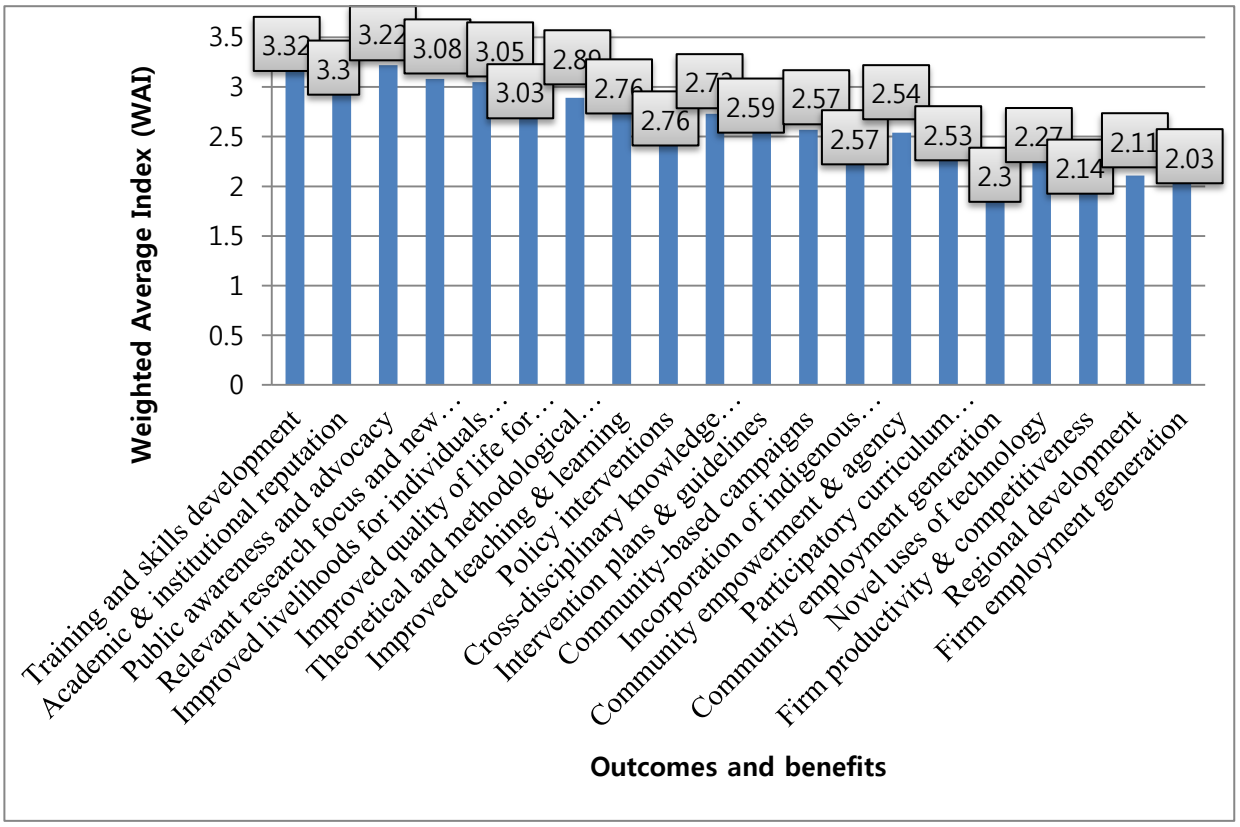


Figure 4.7: Weighted Average Index (WAI) of outcomes and benefits in descending order by WAI for the Lilongwe University of Agriculture and Natural Resources (LUANAR); Source: Survey Data (2013).

The results indicate that the least reported benefits or outcomes of academic interaction with external actors are community employment generation, novel uses of technology, firm productivity and competitiveness, regional development and firm employment generation. The low benefits in these categories are a reflection of low commercial firm and industry interactions with LUANAR. With more interactions with firms and industry, these parameters are likely to improve.

4.1.5.6 Obstacles and challenges to academic interaction

Academics in developing countries face a number of challenges and obstacles as they engage with external social partners and Malawi is no exception. Figure 4.8 shows results of the analysis of obstacles and challenges to academic interaction at LUANAR. The results show that the most significant important obstacles/challenges are limited financial resources for competing university priorities (3.89), and sustainable external funding (3.70). This limits the extent of research and outreach activities academics do in addition to teaching. Student attachments and internships are costly for the university and where resources are limited, these are often sacrificed.

Other challenges and obstacles that were cited by academics as slightly important (*i.e.* WAI scores of above 2.0-3.0) are lack of institution recognition systems that do not reward academic interaction activities sufficiently, lack of clear university policy and structures to promote interaction, negotiating access and establishing a dialogue with external social partners and lack of mutual knowledge about partners needs and priorities. Also, there is lack of initiative and creativity among the academics to do interaction. They lack ideas and sometimes time is limited. This is particularly the case for those few

academics who reported no interaction with external actors. Among the obstacles that were rated important (*i.e.* WAI scores of above 3.0) at LUANAR was competing priorities on time (3.08).

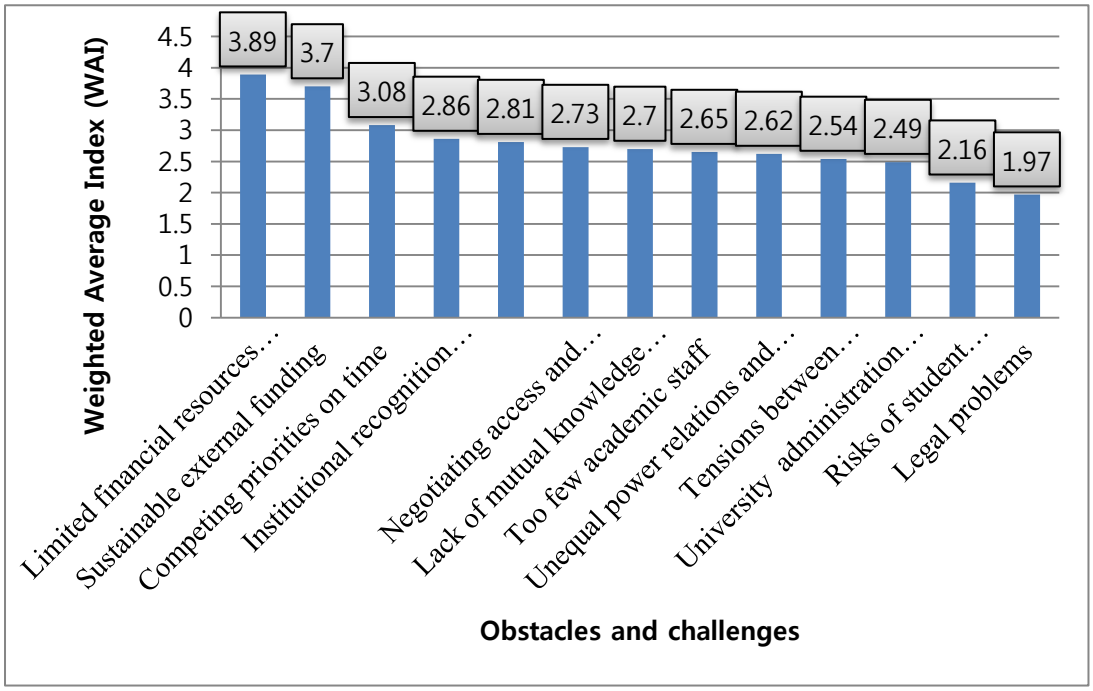


Figure 4.8: Weighted Average Index (WAI) of Obstacles and challenges in descending order by WAI for the Lilongwe University of Agriculture and Natural Resources (LUANAR). Source: Survey Data (2013)

4.1.6 Summary

This chapter investigated the nature of interactions with external actors at LUANAR. In accordance with LUANAR mission and mandate, core activities are teaching, research and outreach. The balance between these varies from programme to program, faculty to faculty, department to department as well as individual academics. Teaching of students is the core activity followed by Research leading into publications for awards and promotions. Research while critical, has not been matched by direct financial support from LUANAR through budgeted government subvention. Instead, it is donor driven through competitive proposal bidding. Community engagement is mostly through short courses training, participatory farmer research and community projects..

Teaching of students according to their study programmes have been the key activity of LUANAR. Research is second given the need for staff to publish journal papers in order to get promotions. Teaching is not weighted as heavily for promotions. Interaction incentives with external actors include promotions, academic awards and financial benefits;. Direct personal financial benefits include field allowances, honoria and fees. The interaction can also be a source of vehicles, equipment and supplies for participating departments. For LUANAR, research and outreach activities have contributed greatly to the development of infrastructure, acquisition of vehicles, equipments and supplies for faculties and departments.LUANAR academics are mostly engaged in social interactions with small-scale farmers, NGOs and district government officials. There are very few interactions with private firms and industry.

The most frequently reported outputs of interaction were graduates with relevant skills and values. Other key outputs include dissertations, academic publication, academic collaboration as well as reports, policy documents and popular publications. Spin off companies, community infrastructure and facilities and new or improved products, were amongst the least frequent outputs reported by academics. The least reported outcomes of academic interaction with external actors are community employment generation, novel uses of technology, firm productivity and competitiveness, regional development and firm employment generation. The challenges in interactions include limited financial resources. Others include lack of institution recognition systems that do not reward academic interaction activities sufficiently and lack of university policy.

4.2 MZUZU University (MZUNI) findings

4.2.1 Background of Mzuzu University

Mzuzu University is the second public university after the University of Malawi. It was established to increase intake of students from country's post-secondary students. The university was established by an Act of Parliament in May 1997 and enrolled its first students in January 1999. Currently, Mzuzu University has five faculties, namely: Education; Environmental Sciences; Information Science and Communications; Tourism and Hospitality Management; and Health Sciences. In addition to these, there are five centres including the Centre for Open and Distance Learning (CODL); the Centre for Security Studies (CSS); Test and Training Centre for Renewable Energy Technologies (TECRET); Chilundu Point Nature Sanctuary and Environmental Education, Training and Research Centre; and Water and Sanitation Centre of Excellence. The University is supported by a Library and Learning Resources Centre (LLRC). Mzuzu University offers 21 undergraduate programmes for generic and upgrading students. The University has five (5) postgraduate programmes *viz*: Master of Science in Fisheries, Master of Science in Information Theory Coding and Cryptography, Master of Education in Educational Leadership and Management, Master of Arts in Theology, and PhD in Theology given its early involvement in Theology.Compared to UNIMA and LUANAR, Mzuzu University is a young university in terms of qualified staff at PhD level (See Table 4.5) and infrastructure.

4.2.2 Structure of Mzuzu University

Like LUANAR, Mzuzu University is governed by a Council (headed by Council Chairperson) which reports to the Chancellor (the country's president). Under the Chancellor are a Vice Chancellor and Deputy Vice Chancellor (Figure 4.9). The Directors of Research and Deans of Faculties report to the Deputy Vice Chancellor whilst the University Registrar, Librarian, Director of Finance and Investment, and Director of Research report directly to the Vice Chancellor.

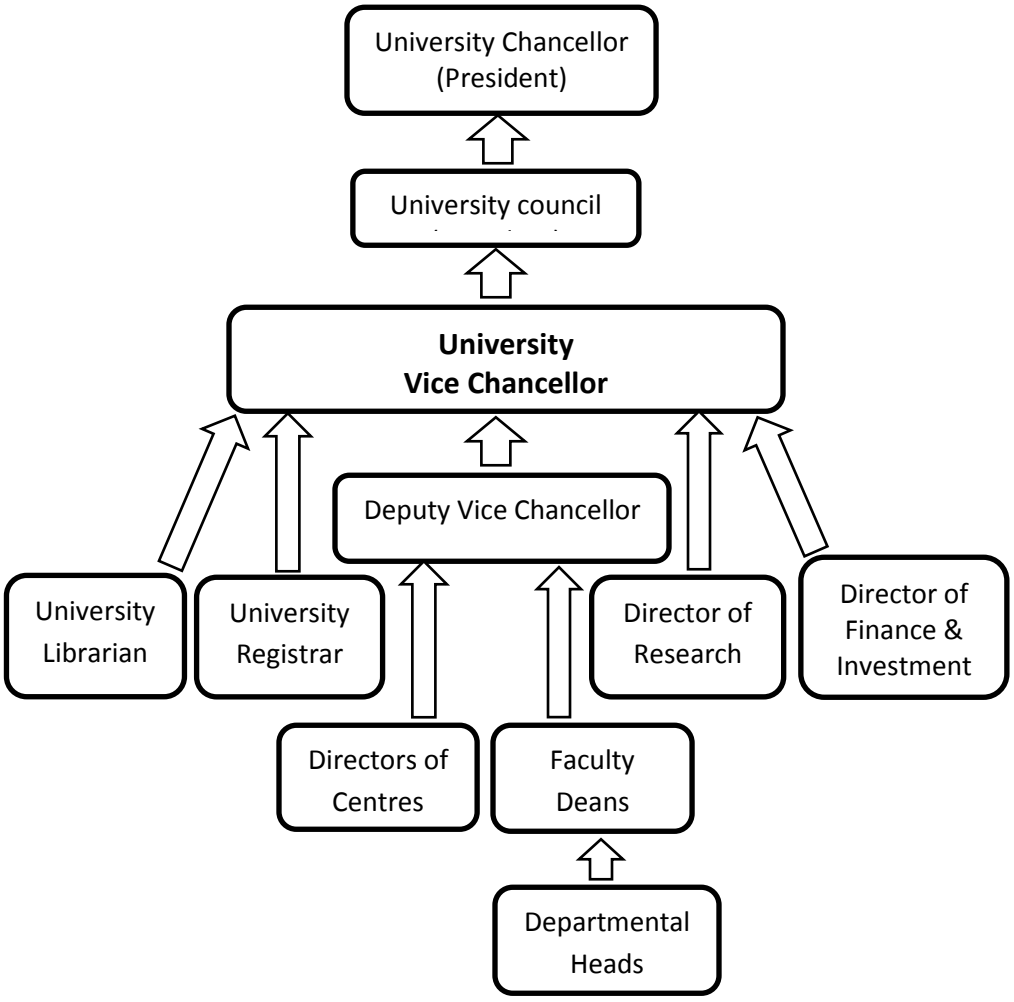


Figure 4.9: Structure of Mzuzu University. Source: Mzuzu University Website and interview with the University Librarian

4.2.3 Vision, Mission and Core Values of Mzuzu University

The mission of the University is to provide high quality education, training, research and complimentary services to meet the technological, social and economic needs of individuals and communities in Malawi and the world. Its vision is to be a premier provider of tertiary education, adaptive research and outreach in Malawi and the world, and its values are: service, self-reliance and perfection (Table 4.4).

Table 4.4: Vision, mission and core values of Mzuzu University

Motto:	Self Reliance, Service and Perfection
Mission:	To provide high quality education, training, research and complimentary services to meet the technological, social and economic needs of individuals and communities in Malawi
Aims:	Mzuzu University was established with four chief aims: (1) to advance knowledge and to promote wisdom and understanding by engaging in teaching, research and training and by making provision for the dissemination, promotion and preservation of learning; (2) to engage in such University education, research and training as is responsive to the needs of Malawi, Africa and the world; (3) to offer an education of high University standard; and (4) to provide complementary services to meet the technological, social and economic needs of individuals and communities in Malawi
Faculties:	Five: Education, Environmental Sciences, Information science and Communications, Health Sciences and Hospitality Management and Tourism. Each faculty is made up of several related departments (3-5)
Research/Training Centres	Three: Centre for Continuing Education, Centre for Security Studies and Centre forWater and Sanitation. These carry out specialized training, research and outreach functions as part of a faculty or part of central administration of the university. These are often stand alone entities headed by a director and well integrated with the university. They are expected to generate income for the university.

As a university, in its mission, MZUNI will among its services strive to meet the technological, social and economic needs of individuals and communities in Malawi. MZUNI is located in the North of the country but like LUANAR and UNIMA admits students from all districts of Malawi. Malawi has no regional public universities, instead public universities are given clear mandates to limit duplication of effort.

4.2.4 Indicative data for Mzuzu University

Mzuzu University is one of the fast growing institutions of higher learning in Malawi. Since its establishment in 1997, the university has graduated many students (for example, in the year 2012 alone, the university produced 1,830 undergraduate students Table 4.5). MZUNI is education focused training teachers for primary and secondary education. Consequently, the education faculty is the largest. The other faculties (Environmental Sciences, Information science and Communications, Health Sciences and Hospitality Management and Tourism) are small and attract fewer students.. Another remarkable achievement for Mzuzu University is the high percentage (30%) of women enrolled in its programmes similar to LUANAR (43%). MZUNI has capacity challenges in that there are very few staff with PhDs and just a handful of professors. It has a low percentage of public funded research and as a consequence very few journal publications.

Table 4.5: Indicative data for Mzuzu University

Category	**MZUZU (2012)**	**MZUZU (2017)** (projected)
Number of Academic staff	60	120
Percent Staff with PhD	1% (N=60)	10% (N=120)
Number of Active Academic Researchers	10	30
Percent of GDP of Public Funded Research	1%	6%
Total Number of full-time students	1830	3500
Undergraduate students, full-time	1800	3500
Post graduate (MSc, PhD), full-time	30	100
Percent learning under e-learning mode	10%	30%
Female enrolment, percent of total	30%	50%
Ratio of undergraduate students to staff	12 : 1	20:1
Staff publications per year	Less than 10	More than 20

Annual university budget (2012)[1]	MK 1.8 billion	-
Research budget as percent of annual university budget	2%	5%
Number of successful proposals in a year	Less than 5	More than 20
Academic Vacancies	80 % filled	>90 % filled
Self-generated income as percent of total annual university budget	20%	35%
Government subvention as percent of total annual university budget	80%	65%
Consultancy income as percent of total annual university budget	Less than 0.5%	10%
Number of Patents in a Year	<3	7

[1]*One dollar equal to MK343, 2013. Source: Mzuzu University Strategic Plan, 2012 Annual budget documents. Active researcher means those who regularly conduct research within the university and are able to publish in scholarly journals.*

The data in Table 4.5 is indicates that Mzuzu University is by comparison smaller than UNIMA and LUANAR in terms of qualified academic staff and projects being carried out. Thus, there are also less innovations being developed. It is also evident that the increasing student enrollment is not marching with number of academic teaching staff available, resulting in a high student to staff ratio.

4.2.5 Institutional conditions that sustain and promote interaction

4.2.5.1 Balance of knowledge functions

The mission statement of Mzuzu University is, "To provide high quality education, training, research and complementary services to meet the social, economic and technological needs of individuals and communities in Malawi". While the major functions of teaching, research and outreach are the same for MZUNI, LUANAR and UNIMA, MZUNI has strived to introduce new programmes not available at either LUANAR or UNIMA. Such examples include Security Studies and Tourism and Hospitality Management. MZUNI has shown versatility by carving out its own niches, while avoiding duplication with the other public universities. Interaction with external social partners is an integral part of the mission of Mzuzu University. However, there is no clear policy in terms of how academics can balance their three major functions of teaching, research and outreach.

4.2.5.2 The conceptualisations of interaction in relation to research, innovation and interaction with external partners in the university

It was generally acknowledged that despite the fact that the mission statement of Mzuzu University clearly mentioned complementary services to individuals and communities, the university lacks a policy framework providing guidelines on University's interaction with external social partners or outreach. It is not clear how the community and marginalized groups will be engaged. However, in spite of lack of supporting policy, MZUNI has a history of academic staff interacting with external social partners individually and/or informally, though it lacks coordination. There is room for strengthening community engagement at MZUNI.

4.2.5.3 Organizational Structures to Promote and Support Interaction

There are no institutional policies to support interaction, except for the Faculty Boards whose membership includes representatives from industry and line ministries and departments of government

who sit in Faculty Board meetings. Mzuzu University is in the process to operationalize the Research Directorate in the University which would coordinate collaborative research activities and consultancies with external social partners. Despite a lack of organizational structure to anchor interactions with external actors, some staff (n=32) during interviews highlighted some successful case stories of interaction. These are highlighted in Table 4.6.

Table 4.6: Case Studies of Interactions with External Actors at Mzuzu University

1	**Centre for Security Studies**	The Centre interacts with the security sector through joint meetings, offering of short courses, symposia and public debate. Interaction with collaborating partners at the senior level is strong.
2	**Center for Water and Sanitation Excellence**	The Center interacts with the outside communities more frequent such as through conducting water tests in boreholes and advising on precautionary measures to prevent water borne illnesses.
3	**Department of Fisheries Science**	The Department of Fisheries Science has a fully-fledged Master of Science Degree programme in Aquaculture and Fisheries and all research activities are done with the communities notably Mpamba area in Nkhata Bay district. Students in the department are carrying out their research projects in the area where they interact with farmers on regular basis. The Department is running an integrated fish farming project in the same area funded by the United Nations Development Programme (UNDP). Staff in the department also visits fish farmers around the university as an extension outreach programme.
4	**Faculty of Environmental Sciences**	The faculty of Environmental Sciences is also engaged in a number of projects, notable ones being the Choma-Chigwere Biogas Project; Water and Sanitation project (WATSAN).
5	**Faculty of Education**	There is interaction with local schools through practicals and refresher courses for primary and secondary school teachers. The interaction is two-fold. The university sends out its students for attachments in various secondary schools across the country. Then the schools (both primary and secondary) send their teachers to the University refresher courses as well as upgrading of their qualifications.
6	**Library**	The Children's Library, which is an annex to the main library, provides services to school children aged between six and fifteen from around Mzuzu City and outlying areas. Programmes offered include life skills, literacy, story-telling and cultural education. Primary school teachers are also taught "Information Literacy" skills and techniques in managing information resources.

4.2.5.4 Incentives for individual academics to interact with external partners

There are no clear incentives to promote academic interaction with external actors. Interaction with external social partners is not stressed among the criteria for promotion. Academic Staff get monetary benefits through interactions with external actors. These include allowances and fees from projects and consultancies. The challenge has been that these are done on an individual basis and not often declared through the university system. Although there isn't a clear policy guiding the way consultancies should be conducted at individual level, it is apparent that MZUNI is not in control, except in cases where consultancies are channelled through centres, departments and faculties. In this case, the university gets about 10% of the cost as overhead costs from those projects. The challenge of formalizing consultancies is therefore similar to LUANAR's.

4.2.6 Pattern of interaction with external social partners at MZUZU University

4.2.6.1 Most common external social partners of academics at the university

Examination of the WAI in Figure 4.10revealed that the most frequent partners reported by academics at MZUNI are schools, individuals and households and national universities, in rank order. However, these are engaged on an isolated to moderate scale as revealed by the highest WAI scores of 2.69, 2.59 and 2.53 for schools, individuals and households and national universities respectively. Small scale farmers were among the least prevalent external partners at MZUNI with a WAI score of 1.25. This is the case considering the focus of MZUNI on education training. The largest and the first faculty at MZUNI is education where the main focus is teacher education. Other science oriented faculties are new such as Environmental Sciences, Biomedical and Nursing and Hospitality. Here, student numbers are still small compared to the Faculty of Education with 60 percent of the undergraduate students. The absence of the agriculture faculty means MZUNI interacts less with farmers compared to LUANAR. It is interesting to note however that MZUNI interacts with security personnel (intelligence, police, and defence), fishermen, health personnel and hospitality industry. This is unlike LUANAR where smallholder farmer interaction is the highest. Other partners which were reported at the least level at MZUNI are political organisations, commercial farmers, trade unions, social movements and multinational companies (Figure 4.10). For MZUNI, this opens new avenues of interaction with commercial firms and industry and may provide income generating opportunities for the university.

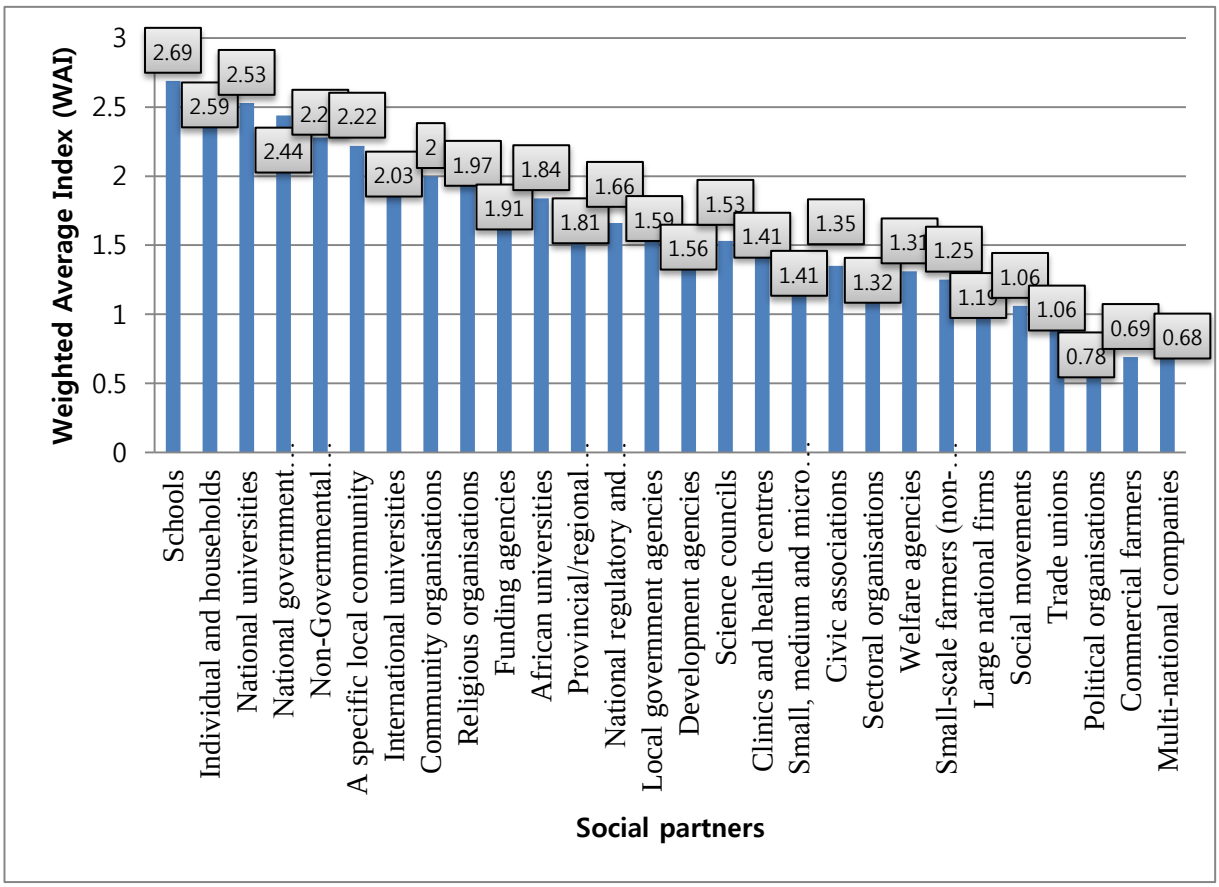


Figure 4.10: Weighted Average Index (WAI) of external social partners in descending order by WAI for Mzuzu University (MZUNI). Source: Survey Data (2013)

4.2.6.2 Types of relationship in general and associated types of partners

At Mzuzu University, analysis of the WAI of the type of relationship (Figure 4.11) revealed that the most frequently reported types of relationship, considering a WAI score of equal to or above 2.5, are education of students so that they are socially responsive (2.53) and continuing education or professional development (2.50), all but related to academics. However, these were reported on an isolated to moderate scale as revealed by the WAI scores of less than 3.0. Other types of relationship within the same scale (2.0-<3.0) are monitoring and evaluation needs assessment; collaborative curriculum design, research consultancy and policy research, analysis and advice. The types of relationships that were reported to be the least prevalent to MZUNI are clinical services and patient or client care (1.23) and joint commercialization of new product (1.38) despite MZUNI having a faculty of Biomedical Sciences and Nursing. This is perhaps a reflection that the faculty is still young and in the formative stages and yet to establish links in the medical field. In addition, technology transfer, collaborative research and development projects and alternative modes of teaching delivery to accommodate non-traditional students were also among the least prevalent relationships at MZUNI. This is peculiar to MZUNI.

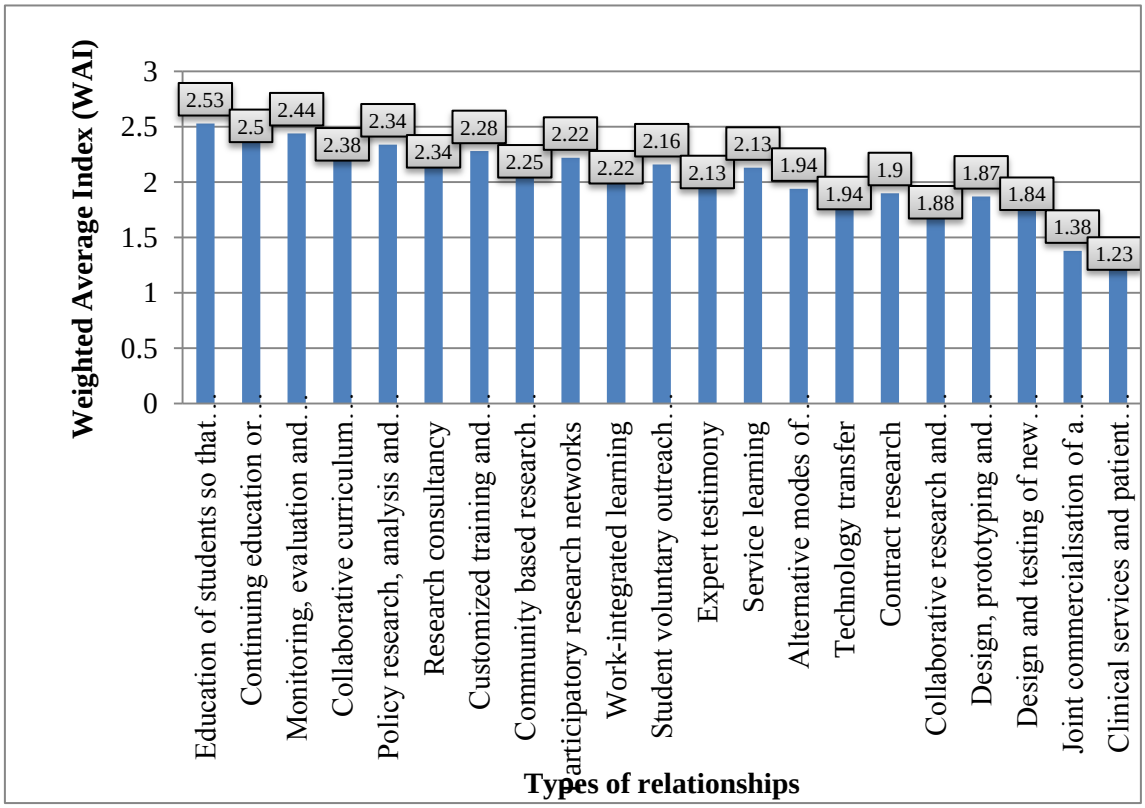


Figure 4.11: Weighted Average Index (WAI) of types of relationship in descending order by WAI for Mzuzu University (MZUNI**).** Source: Survey Data (2013)

4.2.6.3 Channels of interaction in general and associated types of partners

The predominant channels of interaction at MZUNI as shown in Figure 4.12, indicated students as the academics' main channel of interaction with external social partners followed by public conferences, seminars or workshops with WAI scores of 3.31 and 3.03 respectively. This suggests interaction on a moderate to wider scale. The least frequently reported channels of interaction and information are patent application and registration, spin-off firms from the university, software development or adaptation and

technology hubs and incubators. This is similar to LUANAR's arising from low interaction with commercial firms and industry.

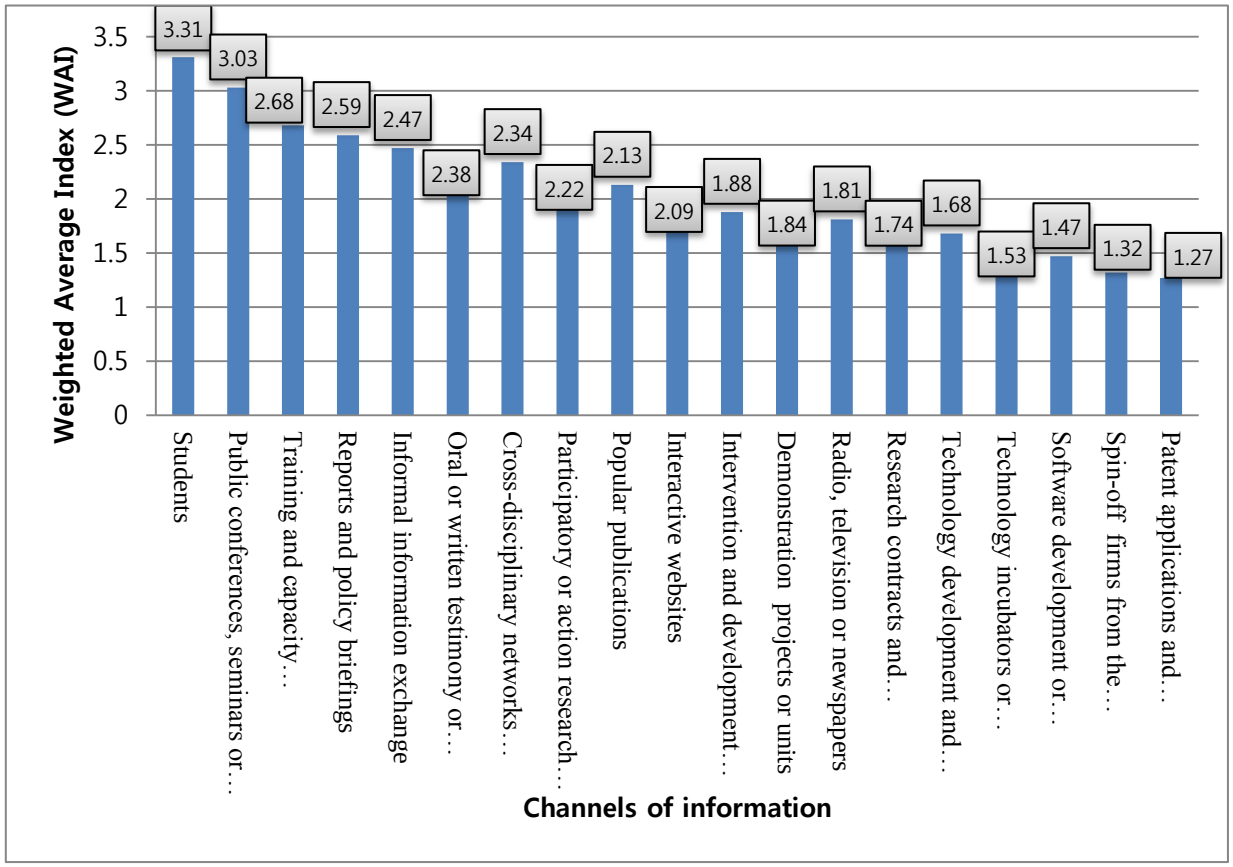


Figure 4.12: Weighted Average Index (WAI) of channels of information in descending order by WAI for Mzuzu University (MZUNI). Source: Survey Data (2013)

4.2.6.4 Outputs of academic interaction

Analysis of the WAI in Figure 4.13 indicated that the most frequently reported outputs at MZUNI were also academically related. These were dissertations (2.94), academic collaboration (2.63), and academic publication (2.53); considering a WAI score of above 2.50 *i.e.* from isolated to moderate scale. Graduates with relevant skills and values fall within the same scale but with a WAI score of 2.44. This is lower than LUANARs, given LUANAR's large population of undergraduate students and significant numbers of post-graduate students. The least prevalent outputs cited by academics at MZUNI just like at LUANAR were spin off companies, community infrastructure and facilities and new or improved products.

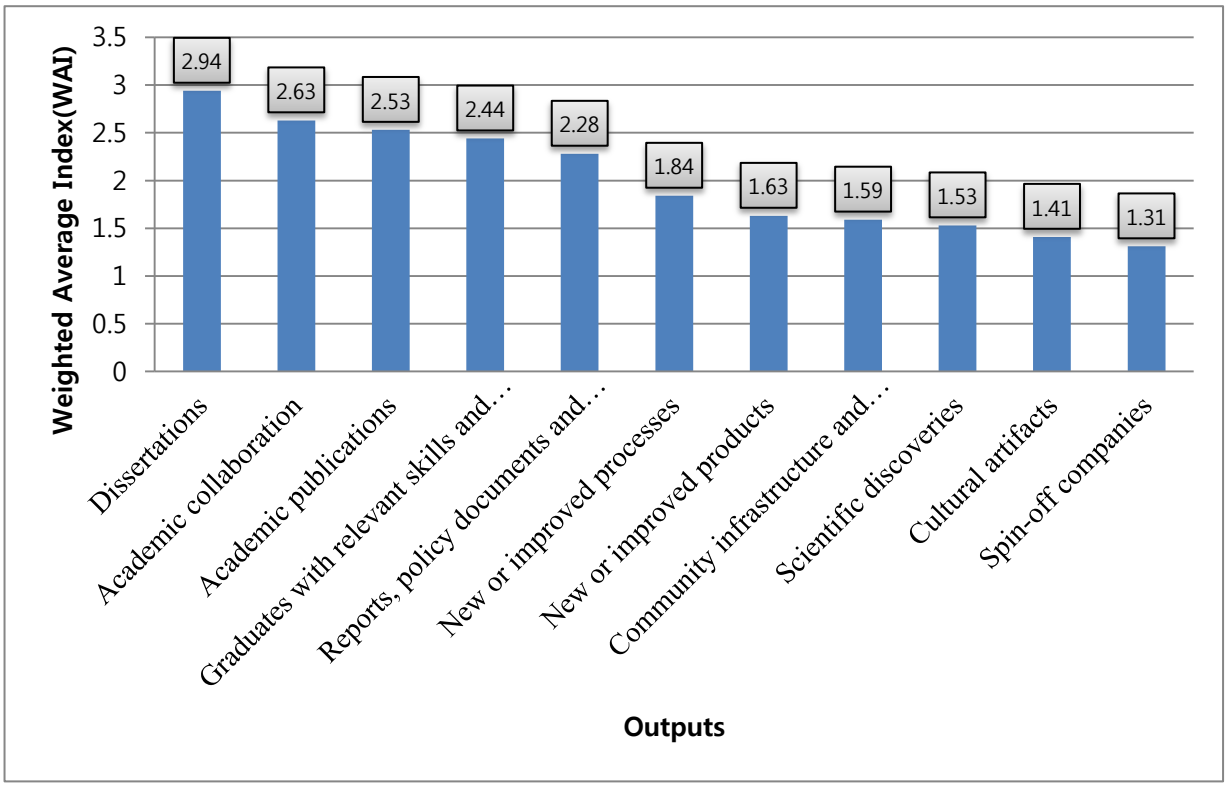


Figure 4.13: Weighted Average Index (WAI) of outputs in descending order by WAI for Mzuzu University (MZUNI). Source: Survey Data (2013)

4.2.6.5 Outcomes and benefits of academic interaction

The main types of outcomes and benefits of academic interaction with external social partners at MZUNI (Figure 4.14) relate to only academics. The highest reported frequencies pointed to only improved teaching and learning with a WAI score of 3.05. Academic and institution reputation, training and skills development, public awareness and advocacy were reported but on isolated to moderate scale (WAI scores less than 3.0). Improved quality of lives and livelihoods for individuals and communities were among the least frequently reported outcomes and benefits at MZUNI on an isolated scale. This indicates that MZUNI is yet to fully engage with local communities in its day to day activities.

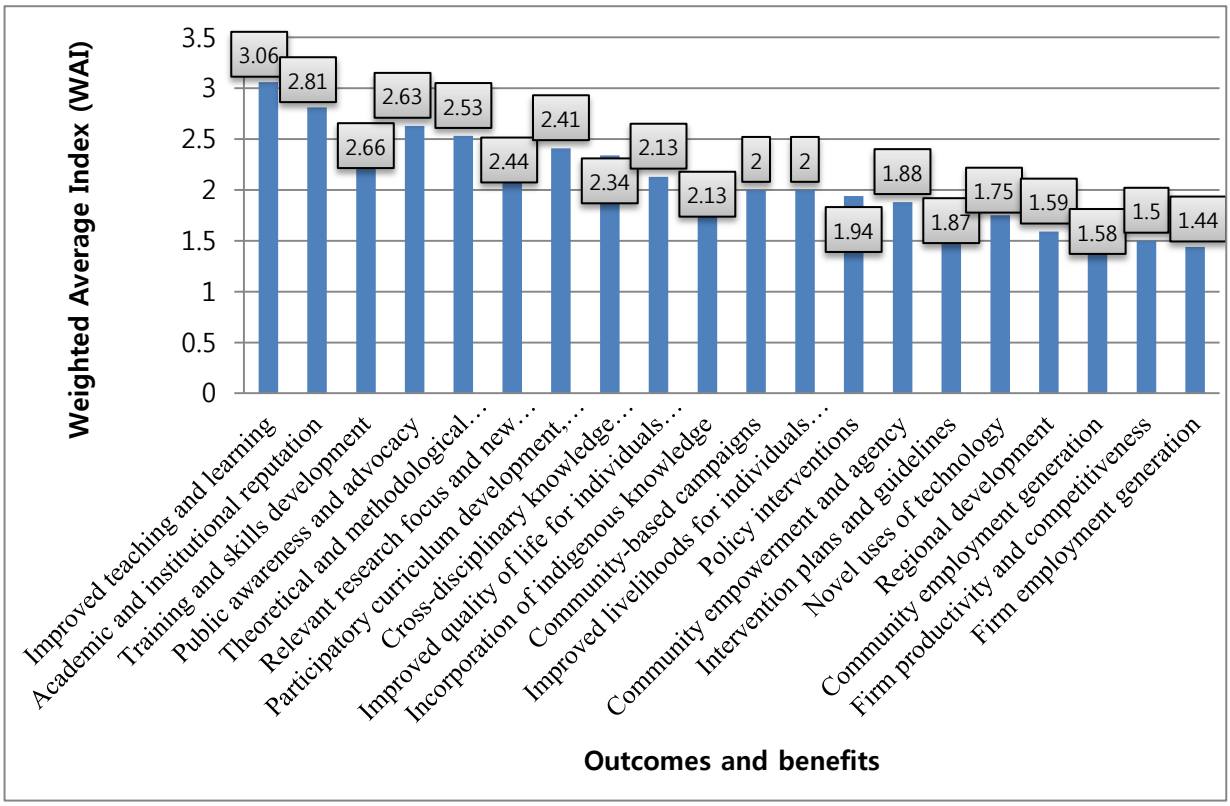


Figure 4.14: Weighted Average Index (WAI) of Academic interaction outcomes and benefits in descending order by WAI for Mzuzu University (MZUNI). Source: Survey Data (2013)

4.2.6.6 Obstacles and challenges to academic interaction

Limited financial resources for competing university priorities were the main obstacle at MZUNI with a WAI score of 3.78 as shown in Figure 4.15. Distinctly to MZUNI was the lack of clear university policy and structures to promote interaction with a WAI score of 3.44. This was also evidenced during interviews with senior management at MZUNI where among others,there are no clear incentives to promote academic interaction with external partners. Other obstacles that were rated important to very important at MZUNI were university administration and bureaucracy that does not support academic interaction with external social partners, sustainable external funding, lack of institution recognition systems that reward academic interaction activities sufficiently, and competing priorities on time. The least important obstacle was legal problems. Some of the challenges are similar to LUANAR's, but notable is the absence of a clear policy on consultancies and outreach.

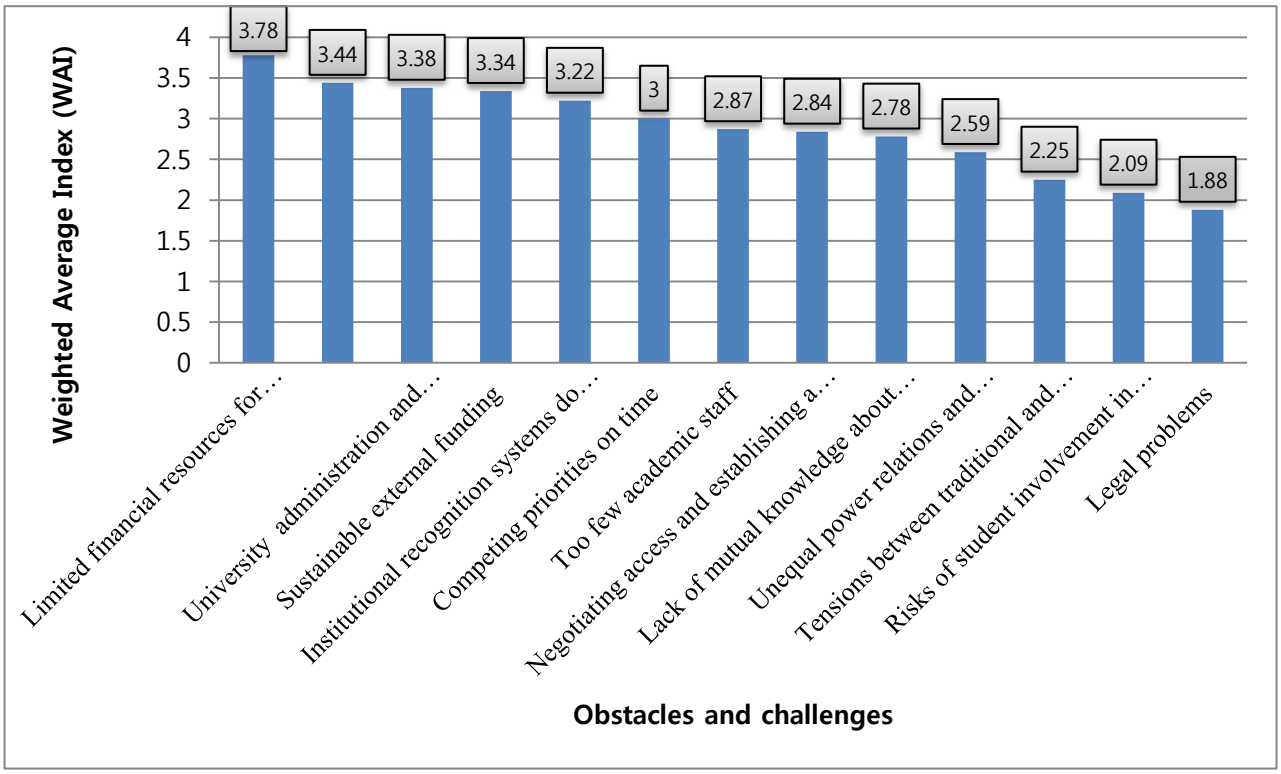


Figure 4.15: Weighted Average Index (WAI) of obstacles and challenges to academic interactions in descending order by WAI for Mzuzu University (MZUNI). Source: Survey Data (2013)

4.3 Understanding university interaction and development in the national system of innovation in Malawi

This section identifies the nature of patterns of interactions in Malawian universities, specifically looking at the mission or policy similarities and differences of the two universities. It will further interrogate how this influence or discourage external interaction. We have also traced, analyzed and compared the patterns of interaction taking place in the two universities thereby giving us an understanding of critical interactions in the NSI in Malawi.

4.3.1 Analysis of University governing principles on social interaction

LUANAR crafted its mission to read "*to advance knowledge and produce relevant graduates with entrepreneurship skills for agricultural growth, food security, wealth creation and sustainable natural resources management, through teaching, training, research, consultancy, outreach and sound management*." On the other hand, MZUNI worded theirs as "*to provide high quality education, training, research and complimentary services to meet the technological, social and economic needs of individuals and communities in Malawi*."

It is noted that both these two universities are clear in their mandate to develop high caliber graduates to sustain the economic growth of the country. Nonetheless, these universities differ in the line of emphasis, in that LUANAR is aligned more towards agricultural sector development whereas MZUNI leans more towards teacher development and service provision. We note that LUANAR is moving away from developing graduates for the job market, more towards self employment and job creation (*i.e.* entrepreneurship skills and wealth creation), requiring earlier mentorship of students on social interaction.

Scrutiny of the two missions makes it clear that these universities do not use the term 'social interaction' for community engagement. Instead, they use equally more inclusive terms as outreach (LUANAR) and complimentary services (MZUNI). Despite this observation, interviews with the top management of the two universities, demonstrated that they are aware of the application of the term external social interaction in the university's contribution to the communities.

Furthermore, the UNIMA/LUANAR vice chancellor asked why the research team did not have a questionnaire for university-industry interaction. He further clarified a number of terms such as 'industry' and 'product'. He explained that the term 'industry' has changed meaning over decades. In the past the term mostly implied the manufacturing sector. Nowadays, 'industry' is a broad term which includes tourism, ICT and the commercial sector, among others. Besides, the 'industry' varies from developed to developing countries depending on the level of 'industrialization'. This has therefore serious implications on the nature of the university-community interactions as universities have to respond to different needs which are a function of several variables. University-industry interaction is a result of competition within the industry. Stiff competition makes firms within the industry to seek services of the university, thereby promoting university-industry interaction.

Responding directly to the question relating how external social interaction fit in their missions, the vice chancellors of both universities agreed in their response. LUANAR indicated that "*public universities are designed to provide service to the communities i.e. it is within their mandate through their threefold mission of teaching, research and outreach to interact with its knowledge users. Community engagement is part of research and therefore automatic that the University gets involved in community engagement*." He explained that generated knowledge is useless if it is not communicated/ disseminated to intended users. In a simple statement, MZUNI retorted, "*Interaction with external social partners is an integral part of the mission of Mzuzu University*." Despite such responses, only LUANAR/UNIMA has developed institutional policies to support external social interaction including the strategic plan and research and consultancy policy. The strategic plan stipulates that each programme of study should be involved in community engagement, among others. It further elaborates plans to go about the engagement. Among the outcomes of the strategic plan is that the communities should appreciate the role of the university. Contrary to this, MZUNI has no institutional policies to support interaction, except for the Faculty Boards whose membership includes representatives from industry and line ministries and departments of government. There are no mechanisms for coordinating such policies either. The interaction taking shape at MZUNI is naturally occurring due to nature of activities of the faculty members and their departments.

4.3.2 Malawi universities' external social interaction patterns and their manifestation

A number of similarities and differences have been observed from the ways in which academics at the two different types of universities interact with external partners. The institutional background or knowledge field in which the universities were established determined the patterns, magnitudes and shape of interactions, as demonstrated in the following sections.

4.3.2.1 Prevailing main external social partners for LUANAR and MZUNI

At LUANAR, using a WAI analysis, the three most frequent partners identified were small-scale farmers (3.27), Non Governmental Organizations (NGOs) (3.22) and individual households (3.14).The fact that LUANAR is Agriculture and Natural Resource University and that Malawi is an agro-based economy where small holder farmers play a major role in food security of the country, it is not surprising that interaction with smallholder farmers ranked highly. Furthermore, the interviews with the top university management indicated that the university faculty consistently engages with the local communities as it strives to work within the government development agendas. Interaction with individual farmers was equally ranked high. The fact that one of the roles the faculty members are required to fulfill is the

outreach and consultations, it is understandable why NGOs was the second most important partner for the university. The faculty members work closely with the NGO community on collaborative research or carry out consultations on behalf of the NGOs.

As for MZUNI, the highest ranking partners were schools (2.69), individual and households (2.59) and national universities (2.53) whereas the least are political organizations (0.78), multi-national companies (0.68) and commercial farmers (0.69). This is in line with the mandate of this university, to train teachers at degree level. This is corroborated by the management response where they indicated that in their view, that interaction is more on academic level where academicians exchange knowledge and views and further interface with the ministry of education science and technology. In their observation, they also highlighted interaction with other universities, locally and internationally as important in their growth and development as a university. There is little interaction with the political elements, let alone commercial farmers. One reason is to do with the programs being offered which is devoid of political sciences and that no specific program on agriculture despite that they have program in natural resource management.

4.3.2.2 Prevailing main types of relationships between LUANAR, MZUNI and external social partners

We noted very narrow differences in the WAI scores for the three highest ranked types of relationships at LUANAR (collaborative curriculum design (3.24), research consultancy (3.22), education of students so that they are socially responsive (3.00)). This meant that the three are almost inseparable as pathways through which interaction is taking place. Similarly, no wide differences were observed for the first two highly ranked type of relationship at MZUNI education of students so that they are socially responsive (2.53), continuing education or professional development (2.50).

This implies that as much as we recognize that the major partner of LUANAR is the smallholder farmers and that interface is mostly through participatory on-farm research, and field days, the element of academics cannot be ruled out. This is due to the fact that the faculty and their students tend to do their research on farmers fields with participation of the farmers, as a learning process of the science and drivers to change of the interventions carried out with communities. This is supported by the assertions from management that the faculty is mandated to carry out research to complement their teaching activities. The observation is somehow different for MZUNI where top on their list of partners is schools indicating the importance attached to teaching by the sample of academics interviewed. As already alluded to, teaching is taken as the main core activity of the universities in Malawi supported by the high percentage of the time devoted to this element compared to research and outreach. The common least prevalent relationships at both institutions were joint commercialization of a new product, clinical services and patient or client care. There is little interaction observed with the private sector as the two universities are not business oriented in nature and would need radical changes to transform themselves if they are to generate resources and expand their base of social and community interaction.

4.3.2.3 Existing main channels of information to transfer knowledge to external social actors

The predominant channels through which academics interact with social partners at both MZUNI and LUANAR were SIMILAR. These channels of information include public conferences, seminars or workshops (3.49 for LUANAR; 3.03 for MZUNI), students (3.35 for LUANAR; 3.31 for MZUNI). We take it that universities priorities public conference, seminars or workshops when they have some information to share with the public or external actors whereas it is custom to teach and build knowledge of the students who acts as a vehicle to take the knowledge out of the universities to the public or community.

The least frequently reported channels of information were also similar at both institution, and these are patent application and registration (1.19 for LUANAR, 1.27 for MZUNI), spin-off firms from the

university (1.46 for LUANAR, 1.32 for MZUNI), software development or adaptation for social uses (1.46 for LUANAR, 1.47 for MZUNI). They are not a means of knowledge transfer for innovation among marginalized communities, who often lack tertiary level education required for deep understanding of information passed through academics, whose language and presentation of information tend to be too academic for marginalized people to understand due to low literacy levels. These pathways were also echoed by the top management, which means if change is to be achieved, there must be systemic re-orientation of how the universities can effectively bring change to external partners, including the smallholder farmers. Nonetheless, LUANAR has programs which necessitate the students at undergraduate level to work with local communities to gain hands on experience in their field of specialization. Despite this effort, not all programs have this component of interaction. Furthermore, in areas around Bunda College, there is community fatigue with students' research activities *i.e.* the communities around Bunda College are intensively studied by students (*personal experience*). This is due to the fact that for students to get their degrees, they are required to complete a research project which partially contributes to their degree. Due to limited resources, over the years since inception of the university, the students have been going to the same surrounding area, working with the same farmers on different and sometimes related topics of research.

4.3.2.4 Outputs of academic interaction

The outputs of interaction with external social partners at both institutions were to a large extent of academic benefit. Dissertations (3.41 for LUANAR, 2.94 for MZUNI) and academic publications (3.11 for LUANAR, 2.53 for MZUNI) are the dominant outputs. Nonetheless, production of graduates with relevant skills (3.51) is noted as crucial for the excellence of the university. Academic promotions at LUANAR and MZUNI are based on scholarly activities where publications in the referred journals are an express way to attain highest academic rank in the university. This explains why the two, dissertations and academic publications featured highly. This is in line with management assertions at MZUNI where they explicitly indicated that interaction with external social partners is not stressed among the criteria for promotion. The least types of outputs of academic interaction at both institutions are also fairly similar except that the respondent academics at the LUANAR mentioned 'community infrastructure and facilities' (1.84, LUANAR) and at MZUNI 'scientific discoveries' (1.53) are one of the least mentioned output of interaction. This is easily understood since these universities are public universities heavily subvented by the government, hence do not have resources to build infrastructure for communities. On the other hand, there is limited scientific discovery due to limited research facilities and research funds which is a pre-requisite for scientific discoveries.

4.3.2.5 Main outcomes and benefits of academic interaction

The outcomes and benefits of academic interaction were different for LUANAR and MZUNI. Mzuni is more of a teaching institution with education training are more predominant field and having an academic orientation. As result it is less focused on interaction with communities or economic agents, whether private firms, farmers or SMMEs. It has some similarities with University of Malawi, Chancellor liberal arts College. Mzuni policy on innovation and interaction is yet to be developed and there are a few internal or external interface structures.

In contrast, LUANAR is is focused on agriculture and natural resources, is strongly inserted in local community and has a distinct policy promoting interaction with local communities country-wide. LUANAR has wide array of internal and external interface structures such as farms, research centres, student programmes and outreach projects. Interaction is therefore found on a wider scale and with a distinctive pattern of partners (farmers, NGOs and government officials) with knowledgeexchange

relationship where the university provides technical expertise and knowledge while NGOs and government provide extension services for the mutual benefit of the community including farmers.

The specific main interactions (Table 4.7) are aimed at training and skills development; improved' teaching and learning', and 'academic and institutional reputation' as well as "public awareness and advocacy". The least mentioned outcomes and benefits include firm employment generation, firm productivity and competitiveness, community employment generation and regional development. This would imply minimal innovation processes and subsequent inclusive development as the institutions orient themselves more towards teaching and learning.

Table 4.7: Main outcomes and benefits of academic interaction by institution in Malawi

University	Main outcomes and benefits of academic interaction		
	First	**Second**	**Third**
LUANAR	Training and skills development (3.32)	Academic and institutional reputation (3.30)	Public awareness and advocacy (3.22)
MZUNI	Improved teaching and learning (3.06)	Academic and institutional reputation (2.81)	Training and skills development (2.66)
The least three outcomes and benefits of academic interaction			
LUANAR	Firm productivity and competitiveness (2.14)	Regional development (2.11)	Firm employment generation (2.03)
MZUNI	Community employment generation (1.58)	Firm productivity and competitiveness (1.50)	Firm employment generation (1.44)

4.3.2.6 Main obstacles and challenges for academic interaction

There was a little disparity in terms of the obstacles and challenges to academic interaction with external social partners between the two universities (Table 4.8). "Limited financial resources for competing university priorities" were the main obstacle at both LUANAR and MZUZU. We note that as public university increase in number, the basket of resources to support the operations of the universities dwindles. Coupled with this, the government controls the tuition and living expenses of the majority of students who happen to be on the government scholarships. The hands of the university management are tied in that they cannot raise the tuition fees to commercial level to cover the costs. Furthermore, government does not provide seed money to the universities for research and outreach. This implies that financial resources are the most important obstacle undermining efforts by academics to reach out to marginalized people with knowledge and information crucial for the improvement of their livelihoods.

However, distinct to MZUNI was the "lack of support from management and policies which can promote academic Interaction with external social partners". This was also evidenced during interviews with senior management at MZUNI where among others; there are no clear incentives to promote academic interaction with external partners ("University administration and bureaucracy which does not support academic interaction with external social partners" was rated as the third most important obstacle by academics at MZUNI but was rated as the least important obstacle at LUANAR). In contrast,obstacles that were rated important to very important at LUANAR were sustainable external funding and competing priorities on time. This meant that there are limited resources which can sustain social interaction with marginalized communities and at the same time, where conditions support interaction, academicians sampled have competing time needs especially heavy teaching loads.

Table 4.8: Main obstacles and challenges of academic interaction in Malawi

University	Main obstacles and challenges academic of interaction		
	First	**Second**	**Third**
LUANAR	Limited financial resources for competing university priorities (3.89)	Sustainable external funding (3.70)	Competing priorities on time (3.08)
MZUNI	Limited financial resources for competing university priorities (3.78)	Lack of clear university policy and structures to promote Interaction (3.44)	University administration and bureaucracy does not support academic Interaction with external social partners (3.38)
The least three obstacles and challenges academic interaction			
LUANAR	University administration and bureaucracy does not support academic Interaction with external social partners (2.49)	Risks of student involvement in interaction with external social partners (2.16)	Legal problems (1.97)
MZUNI	Tensions between traditional and new academic paradigms and methodologies (2.25)	Risks of student involvement in Interaction with external social partners (2.09)	Legal problems (1.88)

4.3.3 Implications of the pattern of academic interaction with external social partners for the national system of innovation

The comparative analysis from the two universities studied in Malawi indicates the importance of university type to the pattern of interactions developed and how these would entail implications for the higher education system, and consequently determine the pace and extent of the development of the national system of innovation (NSI). It is clear that Malawi has universities that are quite weak, in a weakly aligned NSI. MZUNI is a traditional university which is mostly a teaching institution with limited research and interactions with external actors. On the other hand, LUANAR is potentially more aligned to farmers as it is focused on agriculture, natural resources and rural development and interface highly with most NGOs.

The question which needs more investigation though is: After more than 45 years of Bunda College/LUANAR's existence, the surrounding communities are better off than those far away from the College? MZUNI is education oriented, hence interacting more with schools, national universities, individuals, and households. Notably, the partnerships with schools and national universities provide opportunities for improving the quality of education in high schools and learning among the interacting universities.

The current study established less drive from the two universities to think and operate strategically in relation to economic development. This was noted since the least mentioned outcomes and benefits included firm employment generation, firm productivity and competitiveness, community employment generation and regional development. This was contrary to the phenomenon that entrepreneurship fosters innovation at the firm level and consequently promotes the NSI. It is however noted that LUANAR through the introduction of a Department of Agri-business aims to bring a paradigm shift into how agriculture is viewed in Malawi and catalyst to the process of NSI building.

Findings in this study showed that the type of university did not significantly influence the type of outputs of interaction. Dissertation and academic publications are the dominant ones followed by graduates with

relevant skills conforming to the core functions of the universities in Malawi. It cannot be overemphasized how skills development is crucial for human capital requirement of the NSI. What would be crucial though if necessary is to re-sharpen the programs to be responsive and drive the application of innovations at all levels of interaction.

Chapter 5 provides in depth analysis of the three case studies being implemented by faculty members at these two Malawian Universities.

CHAPTER 5: INTERACTION BETWEEN MALAWIAN UNIVERSITIES AND LOCAL COMMUNITIES: CASE STUDIES OF LIVELIHOOD

This chapter presents case studiesthatinvestigated the factors that enable interactions between university members at two universities in Malawi (LUANAR and MZUNI) and the community, in order to improve the livelihoods of those in the community. Thischapter showcases research study innovations and outreach projects that the two universities have undertaken with communities to demonstrate their interaction. Three community research and development case studies selected are: Diary Project and Fish farming Project carried out by LUANAR, and a Botanical Pesticide Project executed by Mzuzu University. The significant achievements and impact on the communities demonstrated in these studies is a clear indication that the need for interaction between the communities and universities cannot be overemphasized.

5.1Promoting community livelihood capabilities through technology transfer: a dairy outreach case study

5.1.1 Introduction

The interaction between the department of Animal Science at LUANAR and the communities (Mkwinda and Mitundu Extension Planning Areas (EPA)) presents a classical example of *production and organizational innovation* in the context of a marginalized community in an informal setting. These innovations are used to address the livelihood problem of lack of income and the social problem of better nutrition of rural households. The interaction and the associated innovation are supported by interface structures that havebeen established within the university and by the funding avenues that support the mainacademic partners, through active participation of the university in wooing research funds from different bilateral donor country programmes. At the same time, the leadership of the rural communities has shown how individual strategic capabilities and social matrix can promote the interface between a community in an informal setting and its academic partners, which can play a crucial role in the establishment and maintenance of mutually beneficial and long-term interactions.

The interaction centered on technology transfer (superior dairy cattle hybrids and modern management methods) to promote the capabilities of the communities to produce enough quantities of milk for home consumption and sale, to meet daily consumption and market needs. The department of animal science provided the seed stock of dairy breeds, forage seed, equipment and training support. The university benefited in that the project provided opportunities for research and learning for students, and academic satisfaction in fulfillment of their professional quest to improve levels of milk production and consumption in the country.

The Department of Animal Science at LUANAR implemented a number of activities under the Flanders International Cooperation Agency (FICA) supported programme titled “Support to the Agricultural

Extension and Training Services Programme" (SAETS). The main objective of SAETS was to increase the number and enhance the capacity of extension workers and veterinarians in Malawi to effectively disseminate technologies that will translate to changes of livelihoods of rural communities in the two pilot districts of Kasungu and Mzimba in Malawi. The Department of Animal Science implemented activities in three key result areas of enhanced institutional capacity, capacity building of extension officers and farmers, and programme management. The dairy outreach project was among the activities implemented in the key result area of capacity building of extension officers and farmers. The dairy *outreach* program included establishing a dairy learning centre at LUANAR, forage establishment, and formation of a bulking group for farmers in Mkwinda and Mitundu Extension Planning Areas (EPA).

It is important at this stage to note the genesis of these government projects came through a baseline survey commissioned by FICA in its impact districts of Kasungu and Mzimba carried out by Bunda College. From the outcome of the baseline, FICA requested Bunda to develop the SAETS in which Bunda College was entrusted with capacity building of extension officers and farmers, and programme management under which the dairy *outreach* program was born.Overall, we see the distinct and complementary roles played by different players, the foreign donor, the government agricultural extension infrastructure and the university - they formed a network that worked well in that each actor had a clear role that the others could not do and that was needed for the whole project to work. Thus, a *network form of interaction* manifested, and this could be built on, to enhance capabilities of existing government structures.

5.1.2A brief overview of the project

5.1.2.1. Establishment of Dairy Learning Centre

The objective was to set-up a dairy learning center for farmers, extension workers and students which would act as a demonstration center during the training sessions for extension staff and farmers. The department procured 42 dairy animals (18 pure Holsteins, 20½ and ¾ crosses (Diamphwi), 2 pure jersey bulls and 2 pure Holstein bulls), a mini-processing plant, a recording computer, 2 mobile milking machines, a cooling tank (1 200 liters). The department also rehabilitated the milking parlour at the center to ensure hygiene and facilitate milk sampling and analysis. The dairy unit increased its herd from 38 dairy animals to 53 as a result of 15 calves that were born. The department distributed 26 dairy animals from the dairy learning center to farmers in Lilongwe (Mkwinda and Mitundu EPAs). The department also facilitated the establishment of a dairy bulking group (dairy farmers putting all their milk together to sell more commercially)to ensure proper management of animals and provision of support services to beneficiaries.

5.1.2.2. Forage Establishment and Evaluation

The objective of establishing pastures was to enhance and maintain pasture (with more species) production at LUANAR to act as a seed bank. This would form a foundation for conducting on-site trainings and demonstrations to smallholder farmers. The rationale for forage evaluation was that forages vary in their nutritive value depending on locality which necessitates constant and regular monitoring and evaluation of forages. The department managed to establish 12 hectares of various pasture species which included 4 hectares of Lucerne (imported from South Africa) and 8 hectares of rhodes grass, centrosema. The department in partnership with Scottish Rural Agricultural College (SRUC) (formerly Scottish Agricultural College (SAC)) engaged a Masters student who studied the adaptability of Lucerne and its potential for use in dairy feeding in Malawi. The results of the study showed that Lucerne is well adapted to Malawi and has potential in increasing milk yield of dairy animals in Malawi.

5.1.2.3. Dairy outreach project

This activity was meant to enhance the contribution of LUANAR to surrounding communities using dairy production. It was also envisaged that the dairy bulking group would provide good practical support to students training for Bachelor of Science degree (BSc), Master of Science degree (MSc), Dairy Diploma and Bachelor of Veterinary Medicine (BVM) programs, apart from being used as an immediate farmer learning unit. In addition, the outreach would have an immediate impact to Bunda Community through dairy production and linkage to market. The goal was to introduce and monitor 20 dairy cows to farmers on a pass-on program, encourage pasture establishment by new dairy farmers and by existing dairy farmer groups working as community based organization (CBOs), and link the farmers to the Milk Collection and Cooling Centre at Bunda Student Farm. This was to provide a win-win situation between LUANAR and surrounding communities.

The department facilitated the establishment of a milk bulking group for dairy farmers in Mkwinda and Mitundu EPAs. Farmers from Mkwinda and Mitundu EPAs were mobilized and trained (42) in various technologies which included breeding, recording, forage production, hay conservation, silage making, dairy as a business, hygiene milking. A total of twenty six farmers from the two EPAs were provided with dairy cows (24 cows and 2 bulls) to be used in a heifer pass-on program. The group was also given two bulls for natural mating due, to unavailability of liquid nitrogen and semen. 18 cows out of 24 cows that were distributed calved down in the first year representing a 75% calving. Milk production from cows averaged 14 litres per day per cow which is above the national average of 9 litres per cow per day (DAHLD, 2012).

To create local support for the farmers, the department trained and equipped one Farmer Artificial Insemination Technician (FAIT) with a full artificial insemination kit that was provided by SRUC. Farmers in the outreach area have not yet started benefiting from the services of the FAIT due to unavailability of liquid nitrogen and semen in the country.

5.1.2.4. The Community: Mkwinda and Mitundu Extension Planning Areas

The dairy outreach project involved communities of smallholder farmers around LUANAR. It is a community that has lived with Bunda College since its establishment but it is also a community that suffers from a lot of livelihood problems. For a community to be considered in this case study, it had to be in an informal setting and with marginalized groups of people. The Mitundu-Mkwinda community according to the principle investigator (PI) for dairy outreach "*can be described as relatively poor community, food insecure and its main economic source is wages through Bunda College and Mitundu areas, and small scale businesses like selling of charcoal*". Income levels of this community like many other rural communities in Malawi are low. According to WUSC Country Director, "*in many communities, the levels of income of many farmers is going down due to a number of factors like climate change, reduction in the land holding sizes and as such, concentrating on crop production only does not bring the required income. For example, farmers in Mkwinda grow tobacco as a cash crop but with reduced land sizes and reduced fertility of the soil due to overuse, farmers are harvesting less and less amount of crops and therefore the income is reduced*". The marginalisation of these communities was also echoed in the interview with the District Animal Health and Livestock Development Officer who described the communities as less educated, economically poor and lacking good nutritious food. It is clear that these two communities have marginalised groups of people with low income levels, informal employment and food insecurity.

5.1.3 Main livelihood problem

LUANAR, in particular the Department of Animal Science noted the plight of these communities being poor resource farmers and took initiative earlier on through other interventions before the Dairy Outreach Project. According to the dairy outreach PI, the Department of Animal Science at LUANAR initially worked with this community through a goat project which was funded by USAID. The department also had a local chicken immunization program and many other programs in order to address a number of challenges the communities were facing.

> *"……. upon having those programs, we thought that it is important to turn these communities to be dairy farmers. That is why we came up with dairy outreach program, a project which was basically funded by FICA. The idea is that we should transform them from wage dependency to sustainable livelihood intervention. The sources of income for these communities have been crop sales and selling labour, locally called ganyu. Crop sales are seasonal but they could also not harvest enough even for their own consumption, let alone selling, which left them to rely on ganyu to earn money for household use. That is why the department of animal science at LUANAR thought of dairy farming which provides a decent source of income almost throughout the year"* (Academic Interview).

The Lilongwe District Animal Health and Livestock Development Officer agreed that the main livelihood problem is low incomes but argued that this problem creates other problems for the communities, such as lack of nutritive food:

> *"In most communities, people are less educated, economically they are poor and the coming of this project; to us as district office, we felt it will really help these communities at least to get some income, good health as they will be having nutritive foods from the milk they are getting from the animals, of which their health status will be improved. We hope that these people are going to have healthy lives and they will be economically improved".*

It is clear that the main livelihood problem faced by the communities of Mkwinda and Mitundu is low income levels, which are centered on subsistence agricultural production. This problem is caused by the low production levels of cash crops such as tobacco and the lack of alternative sources of income such as formal employment since they relied on *ganyu* (wage labour) to earn income. Households can also not increase their production due to factors such as low land holding sizes. According to Chirwa (2007), one of the main constraints facing agriculture in Malawi is the small size of the land holdings, which are becoming smaller and smaller through subdivisions to family members.

With respect to the community participants, it was unanimous that the main livelihood problem that the engagement was addressing in the communities is poverty. Community participants explained that they were not able to have enough money to meet household needs such as nutritive food and school fees for their children and failing to buy fertilizer for crop production. This was despite the fact that they have been in farming, especially crop production, for a long time. Dairy farmer 1 stated that:

> *"The main problem here is poverty. Many people in this village are poor, we are not empowered economically and we even fail to provide adequate food to our families; so members from Bunda College upon seeing this problem; that is why they came up with this project to us".*

5.1.4 Mapping of actors

Different actors play different roles in collaborative projects (see fig. 5.1). The importance of engaging other actors is highlighted in the following quote from an interview with the PI and faculty member from LUANAR:

> *"Learning from other projects we have had, Bunda was dominating thereby affecting sustainability of the programs; we wanted this program to be of shared responsibility type of project. So we thought of coming up with Private Public Partnership to strongly engage the agriculture extension system. The idea was to focus ahead so that other actors should come on board".*

Based on the interviews with the academic, other actors and community participants, it was established that there are several actors that were involved in this engagement. Some were directly involved with the farmers while others indirectly through provision of finance. The interaction was not only between actors and farmers (community actors) but also among actors themselves*i.e.* this was a *network form of interaction*. LUANAR played the coordination role, with LUANAR faculty taking a lead. The actors in the engagement included, Scottish Agriculture University (SAC), Lilongwe District Animal Health and Livestock Development Officer (DAHLDO), Agriculture Extension Development Coordinator (AEDC), Assistant Veterinary Officer (AVO), Central Veterinary Laboratory, Word University Services of Canada (WUSC), World Agro forestry Centre, Flanders International Cooperation Agency (FICA), Local leaders, and Community Participants. Figure 5.1 below depicts the interactions among the actors and the roles they played in the engagement.

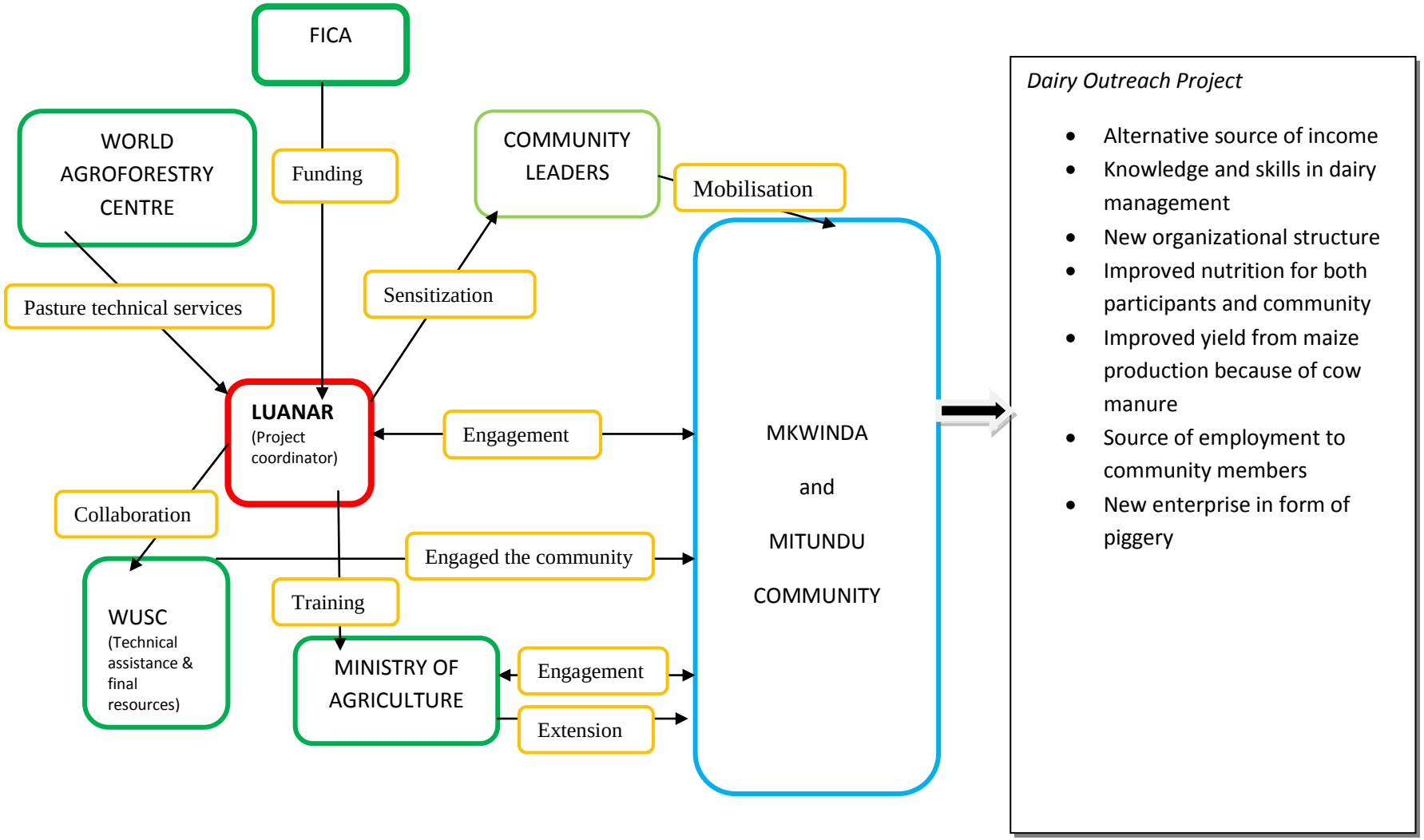


Figure5.1: Mapping of actors involved in Dairy Outreach Project

5.1.5 Organizational Arrangements and Interface Structures

Organizational arrangements and interface structures play an important role in the network structure of engagement of academics and external actors. They give a policy direction for academics. According to LUANAR strategic plan 2012-2017, outreach is among the objectives of the university. However, for outreach to take place there is need for an enabling environment in the form of interface structures. The university has an office specifically mandated to manage outreach and research. It is called the office of the Director of Research and Outreach. According to LUANAR Strategic Plan (2012), the university has research committees, centres and coordinating units for outreach activities but lacks a budget line in the LUANAR budget line for implementation of research and outreach activities. The presence of such policy guidelines in terms of outreach is not enough to encourage engagement between academics and external actors because a key link, funding, is lacking hence, academics rely on external funding from partners to drive interaction with partners. This means academics who engage with external actors like communities do so using external funding. The PI (LUANAR faculty) in an interview also acknowledged the role played by the engagement policy within LUANAR in the dairy outreach project:

> *"Bunda has got outreach and research mandate, so this has driven us to be reaching the communities as much as possible and this has turn to be action oriented not demand driven and through this we are doing relevant research as they are directly leading to impact in the communities".*

At community level, the dairy outreach project used two interface structures. The first one, and probably the key for acceptability of any intervention, is the community leader (traditional chiefs who have the legal mandate and are custodians of customary land). The dairy outreach project had to seek approval from the community leader in order to engage the community participants. Acceptance of the intervention by the community leader is very important because he/she will move on to mobilize his/her subjects for the intervention. The second set of interface structures were the farmer clubs (group of farmers working together on agriculture technologies under the guidance of the Agriculture Extension Development Officer (AEDO)) in the communities. Since the participants are already in a club, it was easier for the academic to interact with them. These farmer clubs are managed by the farmers themselves. They have their constitution which helps in the management of the club.

At government level, there is an interface structure at both district and community level. At the district level, there is a subject matter specialist who coordinates all interventions to do with his field of expertise at district level and manages officers on the ground in the community. The interface structure in the community is the agricultural extension workers, who are the key personnel in the implementation of agricultural related interventions on the ground. In the dairy outreach project, there was the Lilongwe District Animal Health and Livestock Development Officer (DAHLDO) at district level and Agricultural Extension Development Coordinator (AEDC) and Assistant Veterinary Officer (AVO) at community level. The key role of government community extension interface structures can be seen in the following quote by Mkwinda AEDC:

> *"We were the ones who have been having sensitization meetings with these communities to let them know about the program and join it. We had to come up with a club which was very big. I understand when we were starting this club had 100 people but because of some delays that took place before the project start, some farmers dropped and we remained with 20 farmers, but we provided 14 cows to farmers whom we thought they are going to manage caring the animals"*

The assertion by the AEDC in the quote above is enhanced by the District Animal Health and Livestock Development Officer (DAHLDO) who stresses the important role played by government agricultural community interface structures:

> *"The procedure is that from the district office we go to the EPAs (Community level) where we have our supervisory members of staff and from there we go to the sections where our technical officers are who usually do day to day implementation processes. And let me also mention that as a district we are not only working with dairy outreach programs from LUANAR alone but we also have other projects implemented by other Non Governmental Organizations. We are the ones who coordinate these programs but the major implementation team is the field officers who are on the ground. We usually go there if they need our backstopping support of any kind more especially technically".*

Figure 5.2illustrates the relationships between these government interface structures in the Ministry of Agriculture in Malawi.

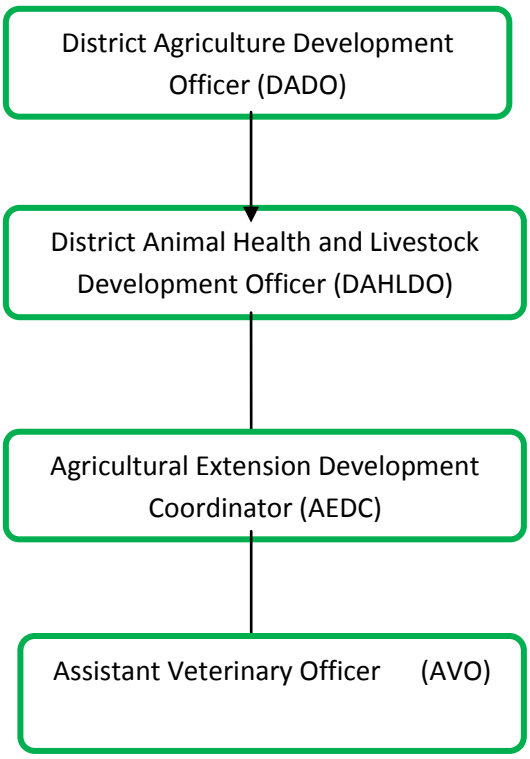


Figure 5.2: District Interface structures within Malawi Ministry of Agriculture (source: Author's compilation)

One of the external actors for the dairy outreach project was World University Services of Canada (WUSC). The interface structure for WUSC Malawi in this engagement was its volunteers. Through its volunteers WUSC interacted with LUANAR as well as community participants. The volunteers came from Canada with the coordination of WUSC Malawi country office. According to WUSC Malawi Country Director:

> *"We are able to achieve our objectives through a number of programs. The biggest programme that we have is CIDA funded volunteer programme which has been there since we started working in this country but the funding is in five year phases. Three volunteers*

from Canada worked with LUANAR in the outreach program… involved in engaging the communities in the dairy outreach program … involved in planning, assessing the role of farmers in this project, what benefits do they see in having this program and challenges we would expect to have in the implementation process".

5.1.6 Drivers of Interaction

There are different factors that motivate people to get involved in outreach activities. In this case study, we asked the different actors about what motivated them to get involved. According to the government extension staff, they got involved because it is within their mandate to coordinate all livestock projects in the district. It is also their duty to advise farmers in the area on livestock management. The Lilongwe DAHLDO was quoted as saying:

"We are extension workers; our main job is to provide technical support or services to farmers. If there are some organizations that require our services or support we do so as requested. Don't forget that we are government machinery; we do go where there is need for involvement".

The community extension officers went further. Despite getting involved as extension personnel, they were also driven by the long collaboration that is there between LUANAR and the surrounding communities. They are willing to get involved in any outreach activities from LUANAR because they have been working together for a long time:

"We at Mkwinda EPA we have been working with Bunda College for a long time as their students come to do practicals and research studies. Even those who are doing nutrition course at this school they come here and we have no choice but to accept working with them as we are extension people. So when this project was coming to us we were not surprised and as people who are close to this institution we wished to be the first beneficiaries of Bunda College programs".

The driver for interaction was thus closely linked to the mandate of each the actors. Some actors are mandated by their organization's strategic direction, *i.e.* vision and mission, to engage in outreach. This is the case with LUANAR and WUSC. LUANAR strategic plan clearly states outreach as one of the functions of its members of staff. This therefore encouraged the department of animal science to go ahead and reach out to the surrounding communities of Mkwinda and Mitundu. According to WUSC Malawi Country Director:

"Our mandate or core business in Malawi and worldwide is to build capacity of local organizations, individuals and the society at large; so that they effectively and efficiently deliver their services to the people they serve".

However, for LUANAR faculty (the PI), the drive to interact with local communities is much deeper than theorganizational mandate. The academic wanted a real world scenario in which he could apply his knowledge and expertise as an animal scientist. He also believed that through the outreach, he would generate relevant knowledge for his field:

"I am an animal scientist, I am a breeder and one of the goals is to promote livestock production and productivity. What I mean is that we increase number of animals and also yield per individual animal. So this is a good avenue that I can participate in and within the breeding sector we also encourage farming system approach. If you really see this is beyond

doing our work within our institution boundaries. We also promote issues of recording of animals, breeding as well as recording for evaluation. So all these are within area of my expertise and I really need to participate in it. As an academic we are also required to generate knowledge not only from the books but also working with communities as very relevant avenue for knowledge generation. So that what we are teaching here should be relevant and this is my area of interest and I like it".

We note a very complex interaction taking place here whereby the initiation of the interaction has multiple motivations.

5.1.7 Role of Innovation

'Innovation', as defined by the innovation studies literature, is the development of new products, processes and organizational structures into an economy or society. The level of novelty can be 'new to the world', or it can be 'new to the country' or 'new to the firm'. In this instance, it is largely 'new to the community' or the 'new to the informal livelihood setting' in which it is being implemented. Wherever there is technological or organizational upgrading, there is innovation to some extent. Based on this definition, we found several innovations in this dairy case study. The innovations included knowledge transfer and generation, processes and organizational structures.

Dairy farming is a relatively new enterprise in these communities. According the PI, the department of animal science has had other livestock interventions in the same communities in the past but they were not in dairy:

"At first we worked with this community through a goat project which was funded by USAID. Following that we also had a local chicken immunization program and many other programs of course. Upon having those programs we thought that it is important to turn these communities to be dairy farmers. That is why we came up with dairy outreach program".

The Assistant Veterinary Officer (AVO) for the community concured that dairy farming with hybrid cows is a new innovation to this area: *"As an EPA this dairy project was new because these dairy cows were only available at student farm. There was none among the farmers here who had dairy cows in this area".*

There are some people who kept cows but it was the local breed called Malawi Zebu which is not good at milk production. The new breed of cows introduced by this outreach project is specifically meant for milk production. A total of twenty six farmers from the two EPAs were provided with dairy cows (24 cows and 2 bulls) to be used in the heifer pass-on program. These hybrid high yielding cows were new to this community.

The other innovation is the effective breeding system introduced by the project. This has helped to speed up the pass on process but will also enable farmers to have more cows and produce more milk. The PI states that …

"Because of the effective breeding systems that we introduced, we could challenge that for the first two years the calving interval was happening every year and due to this, pass on was taking place as quickly as possible as compared to what is happening elsewhere. So the numbers of people with cattle increased within short period of time".

There were also new organizational structures as a result of the dairy outreach project. The department of animal science set up a Dairy Learning Center at LUANAR students' farm.

Upon seeing the importance of the dairy project, the farmers themselves also came up with a new intervention. They decided to venture into piggery but following the same model being used by the dairy project. They made some monetary contribution and bought piglets from LUANAR farm. The idea behind this innovation was that those farmers who are on waiting list of receiving dairy cows should receive pigs. They are also passing on the pigs.

The Department of Animal Science also set up a milk processing centre at LUANAR which the farmers will be using. This will provide an alternative market to the farmers. The idea is that milk should be processed under Bunda label and sold at an added value. The machines for processing have already been purchased but were not installed because of standardization process and lack of electricity connection.

There was knowledge transfer among the different actors. WUSC partnered with LUANAR under the CIDA Volunteer program where they mobilized three volunteers from Canada who worked with LUANAR in the outreach program. The first veterinary experts that WUSC brought to LUANAR contributed to the development of curriculum for Bachelor of Science in Veterinary Medicine. The other volunteer, a veterinarian and expert in outreach, trained LUANAR staff, especially the technicians, in the department of animal science on issues of animal health. The LUANAR staff then trained extension officers who later trained the dairy farmers.

New knowledge was also generated during the outreach project. Volunteers provided by WUSC carried out a rough feasibility of the dairy outreach project. They engaged the communities on how they can establish the groups. They were involved in planning, assessing the role of farmers in the project, what benefits they see in this program, and the challenges that could be expected in the implementation process. So the volunteer drafted a position paper on how LUANAR could start the outreach program.

As a result of the dairy outreach project, pasture seeds were introduced in the area, courtesy of World Agroforestry Centre. Some farmers participating in the project now grow pasture of high quality to feed their dairy cows. The department established pastures of different types. Other sectors are promoting pasture training and production that is basically grass type, but what the dairy project did is that they included legume type, so that both protein and energy requirements are sufficed from pasture.

The other innovation is the monitoring process. In many projects, monitoring is done by project staff but in the dairy outreach project, monitoring is done by farmers themselves. The farmer groups were empowered to the extent that monitoring is done fortnightly by them among themselves. The PI argues that the fact the farmers are monitoring the project themselves shows that they have received the initiative very well.

Since the dairy farmers are making money, it has encouraged them to open bank accounts with commercial banks. They have also formed their own village savings and loan association so that they can save the money from milk sales. The Agriculture Extension Development Coordinator for the area reported that:

> "*They have also learnt how to open a Bank account where they are keeping their money and they also developed village banks within their communities where they save and provide loans to each other which is positive thing because they will be able to save money and obtain a loan in times of need".*

5.1.8 Knowledge and Skills

During the engagement, there was a lot of knowledge flows and skills transfer. The flow was bi-directional because the other actors, *i.e.* extension officers and LUANAR staff, reported that they also learnt some things from the farmers. The knowledge flow to the farmers was mainly through extension officers. LUANAR staff in the Department of Animal Science has acquired some new knowledge from the farmers in the course of the interaction. During the interaction, the staff reported that they have learnt new type of pasture for the dairy animals but also new milking techniques. Some of the pastures species were not brought by LUANAR faculty. The PI reported they advise the farmers to milk and leave some milk for the calf. However, when they went to the field, they saw that some farmers were milking three tits leaving one un-milked for the calf while others were milking all the tits but leave some milk in it for the calf.

Government extension officers have also come across some indigenous knowledge from the farmers. According to the AEDC for the area, some of the indigenous knowledge really works while some are just beliefs. The beliefs are also a challenge because they affect the adoption of new technologies:

> *"There is a lot of indigenous knowledge among the farmers of which some work and some are just beliefs which does not work. In terms of accepting the artificial insemination, it is a problem because they think that it is a system used in Europe not here and the best way is to use a bull. We trained them on the importance of using artificial insemination as this can help them to decide what type of breed they want to have unlike with the bull. So to change them from what they believe is not easy, but I believe with time upon seeing the importance of artificial insemination, they are going to adopt with no challenges".*

On the other hand, the PI also reported that he has learnt that farmers are innovative and have the ability to adopt new innovations as long as they understand it. His perception towards farmers and adoption of new technologies has therefore changed as a result of this dairy engagement:

> *"At first we had a theory that these are smallholder farmers and that their capability to cope or adopt new innovation is rather low but this has not been the case. What we have learnt is that the moment you have introduced an innovation in a way that it can be captured by the farmers they will adopt it and implement it to the benefit of everybody … we did not teach them that they can diversify to pigs. They decided this on their own. It might be an expression of willingness but there is innovativeness there".*

The farmers themselves also acknowledged that academicians have learnt some things from the farmers. One farmer reported that academicians have theoretical knowledge but learnt how to construct Khola on the ground from the farmers themselves:

> *"I think they have learnt how to construct kholas physically because most of them they know khola construction theoretically but when they came to us they have learnt how to construct the kholas physically because we were doing this job together with them"* (Dairy farmer 1) .

WUSC in Malawi transferred knowledge to the local communities through LUANAR staff. WUSC Malawi Country Director said that … *"We were involved in this program to build capacity of LUANAR that they came with an outreach program of quality and that brings intended impact in the areas. If we talk of sustainability of a project impact is very key, if there is positive impact on farmers the project sustains itself".* They trained LUANAR staff, especially technicians, in issues of animal health.

Agriculture field officers are key in the transfer of knowledge to the community participants because they directly interact with the farmers frequently. The dairy project transferred a lot of knowledge to these farmers. The DAHLDO reported that:

> *"Coming to the members of staff more especially the field officers, there were some trainings which were conducted which means that there is transfer of information from the project to the field officers. We received reports that some of them were trained in pasture production, artificial insemination, and the general management of the dairy animals. As a district office, we thank the project staff for the trainings offered to our field officers because it is us who were supposed to train them but the project has trained them; thank you very much for this. This is a positive thing as far as technical knowledge to the field officers is concerned".*

Based on the trainings that field officers had, they imparted knowledge and skills to the community participants as can be seen in the following quote from the AVO for the area:

> *"On dairy farming I advise them many things on how they can care for their animals like providing a well-designed khola where there is a good sleeping place with a roof, a place where the cow can be warming itself on the sun, a good milking place and also a crush where we can be treating /dipping the animals, in addition to that they should also make sure that they are giving the animal good feeding grass as well as other legumes like centrocema and silver leaf because these boost milk production. Lastly they should also make sure that animal breeding should be up to date. Its own offspring should not be issued for reproduction, it should be controlled. They must also see that milk production is clean. We also encourage them to keep records at khola level in order to make sure that they are able to see how their animals are doing, and when you go there you will be given the record book. Even when the farmer is not there, whatever you see in the records you should be able to answer all the questions you had".*

The farmers themselves also corroborated that they have received a lot of training on dairy management because of the dairy outreach project. This can be seen in the following quotes from the dairy farmers:

> *"I have learned how to rear dairy cows and milking. I learned cleaning of milking area and feeding utensils, and good feeding practices. In addition to this I have also learnt that through rearing dairy cows, a person can make more money than a person who is working in certain organization, cows are a source of manure and food. Khola cleaning is the most new thing that I have learnt. Since my past I did not know that it is very important to clean the khola for the good health of our animals but in our lessons we were taught that we should be cleaning the kholas the same way we clean our Houses."* (Dairy farmer 1).

> *"Before we received the cows; we were trained on how we can make a Khola, symptoms of Cow disease, records keeping, and feeding practices and how to make hay; for example through the use of silver leaf, style leaf, and elephant grass"* (Dairy farmer 2).

> *"We have learned how to feed dairy cow; you don't have to take them to feed at the dambo (grassland) as we do with the local breed. We have also learnt proper construction of khola, by designing it to have a milking place, treating/ dipping place etc. As you see this concrete box, this is a feeding trough, we put in it green grass, and even maize stews can be used to feed them"* (Dairy farmer 4).

5.1.9 Community Participation

Interaction with local communities entails reaching out to the communities and including their input in the development of interventions that intends to address their livelihood problem. We therefore enquired on the role that the local communities played in the engagement *i.e.* from design, implementation, and monitoring of the intervention. We sought to find out the extent to which the community participants were involved in the whole project.

After the idea of a dairy project was conceived by LUANAR's Department of Animal Science, WUSC in Malawi was asked to help in a feasibility study of the intervention. WUSC therefore conducted a situation analysis in the impact communities, taking the input of the community members. WUSC in Malawi provided a volunteer from Canada who is an expert in outreach programs. He engaged the local communities. After the engagement, the volunteer drafted a situation paper which LUANAR used in starting the outreach project. The communities gave input into the dairy outreach project as can be seen in the following quote from WUSC Malawi Country Director:

> *"Engagement of the communities was very good. When we introduced this project to them (Communities) they were excited because they know that it will provide them with another alternative source of income and they were very engaging and open; they talked about how they think the project will benefit them, the challenges they think they will be facing and what LUANAR should do in order for them to get started. Their involvement in this project helped them to think about the future of which it is not common to farmers in their farming. We also had a time together with farmers and LUANAR to think of markets where the farmers will be selling their produce. That is why before the project got started LUANAR had applied for funding from Norwegian Aid to get plant so that there should be a ready market for the farmers. If there would be no such plant, sustainability would not be there".*

The community participants acknowledged that they participated in the project design, monitoring and implementation. Before the project rolled out, extension officers had consultative meetings with community participants to get their input. The community participants were free to ask questions even during the implementation stage. This can be seen in the following quote from a dairy farmer:

> *"Before we received the cows, the AEDC came to ask our ideas towards the project. So we told them that we are very much interested with the project as we have been hearing from our friends concerning the goodness of the project in terms of the way they are benefiting from it and we surely told them that we are ready for the project … They were asking us to give them our ideas on the caring of the cows. I should also take an advantage to say that we also had an opportunity to ask questions on the feeding practices, caring and speeding up the gestation period. For example I had a chance to ask what we can do to make sure that our cows were calving early since some cows could go up to a year without calving" (*Dairy farmer 1).

5.1.10 Outcomes and Benefits

5.1.10.1. Outcomes

The project produced several outcomes and benefits to all the actors involved. According to the AEDC for the area, one of the outcomes of the project is the knowledge acquired by both farmers and extension officers. The other outcome is the good collaboration that has been built between Bunda College, communities and the extension people. The benefits of the project include improved economic and health status of people. The other outcome according to the Assistant Veterinary officer is the exposure that the

success of this project has brought to the dairy club. Other people come to see how they are doing it. The chairperson of the club sometimes gets invited to talk about their project in other forums.

WUSC in Malawi sees three outcomes from the dairy project. These include the roll out of the dairy project, alternative source of income for farmers, farmers working in groups and change in mindset of farmers. WUSC Malawi Country Director sums up the outcomes:

> *"For us, our role is to build capacity of organizations like LUANAR so that they improve their service delivery and we are proud that after supporting them to engage the community to come with position paper, LUANAR was able to move forward and start the program. To us we are very proud because we supported them in building their capacity on how to do an outreach program and we are also happy that at farmers' level, farmers have an alternative source of income. Secondly, it is only in this outreach program that farmers were able to work in groups because most of the times farmers work individually but they have started working in cooperative which is one thing that the project suggested to happen. Thirdly as an outcome that now goes beyond the dairy production is that when farmers start working in a cooperative they become business oriented; this is what I have seen in the farmers we are working with. This is very important thing because in whatever they do they take it as a business".*

The PI believes the key outcome of this interaction is the model of dairy development in communities that this outreach has developed. The model involves engagement of different actors that contribute their various expertise while involving the community participants for their inputs as well. This model led to another output: the adoption rate was almost 100. The PI sees the rapid increase in number of farmers joining the club as an important outcome. The project started with very few farmers, almost 26 of them, but within a short period of time the figure had risen to 52 because others became second beneficiaries. The number is now about 100 and still the membership is increasing.

5.1.10.2. Benefits

The DAHLDO and the academic; sum up benefits of the dairy outreach project in terms of good nutrition and economic benefits to the farmers:

> "*To the farmers' nutrition, it has improved because they are consuming milk every day and economically they are improved as they are making money by selling the milk they are producing. This tells us that their income levels have changed in their households which are a good thing to us and also the government"* (DAHLDO).

> *"The great impact is that we are seeing notable milk yield within breakeven point per cow among the farmers and for sure there is substantial income from dairy among these particular farmers. We have evidence that we gave some cows to elderly people as first beneficiaries who used to drink beer but now they are consuming milk and they have good health than before and they have stopped drinking beer"* (PI, LUANAR faculty).

The farmers also reported that they are indeed getting benefits from the dairy outreach project. The benefits include high incomes, good nutrition, and even high yields from their maize production because of cattle manure. The following are quotes from dairy farmers on the benefits of the project:

> *"I appreciate this project; I have been empowered economically because of it. Nowadays I am able to pay school fees for my children, which is a thing that I was not able to do in the past years. It is not only that, every person in my family has a good health now than before*

because of the milk I am getting from the cows. Can you just look at me; am I looking like someone with nutritional disorder? Ha-ha-ha-a-a!! Yah that is what is happening in my family; In short I should say that I am able to provide a balanced diet to my family through the money that I realize by selling the milk as I do buy all needed foods and other essentials needed at the house. In addition to what I have said, I am also getting high yields because of manure I am getting from the cows and I have stopped spending more money buying fertilizer because I am using manure from my animals" (Dairy farmer 1).

"This project has changed lives of people and is still changing the lives of people because the first beneficiaries have improved economically as they are getting money by selling milk which is produced by these animals and I have also seen some people getting a job of feeding the animals and this is also helping lives of those people economically and socially as they are earning a salary at the end of a month. There is also a certain farmer who bought hybrid pigs and currently is doing piggery farming because of the money he realised from dairy farming. I was told that he was getting 75 000 kwacha per month even if you can see their bodies they show that they are health meaning that they are having balanced diet all the days because of this dairy farming" (Dairy farmer 2).

"Actually, I was able to get money from tobacco sales but it was not stable due the prices of the crop at the market but as of now since I started this dairy farming, I am not only getting milk but as I said earlier on that we also get manure for the garden. We also drink this milk every day as you can see that I am healthy and strong. And the money I get from this milk is also used to pay for the people I employ to help me on the farm" (Dairy farmer 3).

Figure 5.3: The benefits of dairy farming. In the top picture, a woman (dairy farmer) stands next to her house (to her left) and her dairy kraal (in wooden poles behind her). In the bottom picture, it is her new burnt brick house she is constructing with proceeds from her dairy enterprise.

The project has impact beyond those directly involved in it. The benefits are also reaching out to other community participants who did not receive the dairy cows. The dairy outreach project is a source of knowledge and skills, good nutrition and employment to some community members. They are employed either full time, taking care of the animals, or part time; fetching water, cleaning the kraals, and transporting feeding materials like maize bran and husks ...

> *"I should say that cases of malnutrition are reducing in my area because many people have access to fresh milk. I have seen many aged persons and other families coming to buy the milk for their consumption. So this tells me that the area will have low cases of malnutrition. I recruited a certain boy who takes care of it. I pay him using the same money I am realizing from the milk. This is also another development because some people are getting an employment through this project. It is not only that, we do hire many people in form of piece work to bring Elephant grass, Ground nuts leaves and leucena and at the end, they receive wages. We also have some women to supply us with water per day and they also get a wage. The community is also benefiting because they are learning how they can take care of their animals. For example some people who have local cows they have started providing good care to their cows to ensure that they should be producing more milk as the way we are doing"* (Dairy farmer 1).

> *"People have benefited because when they saw that their children were swollen due to malnutrition, they just rush here and buy milk, which they feed their children and after few weeks you see that they are better. They come here to say thank you very much"* (Dairy farmer 3).

5.1.11 Conclusion
5.1.11.1. The Dairy Outreach Project

The project was well conceived and designed. The local community was involved from the designing of the project. This can be evidenced from the local community's understanding of the main livelihood problem being addressed by the project. The project is still in high demand among the households that have not yet received the dairy cows. This can be witnessed by the number of farmers that have already undergone training (dairy management) just in anticipation that they will someday receive a dairy cow.

The level of innovation within the project is quite remarkable. The innovations include the low cost construction of kraals. Kraals are made from cheap locally available materials such as trees instead of constructing them with bricks and cement. Knowledge transfer is very good within the project. The farmers, within their dairy club, conduct trainings themselves with the supervision of a qualified government extension agent.

There is good collaboration in the design, management and evaluation of the project. During project design, LUANAR engaged the services of World University Services of Canada (WUSC) to help in situation analysis and get the input of the communities. Then FICA was involved in providing finances to train the beneficiaries and procure cows for them. The government, through ministry of agriculture in the community, provided training to the farmers in all aspects of dairy management. The training was in conjunction with LUANAR's department of animal science as experts in dairy farming.

5.1.11.2. Enablers

Based on the analysis of the dairy outreach project, we sought to identify factors that made the engagement possible. The following enablers were established:

- The policy environment of LUANAR clearly mentions outreach among the responsibilities of the academics. This encourages academics that are interested in outreach to do so freely. Despite a clear policy on outreach, LUANAR has yet to internalize this through provision in its annual budget a budget line for outreach. Thus, *We should mention that this is done though at the backdrop of lack of specific budget line to support the effort*, meaning those who are able to secure outside funding are advantaged
- The social conscience of the academic concerned to reach out to the communities. He wanted to use his expertise in the field of animal science to reach out to local communities in order for him to practice what he knows
- Previous Bunda, LUANAR involvement with the communities with the goat and chicken immunisation outreach activities built strong trust between LUANAR and the communities
- The desire to generate new knowledge through research through interaction on the ground with communities
- Collaboration with severalactors using a private public partnership model (WUSC, DAHI, SAC, World Agroforestry Centre, Government Extension –veterinary, extension and livestock officers. There were strong interface government structures at district and area level
- Existence of subject matter specialists facilitated the networks as they provided an intermediary level for university involvement
- Stable and continuous external funding from FICA and WUSC allowed continuity of field activities; this overcame lack of funding from LUANAR
- A multi-faceted approach addressing several community needs (income, food security, nutrition, extension, knowledge and skills, employment generation, savings and loans) meant communities perceived project as addressing their needs
- Strong project ownership from the community and good community participation as exemplified by the strong participation of traditional leaders in the project. Traditional leaders helped with project acceptance and mobilisation. The community participants felt they owned the project because they were involved from the design stage, implementation to monitoring
- The high demand from the communities to be a part of the project was another enabler. The demand made the first beneficiaries to properly manage their cows so that they give it to the second beneficiary. If a first beneficiary was not properly managing the cow, the club had the right to take away the cow and give it to someone else
- Strong group dynamics among the community participants*e.g.* farmer clubs. This generated demand for project services in the area and led to its sustainability
- The project also addressed market issues by providing a cooling tank and a ready market for the milk.

5.1.11.3. Constraints

Despite the intervention being reported as beneficial by the community participants, there were some challenges. These include;

- Inadequate funds for outreach activities by the university (LUANAR Strategic Plan, 2012). This could deter other academics, especially those who cannot source alternative funding, to stay out of community engagement

- Inadequate financing for the dairy intervention. This led to leaving out some very important aspects of the project such as dipping tanks. Diseases could wipe out the whole intervention
- Local beliefs of the community participants. It was reported that some community participants were reluctant to adopt artificial insemination because they just believe that a bull should be used during reproduction. Interventions should therefore be fully aware of traditional beliefs during project design and address them accordingly
- Lack of established market for milk. The plan is there in the project design to establish a market but it is not yet operational. This may affect the intervention because the farmers may be getting low prices from other markets or even fail to get any market

5.2Increasing community resilience through application of best bets: a case of Fish project

5.2.1 Introduction

As Malawi economy is agro-based and LUANAR being predominantly an agriculture and natural resources university, we see the evolution of an interaction between Community Action Research Programme (CARP) at LUANAR and the farming communities in Dowa and Mchinji districts pivoting around inclusive production and organizational innovation in the context of a marginalized community in an informal setting. The innovations are geared to address the livelihood problem of poverty and better nutrition of rural households. Just as in the previous case study, the interaction and the associated innovation are supported by interface structures that have been established within the university and by the funding avenues that support the main academic partners, through multi-discipline approached research areas.

Just as in the previous case study, this interaction centered on technology transfer in aquacultureinnovative fish management, innovative use of aquaculture products (mud, fish pond water) for complementary crop production; agribusiness aspects) to promote the capabilities of the communities to increase fish pond production for food (nutrition) and sale to meet daily household needs. LUANAR through CARP provided the technology and leadership of the project as well as fingerings through its partners and training support. The university benefited in that the project provided opportunities for research and learning for students, and the academics satisfaction in fulfillment of their professional quest to improve domestic aquaculture through improved yields of fish pond harvests to improve protein intake of farm families in the country.

The project was implemented by Community Action Research Programme (CARP) with support from Regional Universities Forum for Capacity Building (RUFORUM). CARP is coordinated by Regional Fish Node at Bunda College of Agriculture (LUANAR). This was a four year project (2010-2013) with a total of 68 fish farmers, 54 farmers in Mchinji and 14 farmers in Dowa Districts and working on 80 fish ponds in total (30 in Dowa and 50 in Mchinji districts). Initially, 14 fish farmers who had fish ponds or land where fish ponds can be constructed were identified. The identified farmers were then trained in group dynamics and formed a Club (working group). The project involved action research where the farmers together with CARP students identified best bet technologies and worked together in assessing them.

The aim of the project was to increase fish production from 750kg/ha/yr to 1,500kg/ha/yr, improve rural incomes through application of aquaculture innovations as well as adaptation and application of best bet technologies in fish pond management, and strengthening the aquaculture value chain in Dowa and Mchinji districts.

5.2.2. The Main Livelihood Problem Addressed by the Interaction

The main livelihood problem that the interaction was trying to address is poverty and food insecurity. Specifically, the project aimed at increasing fish production (from the initial 750 kg/ha/yr to 1,500 kg/ha/yr) and rural incomes through the application of aquaculture innovations in the value chain. This was necessary since not many farmers were practicing aquaculture and many who were practiced, without basic knowledge of fish pond management. Many of the responses from different participants confirmed this.

As noted by the field officer in Dowa District:

> *"There is a problem of poverty in this community. Many people are poor; this project is trying to help these people to give them a source of income (money). Many people are not*

able to support their families in terms of food, clothes and other things which show that they are not economically empowered. The project not only wants to empower the people economically but also targets to improve their food security situation''.

On the other hand, one farmer in Mchinji District said:

"We wanted to deal with hunger as well as being able to support our children at school. In summary, I should say that the major livelihood problem here is poverty".

5.2.3 The Communities and their involvement in the interaction

The project was implemented in Dowa and Mchinji Districts under Kasungu and Lilongwe Agricultural Development Divisions (ADD) respectively, in the Central Region of Malawi.In Dowa District, the project was implemented in TA Chiwere, particularly in Mwase village. The village headman, who happens to be a veteran fish farmer in the village, is the chairperson of the oldest fish farming Club called Khumbirani. Another Club has just been formed recently. Initially, they started with communal fish ponds which were later, owing to increasing membership of the club, given to individual farmers. In Mchinji District, the project is implemented in TA Mavwere and TA Nyoka. In TA Mavwere, they started with two clubs: Phindulanu and Nthawinchuma clubs.

Both communities in Dowa and Mchinji are marginalised and are far away from urban centres and thus separated from the circles of economic development. Among others, the communities have a poor road network which limits them from accessing social services and other amenities from urban markets (formal markets). Most of the local dwellers are smallholder resource-poor farmers who are largely dependent on fragile rain-fed agriculture and can't afford agricultural inputs such as fertilizer, given their low income levels. As such, poverty and food insecurity has remained the major livelihood problem in the communities.

In Dowa, the farmers started working firstly with a Farm Income Diversification Program (FIDP) in 2007 on fish farming, before the introduction of CARP fish project in the community. CARP came in 2010 which helped the community participants in digging of fish ponds. CARP provided equipment such as hoes, wheelbarrows and fingerlings (seed fish). CARP also provided training to farmers on fish production and marketing. CARP was motivated by the farmers' interest and passion in fish farming, which dates back to the 1990s. For instance, the village headman started fish farming on his own in 1999. In Mchinji, CARP came in TA Mavwre in 2011 and facilitated the formation of two clubs. In Mchinji, CARP came to know the farmers through a survey that was done by the fisheries department about fish farming. Upon hearing about the coming of CARP, they become more interested in fish farming.

5.2.4 University-Community Interaction: What Help?

LUANAR's interaction with the communities has made a significant contribution to the lives of the local communities. As echoed by one of the farmers :

"Our interaction with the university has helped us a lot with new skills with regard to fish farming. For instance, we have regularly received training on fish feeding and fish breeding among others. The college through CARP also provided us with equipment such as hoes, wheelbarrows to help in pond construction. We have also received training in agribusiness (marketing skills). Basically, CARP has encouraged us farmers to take fish farming as a business".

The University has helped the farmers with sourcing of markets where necessary. In most cases, the farmers are encouraged to liaise with CARP and the aquaculture department at Bunda in order to promote their business and sell their fish yield at Bunda College during public events. This was not the case with FIDP.

5.2.5 Mapping of Actors in the Project

Several partners were involved in the implementation of the CARP Fish Project. LUANAR was the leading actor responsible for coordinating project activities while Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) provided funding for the project. Different project partners played several roles and responsibilities that served to contribute to the success of the project.The following are some of the social partners that were involved: Farmers Union of Malawi (FUM) who facilitated the formation of clubs, and further provided training in group dynamics;Research into Use who provided training in group dynamics & marketing; Initiative for Development and Equity in African Agriculture (IDEAA) who were partners in training of farmers in marketing skills; Trustees of Agriculture Promotion Programme (TAPP) who supported the farmers with extension; World Fish Center (WFC) and National Aquaculture Center (NAC) who provided the fingerings and trained the farmers in fish breeding and feeding; National Commission for Science and Technology (NCST) who supported the research component of the project; Kawjo Foundation and Research into Use (RIU) who supported the farmers with extension and best bet technologies for fish pond management and innovativeness. Note that the project was conducted in two districts and a number of traditional authorities thereby requiring a number of actors playing complementary roles and in some cases similar roles in their area of operation. Figure 5.4 below illustrates the interactions and network of the actors that were involved in the project.

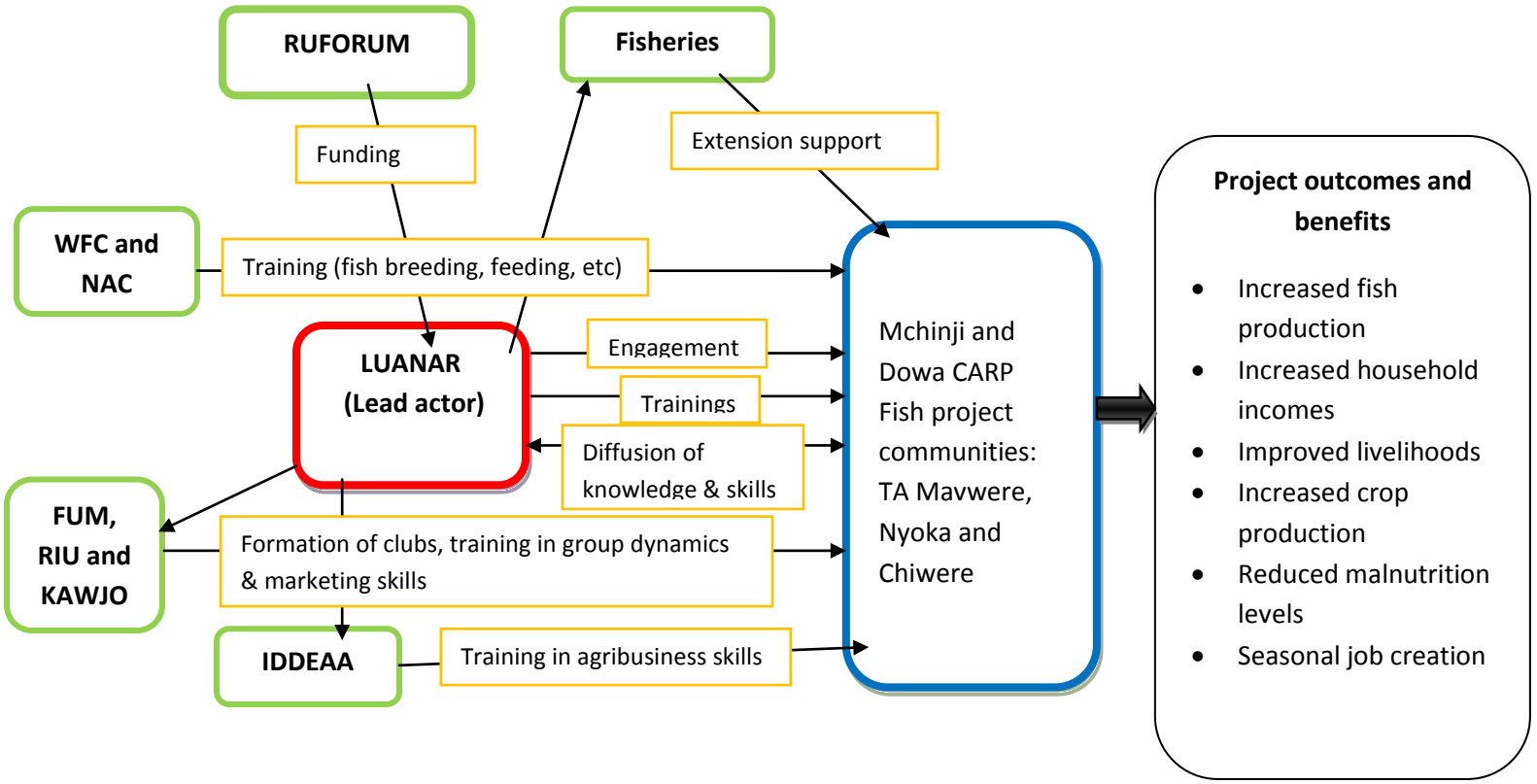


Figure 5.4: Mapping out of actors involved in CARP-Fish Project.

(Interaction of other organizations with LUANAR is through a memoranda of understanding (MOUs))

5.2.6 Organizational Arrangements and Interface Structures

This section serves to explore the organisational arrangements, interface structures as well capabilities of each actor that support or constrain their capacity to interact, and in an inclusive manner. More emphasis here is given to LUANAR and RUFORUM owing to their central roles in the project.

5.2.6.1. Lilongwe University of Agriculture and Natural Resources (LUANAR)

The university's vision, mission and values as well as the research, outreach and consultancy policy have all created an enabling and conducive environment in promoting interaction with the communities. LUANAR has provided infrastructure in terms of office space for implementing the project. For instance, CARP as a program was conceptualized under the aquaculture department at LUANAR. The management provided space for offices so that the program executes its mandate of research and extension with communities without problems. The program is well integrated with the aquaculture department as it provides space for interns and provides scholarships for postgraduate students to be trained at LUANAR in aquaculture and take their research within the community.

5.2.6.2. Regional Universities Forum for Capacity Building in Agriculture (RUFORUM)

RUFORUM has provided funding for the project with support from the Bill and Melinda Gates Foundation. Established in 2004, RUFORUM is a consortium of 32 universities in Eastern, Central and Southern Africa. RUFORUM's Secretariat is based at Makerere University in Kampala (Uganda) and its mission is to strengthen the capacities of universities to foster innovations responsive to demands of small-holder farmers through the training of high quality researchers, the output of impact-oriented research and the maintenance of collaborative working relations among researchers, farmers, national agricultural institutions, and governments.

RUFORUM has embraced the vision where it sees a vibrant agricultural sector linked to African universities which can produce high-performing graduates and high-quality research responsive to the demands of Africa's farmers for innovations and able to generate sustainable livelihoods and national economic development. Specifically, RUFORUM came into play upon recognizing the important and largely unfulfilled role that universities play in contributing to the well-being of small-scale farmers and economic development of countries throughout the sub-Saharan Africa region. The strategic objectives of the RUFORUM include:

i. Train a critical mass of Masters and PhD graduates, who are responsive to stakeholder needs and national/regional development goals
ii. Develop collaborative research and training facilities that achieve economies of scope and scale
iii. Increase the participation and voice of women in agricultural research, production and marketing
iv. Improve the adaptive capacities of universities to produce high quality and innovative training, research and outreach activities that can contribute to policy and development practice
v. Increase the use of technology to support effective, decentralized learning and the sharing of knowledge
vi. Mainstream new approaches within university teaching and research that emphasizes quality, innovation, and impact across the agriculture sector's full value chain
vii. Create a dynamic regional platform for policy advocacy, coordination, and resource mobilization for improved training, research and outreach by universities.

5.2.7 Organizational arrangements and interface structures of other actors

The project encountered a number of challenges in working together with different partners. As explained by project coordinator, *"our budget was small to accommodate all NGOs activities. Most of the NGOs had high expectations from the project. For some NGOs to participate, they have to see the benefits".* As such, this presented conflict of interest as partners had different objectives to achieve. For example, IDEAA pulled out in the process. Further, the project coordinator lamented that the government was not fully supportive in the project. The project was also affected by the death of an agricultural officer from one of the partner organisations, TAPP.

5.2.8 The Drivers of Interaction

There are a number of reasons why different actors got involved in the interaction. Among the various reasons, reasons to do with social conscience were predominant. As explained by the project coordinator:

> *"You know as a professor, interaction with the rural communities is mandatory and you would want to see positive transformation in the lives of rural people. One desires to improve the general living standards of the marginalised groups".*

The project coordinator also explained that he desires to upgrade the fish farmer's Clubs to a Cooperative which will be managed by the farmers themselves. This will help the farmers to be getting high returns from fish sales through collective action. Further, the communities' prior experience and interest in fish farming was a motivation to the academics in driving the interaction.

With respect to the other actors *i.e.*FUM, IDEAA, TAPP, WFC, NCST, NAC, Kawjo Foundation and Research into Use (RIU), the multi-disciplinarily nature of the project which required their expertise and the availability of the funds to support their participation played a major role. This signifies that as much as these organizations have a key role to play in this project, they all are struggling with funding to effect projects on their own. For example, the availability of funds as a driver is reflected in the project coordinator's assertion where he indicated that IDDEA eventually pulled out of the project due to insufficient funding.

5.2.9 The Role of Innovation

The aspect of innovation in the project was well incorporated and played a crucial role in addressing the livelihood problem through interaction-including aspects of technological change, social technical change, knowledge intensification, skills, training and capacity development.

In the first place, the project contributed to the creation of some organisational structures in the communities such as fish farmer groups/Clubs (Gwirampini Club in TA Nyoka, Nthawinchuma Club in TA Mavwere and Khumbirani Club in TA Chiwere). These farmer Clubs served as platforms for facilitating diffusion of knowledge as well as skills development between the farmers and the researchers or academics.

Some of the technologies or innovations that are currently being used by farmers that were not being practiced before the engagement include the following:

- Use of trays in feeding fish. Previously, farmers were just spreading the feed (any amount usually exceeding the limit) in the pond and the feed would just settle at the bottom without being fully utilised by the fish. Sometimes, these un recommended feeding practices would lead to fish

poisoning as the excess feed decomposes at the pond bottom and release poisonous gases such as Hydrogen sulphide. This was facilitated by the CARP in conjunction with the extension actors such as TAPP, Kawjo foundation and students.

- Application of manure and fertilizer in ponds to stimulate growth of planktons which are natural food for fish. Manure and fertilizer application also makes water in the ponds to become dark green in colour which makes the fish invisible to predators hence protecting the fish (Figure 5.5).
- Of major importance, has been the use of pond (fertilised) water in irrigating crops and vegetables. Besides, farmers use the mud scooped from the pond and apply it in their gardens as manure. This has boosted crop production leading to increased food security.

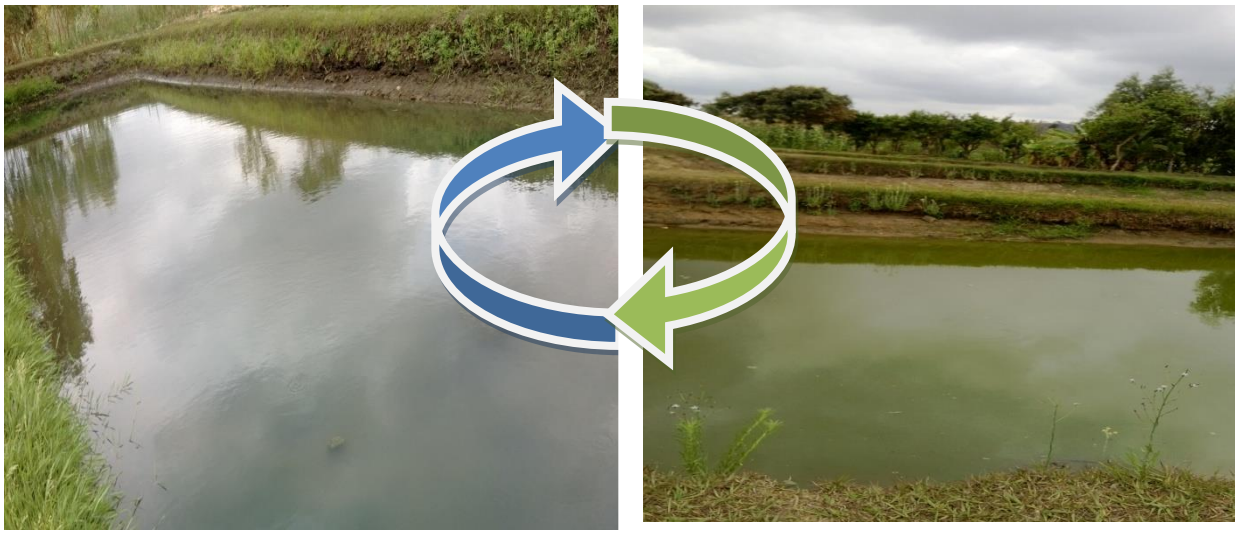


Figure 5.5: Comparison of a transparent pond (left) and a nutrient rich dark green pond (right)

5.2.10 Knowledge and skills

The engagement/innovation (fish farming) is not completely new to the communities but entailed the adaptation and modification or improvements of technologies that already exist in the community. Through interaction and various trainings provided by the college (CARP project and partners), farmers have acquired several skills and knowledge. These include:

- Feed formulation and feeding. Farmers have been trained in improved fish feeding techniques such as recommended feeding intervals as well as how to formulate fish feed using local raw materials. One farmer from Dowa District explained:

"We had an experiment where we were trying to see the effective way of Fish feeding practices. In this study we were feeding our fish using two methods called tray feeding and spreading feeding and we found that tray feeding is effective. Further, we saw that the covered pond (with plastic paper) is the one in which we had more yields than the open pond with tray feeding system. While the open pond offered us low yields''.

Farmers have also been trained about the right quantities of feed as well as timely feeding of fish.

- Pond construction. Farmers were trained by project field officers how to construct a standard recommended pond size (more than 800 m^2) for semi commercial fish production
- Pond dynamics and management. Farmers were trained on how to take care of the pond as well as understanding the dynamics in the pond
- Fish predation control and prevention
- Detection of the sex and fish diseases. Farmers were trained on how to recognise the sex of a fish as well as sick fish respectively
- Fish breeding. Farmers were taught the recommended sex ratio of male to female fish to be stocked in a pond for optimum fish production. Another innovation involved covering the fish pond with a plastic paper which creates a warm environment in the water to improve growth of fish and breeding. The plastic cover also protects the fish from some predators such as birds especially when the waters in the pond have receded
- Farmers were also trained in group dynamics in their Clubs

5.2.11 The flow of knowledge and skills

The structure of knowledge flow in the engagement has mainly being scientific from academics/researchers to farmers. Indigenous or traditional knowledge has played a very minimal role in the engagement. This could be due to the fact that traditionally farmers use to fish from the rivers and streams. The culture of digging a fish pond is new and not well adapted to the traditional way of doing things. When the farmers were asked what they think Bunda College researchers and/or staff have learned from them, one of the farmers explained as follows:

"Bunda College staff has learnt how to take care of fish".

However, another farmer from Dowa said that*, "it is very difficult to know because they cannot tell us. For example there was a certain person who upon seeing a very green maize plant which I had in my farm he asked me to give him one plant to use for teaching at the College. So you can see that he did not tell me why he was taking the plant".*

5.2.12 Community Participation

The community participants were less involved in the interaction than the dairy farmers. The farmers together with CARP staff and students identified best bet technologies and worked together in assessing and evaluating them. For instance, farmers and students worked together in evaluating the performance of fish under covered and uncovered ponds. These included capturing fish samples at specified periods and measuring their growth rates. Further, farmers were responsible for digging the ponds under the guidance of their field officers. Farmers also meet on specified dates in their Clubs where they discuss matters concerning fish farming such as pond management and how they can address such issues should there be any challenges.

5.2.13 Project Outcomes and Benefits

- **Benefits and outcomes of the engagement to the university**

The interaction has benefited both the university and the communities. In the first place, the engagement has put LUANAR on the map thereby increasing LUANAR's reputation as a centre of knowledge, excellence and innovation in the region. This has seen, for instance, members from different universities in the region to come and learn about outreach projects at LUANAR recently. Further, the university-interaction has seen the Project Coordinator, earning several awards in recognition to the valuable contribution to the communities. Similarly, students working under the project managed to successfully defend their thesis obtained from the project implementation areas.

- **Benefits and outcomes of the engagement to the farmers**

The interaction has much benefitted the farmers in the following ways:

- Increased fish production. The first harvest produced a bumper yield of 497.63 kilograms of fish among 8 farmers. The fish yield translates into an average of 1663 kg/ha/yr for each participating farmers which is double the current production of 750 kg/ha/yr. A farmer from Mchinji explained as follows:

"Previously, a farmer would harvest only 2 kg/pond. But now fish production per pond could go as high as 45kg/pond. This shows that through trainings provided by CARP, it has helped us realise increased fish production".

- Increased farm income. Due to increased fish production, the amount of money realized from the sale of fish translated into an average gross income of MK73,231 per person (about US$ 481, at exchange rate of 1 US$=MK152). This is a great income for Malawi where the majority of the population live on less than 1 US$ per day.
- Improved livelihoods. The project has contributed to improvement of livelihoods of community members. Participating farmers have been able to pay school fees for their siblings, purchase fertilizer and other inputs for farming; as well as livestock from fish sales
- Increased crop production. As pointed out earlier, the use of fertilized pond water and mud from the pond has helped to boost crop and vegetable production. This has contributed to the attainment of food security in the communities.

- Improved nutrition status of both the communities and urban areas. This is because both Mchinji and Dowa are far away from the lake and fish farming in the districts has greatly improved nutrition status of the people
- Job creation. Construction of fish ponds under a Local Development Fund (LDF) through a cash for work initiative has in turn increased the number of fish ponds in the area, courtesy of CARP initiating the process.

5.2.14 Conclusion

5.2.14.1 The engagement

The CARP-Fish Project was well conceived and selected to address the major livelihood problem of poverty and food insecurity in the communities of TA Mavwere and Nyoka in Mchinji as well as TA Chiwere in Dowa Districts. The project involved different project partners who played several roles and responsibilities that served to contribute to the success of the project, despite the challenge of erratic rains and droughts which affected the ponds. This was a network form of interaction where the LUANAR academic through CARP-Fish project interfaced with the rural communities directly and through intermediate partners. As one of the aims of the project was to increase the fish yield, the success of the project is supported by the fact that yields of fish from the ponds in good years doubled. The aspect of innovation and inclusive development was well incorporated as evidenced by the involvement of and full participation of the community in most of the phases of the project. The magnitude of the innovativeness was though dwarfed due to unfamiliarity of the fish pond practices in the area to most of the farmers. Among others, the local communities and project staff worked together in identifying best bet technologies as well as in monitoring and assessing them. The use of fertilised pond water (and mud) in irrigating field crops, is one of the innovations that has helped in boosting food production. Furthermore, the applications of manure in the pond, the feed formulation, as well as tray feeding are some of the skills gained by the farmers that have maximised fish production.

5.2.14.2 Enablers

Upon analysis of the CARP case study, we identified factors that made the engagement possible. The following enablers were established:

- Mandate of LUANAR in teaching, research and outreach. Despite lack of budget lines for LUANAR outreach activities, LUANAR has a clear policy on outreach
- Social conscience of Academics to practice what they know and see communities prosper and grow
- Presence of a lead fish farmer in the name of a village headmanm who provided the needed leadership and influence to other upcoming fish farmers
- A Multi-faceted Project approach that addressed several community needs (income, nutrition, livelihoods improvement, food security and created some jobs)
- Involvement of many actors with different sets of knowledge and skills for fish production, feeding, sexing and marketing. This ensured success of the project

5.2.14.3 Constraints

Despite the enormous benefits of such a multi-stakeholder project, challenges were inevitable and include the following:

- Shortage of water. This has been a major constraint to the development of fish farming in both communities (Dowa and Mchinji Districts). Amidst climate change, the areas are becoming drier these years and makes the ponds to dry up before fish are ready for harvesting. This problem was severe in 2013.

Figure 5.6: A dried up pond in Dowa District due to lack of water

- Limited support structure from government offices for fish farming due to lack of budgeted resources and capacity gaps
- Lack of refrigerators or cooling facilities. Due to the perishable nature of fish, it becomes difficult for farmers to transport their fish for marketing to higher distances where the fish fetch higher prices. As such, farmers sell their fish at give-away prices in an attempt to rid of them to prevent the fish from going bad
- Limited budget to accommodate all NGOs and FBOs planned activities(*e.g.* IDEAA pulled out).
- Limited markets for fish. Currently, farmers do not have a reliable market for their fish. Their market has been largely fellow community dwellers who can't afford the fish given high cost of production. Further, lack of collective action in marketing the fish deprives the farmers ofbargaining power for higher prices. LUANAR is the only reliable and lucrative market as faculty members and surrounding communities patronize the aquaculture department fish laboratories and pay better prices than in the villages.
- Shortage of land for construction of ponds: Due the problem of shortage of land for cultivation, a farmer has to weigh and make a choice between putting his/her already small piece of land to fish farming or to crop production. Most often, crop production is given priority.
- Predators such as birds (*e.g.tofu*) and animals such as *Katumbu* (Otter),*Khakhakha* () and *Ng'azi* (Alligator). This has been exacerbated by the drying up of water in the pond thereby exposing the fish to predators. However, farmers have been taking their own initiative in dealing with predators as shown in the figure 5.7below.

- It was also noted that returns to fish farming are small and take long (6 months) to be realised given the investment costs (as well as labour) and the daily livelihood challenges of the farmers that need to be met on a daily basis as well.
- Furthermore, the project has done little in ensuring sustainability of vibrant fish farming. Some of the technologies such as the use of plastics to cover the ponds and fish feed are expensive to the farmers given their income levels

Figure 5.7: Farmers' own innovation in dealing with predators: (left) a tree or bamboo put across the pond to protect fish from Otter(*katumbu*) in Mchinji District and (right) bamboo and mosquito nets covering the pond to protect the fish from both animal predators and birds.

5.3Improving household welfare through interface of indigenous and scientific knowledge: Botanical Pesticide Case Study

5.3.1 Introduction

This is an outreach activity by faculty members at Mzuzu University in Malawi. According to the faculty member some farmers in the rural areas cannot manage to purchase synthetic pesticides to protect their produce. As a chemist and an environmentalist, the academic argues that despite the synthetic pesticides being expensive, they also have adverse effects, are a health hazard to human beings and they have adverse effects on the environment. He therefore sought to find with solutions where farmers can protect their produce using readily available and environmental friendly pesticides.

The faculty members did a survey with the farmers to find out from them what they do to protect their crops, both field crops and stored produce. The survey was conducted in Rumphi and Mzimba districts in the northern region of Malawi. Precisely, the survey was done in Ntchenachena extension planning area (EPA) in Rumphi and Champhira EPA in Mzimba. The survey found that the farmers use synthetic pesticides, and apart from these, they also said that when they do not have money, they use natural products. Among the natural products used are Ash, Cow dung, *Tephrosia vogelii*, Neem, *Securidaca longepedunculata*,and *Venonia*. The farmers claimed that these botanical pesticides are effective in controlling storage insect pests as well as field crops. For example they said these botanical pesticides control pests that attack Tomato and Rape (canola). The outreach program sought to validate their claims. The engagement with the farmers was done in the same area where the survey was conducted in Ntchenachena and Champhira EPAs. The academic – faculty member from MZUNI summed up the project as:

> *"The whole idea is that if we find plants which are working very well, we go ahead with it isolating the active substances, test them and come up with something that is available in Malawi other than depending on the synthetic pesticides. As of now we have found that two plants are working well, thus Neem and Securidaca longepedunculata but we want to explore more plants".*

5.3.2 Main livelihood problem

The main livelihood problem that the engagement sought to address was field and storage food losses due to pests thereby decreasing months of lack of food and income. According to Kamanula *et al.,* (2011), storage losses due to pests threaten livelihoods of farmers across Africa. Synthetic pesticides provide effective control when used correctly but resource-poor farmers cannot afford them (Kamanula *et al.,* 2011). This leads to farmers losing out the little they have harvested because they cannot treat their produce to have enough food for future consumption. Kamanula *et al.,* (2011) found that all the sampled farmers reported suffering pest damage to their maize and the most common pests were *Sitophilus* spp. and Larger grain borer. Farmers pest control actions in northern Malawi were dominated by the use of synthetic pesticides compared to the use of resistant varieties, cultural practices and pesticidal plants.Howevera large proportion of respondents (64%) in northern Malawi regarded synthetic pesticides as expensive (Kamanula *et al.,* 2011). The result is food insufficiency among rural farmers. The engagement therefore aimed to enable farmers to protect their crops in the field as well as in storage by using locally available and cheap materials in form of botanical pesticides. This will enable farmers to yield more crops for consumption and sale. The money they will be realizing from the sale of crops will be used for paying school fees, buying clothes and other household requirements even building houses.

"we have three aspect in this project where the first aspect is food security, second is poverty alleviation and the third is protecting the environment because the synthetic pesticides when they go into the environment they are persistent and we never know some of them they may kill fish in the water, they may add heavy metals in the soil and it is not only that some of them may pollute the Ozone layer"(Academic Interview).

The livelihood problem from the lens of an extension officer (AEDO) was framed as follows:

"……. *farmers have been failing to protect their crops because of exorbitant prices of synthetic pesticides that are commonly used in protecting the crops from pests. Therefore, we want to find new techniques which will help farmers to reduce their cost in protecting their crops from pests"* (Jenda AEDO).

From the community leader point of view:

"Our problem in this village is lack of materials in terms of pesticides used to protect crops from pests. We have been having difficulties in protecting the crops because we were lacking pesticides as the ones which are recommended like actellic(synthetic pesticide) which are very expensive to us. But now this problem is over because this project introduced the use of botanical plants as pesticides and they are the ones we are using now. For example we are using Mtetezya (tephrosia vogelii) to protect our crops from being attacked by the pests" (Community Leader).

From farmers' perspective:

"We had a problem of lack of money to buy synthetic pesticides. Hence they (Mzuzu University) brought this project of using local pesticides with an aim of maximizing our yields as many of us we have been failing to have more yields because our crops were attacked by different diseases and pests" (Botanical pesticide farmer 2).

5.3.3 The Communities and their involvement in the interaction

The project wanted an area where maize and beans were produced widely. The reason this choice was made was that maize is the staple for Malawi and that bean is the main source of protein for most of the farm families. The agriculture officials from Mzuzu agriculture development division (ADD) recommended Ntchenachena and Champhila as the areas that most farmers grow maize and beans. The academic also argued that these areas are marginalised because they face the problem of postharvest losses due to inability to afford pesticides. This problem of food insecurity leads to other problems:

"Yes it is marginalised because in terms of food security, if people do not have food it results into other problems. For example if a farmer is food insecure the children may not go to school because of hunger and that they cannot concentrate in class as their learning ability is affected. Secondly if someone is hungry on the side of females they may engage in prostitution where they also put their lives at risk of HIV. You can see the consequences that can come with food insecurity at a household" (Academic Interview).

5.3.4 Mapping of actors

The project had several actors who played complementary roles. The actors were Mzuzu University who was the lead research institution and coordinator of the project; European Union (EU) through Southern Africa Development Community (SADC) provided the resources which made the research possible.This being an agricultural based engagement, Ministry of Agriculture Field Officers was the contact people on the ground and were involved as the link between the researchers and the farmers and provided the extension services required in the project; the community leaderswere involved in mobilizing their subjects for the engagement and were instrumental in facilitating the entry point of the project in the communities; and the rural farmerswere the intended beneficiaries of the project and they provided the facilities (produce and their granaries) which were used to conduct the farmer participatory research. The engagement sought to address their livelihood problem.The faculty member, a senior lecturer at Mzuzu University led the engagement.

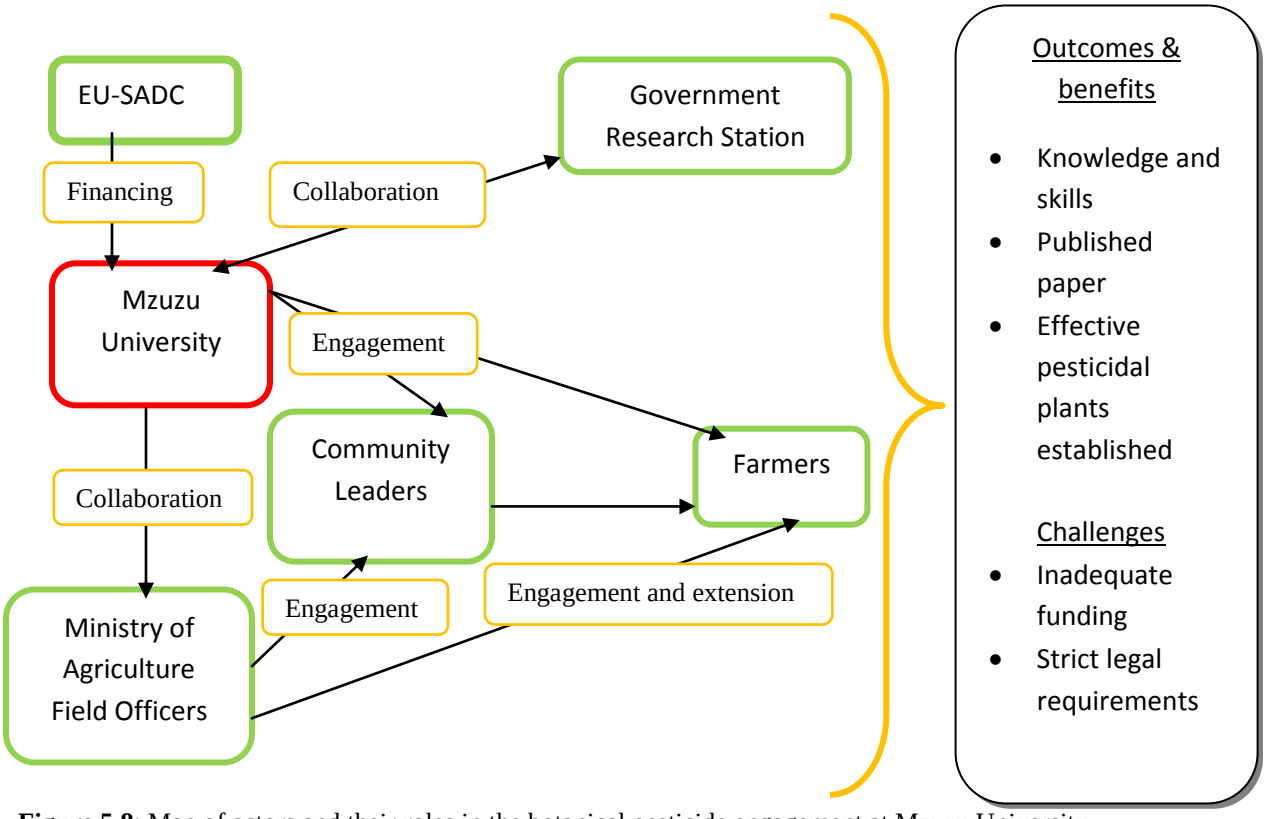


Figure 5.8: Map of actors and their roles in the botanical pesticide engagement at Mzuzu University

5.3.5Organizational Arrangements and Interface Structures

Mzuzu University has an office of Director of research whose mandate is to coordinate all research and outreach activities for the university. Mzuzu University's mission statement clearly states research and

outreach as core activities of the university. MZUNI has centres that promote outreach activities for the different fields but, this engagement did not use any of these centres. According to the academic, he was encouraged to engage based on the mission statement of the university:

> *"According to Mzuzu's Mission statement it is Teaching, research, outreach and consultancy. Because of that good structure, our project was fine because when we were going to the field trips we were using University vehicles and we were providing the fuel and also we have been using Universities technicians upon consulting with the head of department and we have benefited a lot from it"* (Academic Interview).

5.3.6 Drivers of Interaction

We sought to find out the motivation behind academic's interaction with external actors. This would help in understanding why some academics engage with external actors. The academic was driven by intellectual and social conscience reasons.

> *"I am both a chemist and an environmentalist. I got involved into this project because it pains me a lot when I see people from China and other countries come here and tell us that Neem works very well yet we scientists and me especially who comes from Lower Shire or states of Malawi in Nsanje where Neem grows widely and somebody comes there saying that Neem is good in these conditions. This shows that me as a scientist, I am a failure. So my mission is to work on things that are in my Jerusalem"* (Academic Interview).

The other driver for interaction was social conscience. The academic feels he has to use his knowledge and skills to the benefit of local communities:

> *"The other thing is that I want to help farmers because there are some farmers in the communities who could not manage to get even MK100 (one hundred Malawi kwacha) to buy chemicals. In that case, finding a plant that should be helping them in protecting their crops is very important since they will be able to protect their crops and have more yields. At the same time, I do not want indigenous knowledge to die. I want to promote indigenous knowledge"* (Academic Interview).

The other motivating reason was the desire to showcase that traditional knowledge is not useless. There is a lot of traditional knowledge which can be used for the benefit of the local communities themselves ….....

> *"What prompted me to do this is that I have seen that many people this time they think that Traditional things are useless but the western products are the most superior not knowing that those western products are originating from the traditional things they are denying. Based on these premises, I thought it is a good idea that I should work with communities to find traditional plants that can work well in protecting crops from pesticides, so that our farmers can benefit from their own. In short I am a person who wants to study things which have surrounded me and I do not want our environment to be polluted while I am here. I need to find ways of protecting the environment"* (Academic Interview).

5.3.7 Role of Innovation

According to Kamanula *et al.*, (2011), most farmers in northern Malawi (61%) were knowledgeable about the use of pesticidal plants in controlling pests of stored maize despite that only 6% of the farmers were

using them. This means that the knowledge of pesticidal plants was not new to this area but was adapted after the scientific research. What could be new is the processing of the roots to improve their efficacy in controlling storage pests. What is also new is the scientific validation of the claims by local farmers in the efficacy of the botanical pesticides.

> *"Farmers have been using botanical pesticides since long time ago before the invention of the synthetic pesticides. As I said, we have managed to identify two plants which are effective in protecting the crops from pesticides, and to us it is a plus. The other thing is that people always say this plant or that plant works very well or is effective, without any validation through field research here in Malawi. What I have discovered may not be new, remember it was the farmers who told us that they use such plants. For example farmers said "if you use tephorosia that is a best plant to protect maize from insect damage but upon conducting the study with the farmers themselves, it was proven to be negative, not effective, and yet farmers keep on saying that tephrosia works very well"* (Academic Interview).

Despite the farmers having the knowledge of and using botanical pesticide on their own, perhaps the innovation that this interaction brought is the discovery of which pesticides are more effective in treating storage pests.

> *"The botanical pesticides were here but we did not know that they can be used as pesticides to protect our yields from weevils and from rotting"* (Botanical pesticide farmer 1).

Despite this knowledge not being new to the farmers, it is new to the world of scientific knowledge.

> *"In terms of the scientific cycles, botanical pesticides are new and this is a reason why many organizations want food that has been treated organically because they have seen the effect of synthetic pesticides to the health of people and the environment. Within the scientific arena, this seems to be new but to the farmers it is not"* (Academic Interview).

There was also adaptation of the already existing technology of botanical pesticides. The researchers used scientific knowledge to determine the best time to harvest the botanical pesticides. The botanical pesticide's efficacy varies depending on the time they are harvested.

> *"We were just optimizing the use of these plants and adding value to what they know through chemistry. For example if you can harvest Neem today and apply to a crop it won't be effective but if you harvest in the next five months it will be very effective because of change in active ingredients' value. As Chemists we are taking a role of advising the farmers to follow the proper procedures in using these plants so that they should be very effective. On what we have been telling them, farmers are doing it. Through science, we are adding value to what the farmers already know"* (Academic Interview).

Figure 5.9: Botanical roots being processed and evaluated in a laboratory at Mzuzu University

5.3.8Knowledge and Skills

Knowledge was generated as a result of this interaction. This interaction involved validating the efficacy of botanical pesticides used by farmers and it was found that *tephrosia vogelii* was not effective in protecting maize against storage pests.

> *"I am evaluating the efficacy of these botanical pesticides used by farmers but I am doing this work in a laboratory. We have found that tephrosia does not work well in protecting maize from storage insect damage specifically upon using it in a powder form. We have not tested using it in another form"* (Academic Interview).

The knowledge flow was a two way process. The researchers learned from the farmers the type of trees used in protecting crops against storage pests. Researchers also learned that communities respect their values. Women do not speak in the presence of men as a sign of respect to the men. Therefore for outreach activities to be effective, men and women should be separated so that the women can freely share their experiences.

> *"We have learnt which plants are used and those that work very well. We have also learnt the community set up and that farmers are more knowledgeable i.e. we found that women are more knowledgeable than men in terms of use of natural plants but the problem is that when you put men and women together women do not talk, they keep quite giving respect to men. But when you interview them individually women, provide more information than men"* (Academic Interview).

Skills were also transferred to the farmers involved in the interaction. The farmers in the interaction also transferred the knowledge to their colleagues. The farmers were trained a new way of processing the

botanical plants. The farmers were also trained in sustainable harvesting of the botanical plants to avoid killing them.

> *"Through working with the farmers, we are teaching them to dry the plants in a shade to ensure that if the active ingredients are volatile they should not be volatile but they should be effective enough; secondly we are also teaching them about sustainable harvesting of the plant material assuming that if leaves and roots are both working very well, then it is good to use leaves than roots because if you will harvest roots you are going to kill the plant. In an event that it is the root that is working for example Secridacca, in that case we advise farmers that propagation is needed to ensure that the plant is not killed completely"* (Academic Interview).

5.3.9 Community Participation

Different levels of the community participated in the project. The different levels included the community leaders, farmer clubs and the households. The community leader was responsible for accepting the intervention in his area and mobilising his subjects. The farmer club was using botanical pesticides on field crops (tomatoes). Their success encouraged other farmers to join.

> *"At first we started with few farmers but because some of the farmers saw the importance of this project they joined the first farmers we started with. For example, in Jenda area, we have a certain club called Titukulane. When we were using these pesticides to protect their tomatoes they started realizing more money and due to this other village members participated into the club to ensure that they should also maximize their earnings as their friends. Farmers are taking a role of implementing or using the plants to see its effectiveness. Participation in this area is good because at first we had 5 lead farmers and 20 farmers but at the end of the project we had 100 farmers in total"* (Academic Interview).

The households were involved in the evaluation of the efficacy of the botanical pesticides. The experiment was done in their homes on their stored maize. They were collecting, recording and presenting the results. The evaluation was done together with the farmers based on their findings.

> *"We were harvesting the plant materials and ask them how they process. We did as they said because we wanted to evaluate what they do and not what we want. After that we measured the plant materials and apply to ten kilograms of maize. We also gave them note books so that they should be recording what they see in the treated maize every month, in terms of pesticides that are in, its type and the level of damage. We were going there every month to get the sample for record. After theproject we ask them to present their findings and it was fantastic because farmers were able to present their findings. You can see that they were involved in every part of the project"* (Academic Interview).

5.3.10 Outcomes and Benefits

The outcomes and benefits to the farmers of the interaction include knowledge on the plants that are effective in controlling storage pests. This engagement found *Neem* and S*eccolidaca* as being effective in the study areas. This knowledge has helped the farmers reduce the expenditure on buying synthetic pesticides which are expensive to the farmers.

> *"At this initial stage farmers are using these natural pesticides to control storage and field crops which mean that these products have helped in minimizing expenditures they were incurring by buying synthetic pesticides as they are very expensive. Farmers have been*

approaching me to ask whether it is possible that they should be selling these products to other people, meaning that they want to commercialize the products. If this can happen then we should expect that farmers will be making money from it. The use of these pesticides is making farmers to have more yields for consumption and for selling" (Academic Interview).

"The hybrid pesticides are good but they are too expensive of which many farmers were not able to buy it. This made many farmers not to prosper in their farming as they have been spending much and earn less but with local pesticides there is a positive change as they are cheap or I should say they are for free; so use of these local pesticides is making us to make more profits in our farming as we are spending less and earn more" (Botanical pesticide farmer 2).

"This is a good project to us because it is giving us a wide choice to choose on what to use when we want to protect our crops from pests as we can use hybrid pesticides or local pesticides if I do not have adequate money for buying the hybrid ones. The other thing is that the local pesticides are also used as medicine when we are sick and that they are not poisonous to people" (Botanical pesticide farmer 3).

The identification of effective botanical pesticides is also beneficial to the community because they use the same knowledge to control storage pests. The academic benefitted because a paper was published from this research. The paper will also help in his pursuit of a doctorate degree.

"As a researcher my benefit is that I am going to publish a paper and upon publishing the paper I will be promoted. This will make me to be an associate professor and then later on a full professor. Secondly as a researcher, I have gained knowledge because I have been exposed to real situations in the communities" (Academic Interview).

The whole community benefitted from the interaction. There was knowledge transfer from the community participants involved in the interaction to community participants not directly involved. Thus there was a trickledown effect from the community participants involved in the evaluation to the other community members.

"Yes the community has benefited because we have been having community trainings to equip the communities with the knowledge of these pesticides so that they should also be using this in their farms. I have seen a number of people using these technologies on their own without our assistance and they are benefiting as the way we are doing" (Botanical pesticide farmer 2).

The other benefit is the experience the students of the university got from the engagement. They benefitted from the laboratory work as part of practicals. The technicians of the university were also involved which gave them valuable experience.

5.3.11 Conclusion

5.3.11.1 The engagement

The engagement sought to evaluate the efficacy of botanical pesticides used by communities in two districts of northern Malawi. The engagement achieved its objective. It found that two botanical pesticides, *Neem* and *Seccolidaca*, were effective. The livelihood problem was clearly defined. The community was very involved in the engagement. Knowledge on how to process the botanical pesticidal trees was transferred to the community but the researchers also learned the types of trees that are used as

botanical pesticides. The evaluation was only done in two communities in two districts. There is lack of funds to up-scale the evaluation in other areas across the country. The engagement is also beneficial to the academic because of new knowledge acquired but also a possibility of promotion from the paper published as a result of this engagement. Thus, this project we see a lot about new knowledge and integration of scientific and indigenous knowledge. We also see the intensity of active participation of the farmers and communities in various stages to create, use and monitor the pesticides.

5.3.11.2 Enablers

Based on the analysis of the botanical pesticide case study, we sought to identify factors that made the engagement possible. The following enablers were established:

- The intellectual motivation was one of the major enablers for the interaction. The academic needed the knowledge generated for his professional development and promotion
- The social conscience of the academic was important in this engagement. He has a passion to use traditional knowledge to the benefit of local communities
- The relevance of the intervention to the livelihood problem they are/were facing. The community was already using the botanical pesticide. They therefore saw the interest of scientist in the botanical pesticide very important to improving the efficacy of the botanical pesticide
- The policy environment of the university gives academics a chance to go and interact with external actors. The favourable environment also allowed the academic to do his laboratory work using the infrastructure of the university.
- The farmers owned the project due to community participation leading to sustainability. The community members were involved a lot in the evaluation of the technology. They therefore saw the importance of the intervention first hand and learned what works and what does not work.
- The exchange of indigenous and scientific knowledge between the academic and farmers.

5.3.10.3 Constraints

One major constraint was identified during the interaction manifestation which occurred in the botanical pesticides case study which centered more on the funding problems (inadequacy).

> *"At first we said we are going to evaluate the efficacy of the botanical pesticides in the field but the money was not enough that is why we are doing this exercise in the laboratory but had it we would have money it would have been better to evaluate in all regions of Malawi with the farmers"* (Academic Interview).

5.4 Role played by university students in the interaction with the surrounding communities

Findings in this report generally point to the need to actively involve students in research to interact with the communities. Nearly all the case studies base of work was done by students as part of their research projects with the communities. This development is of paramount importance, given the growing call that research should be demand driven *i.e.* research which is carried out to sort prevailing pressing problems in the communities. For long, universities have been conducting laboratory experiment that did little to solve real problems faced by the communities.

While lack of financial support for research in the universities came out as one of the major issues impeding interaction with the outside social partners, involvement of students could be a way of solving this problem in the short run. This is due to the fact that students' research projects are part of the

curriculum suggesting that despite lack or inadequate financial resources, students still need to carry out research project to complete the syllabus which is part of the academic assessment. Undergraduate students at both universities - LUANAR and MZUNI are sent on workplace attachments to several stakeholders (government and non-governmental) throughout the country at the end of their third year. In the course of their attachments, they also conduct their respective research projects.

Furthermore, undergraduate research projects do not require huge budgets suggesting why it is even economical involving students in bigger projects as has been the case at both universities such as the CARP fish project and the GEF project at LUANAR and MZUNI respectively. It is interesting to note that the findings from these small studies provide significant innovation towards the uplifting of the socioeconomics of the rural surrounding communities.

5.5 University and community enablers and constraints on innovation to improve livelihoods in informal settings

5.5.1 Enablers of Innovation

In all the three case studies, an enabling environment was critical in the name of University Policy. It was observed that the key mandates of the University (teaching, research and outreach) allowed academics to engage with communities outside the university. A clear policy on outreach encouraged academics to engage with surrounding communities in research and outreach activities. This however was not matched with budgeted items from the university budget. Research and outreach activities tended to rely on external funding without direct financial contribution from the University. This has to change and the university should set aside financial resources to deliberately support research and outreach programs of the faculty members.

Another key enabler across the cases was the social conscience of the academic to practice what he/she knows and pass knowledge and skills to the community for their direct benefit. Unique to the botanicals case study and implied in the other cases was that by addressing many of the farmers' needs (livelihood, household income, food security, nutrition and employment creation) ensured that communities identified with the projects and ensured their participation.

To ensure that communities take up the interventions as their own, community participation was critical and often led by example by traditional leaders across the cases. The involvement of many actors ensured that expertise was spread out and readily available to communities when need arose as was observed in the dairy and fish farming case studies. The linkage among the university staff, NGOs and government offices made all the difference. The need to interface with government structures at district and area level was critical in the success of the projects. Government officials in the forms of extension workers, veterinary officers, animal husbandry officers played significant roles in reaching grass roots farmers.

Unique enablers to the dairy case study included previous engagement with the communities, desire to generate new knowledge, existence of subject matter specialists in the area as bridges to interactions, strong project ownership by the communities, strong group dynamics and high demand from communities to be part of the project which saw the manifestation and successful implementation of the dairy engagement. Similarly, the fish project relied on the presence of lead fish farmers in the area and multi-faceted project approach as additional enablers to anchorage of the project. Intellectual motivation was crucial to the execution of the botanicals interaction, alongside that farmers owned the project since they were involved in all aspects of the project implementation leading to sustainability of the project activities.

5.5.2 Constraints to University Interaction with Outside Communities

The key constraint was the overreliance on external funding for the projects without accessing budget lines from the university budget. If the role of the university is to be enhanced, there is need for the Malawi Universities to contribute financially and in kind to research and outreach programs. The other constraint was the lack of effort to upscale project activities to national level. Most of the interventions topped at local level. Real impact will come when successes at local level is scaled up at district and national levels.

The other constraints in multi-actor settings where university is working with several development partners is to manage expectations within the available prescribed budget and communicating to all parties (NGOs, donors, communities) on what the project can and cannot do. This will minimize frustrations to the point of some leaving.

Lastly, the engagement has often been led by the individual efforts of academics. There is a need to formalize these engagements so that they emanate from an office recognized by the University through which academic staff can engage with outside communities. LUANAR recently appointed a Director of Research and Outreach programs to coordinate all research and outreach activities of the University. By documenting success of such programs, the impact and status of the university will be enhanced.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 UNIID Study Aims and Objectives

University interaction with the outside world is more than industry interaction for innovation and competitiveness. University interactions also include development-oriented interactions between universities and other productive agents, such as those in informal sector, small-scale farmers or community cooperatives. University interaction is more encompassing and includes other social partners like non-governmental organizations (NGOs), community groups, local government and indigenous knowledge producers. A multi-country UNIID Africa study (South Africa, Botswana, Uganda, Tanzania, Malawi and Nigeria) was undertaken to unearth the nature of interactions between University and the outside world. The UNIID Africa project was aimed at promoting a more coherent understanding of the catalyzing role of universities in enabling innovation and creativity in Southern and sub-Saharan Africa, and in addressing bottlenecks to innovations oriented towards improved livelihoods and inclusive development.

UNIID Africa project wanted to document patterns of university interactions with external social partners across the range of higher education institutions; investigate the nature of functioning of knowledge intensive innovation networks that involve universities and external social partners in different sectors; document interface structures, organizational arrangements and motivations that support and facilitate interactions involving universities and broad range of social actors just to mention a few. The current Malawi research report presents the empirical evidence on the nature of interactions with external social partners in two case study universities; their implications for the national system of innovation and the potential role of universities in inclusive development in Malawi context.

Two universities (LUANAR and MZUNI) were selected for case studies of mapping interactions between universities and external social partners in Malawi. Lilongwe University of Agriculture and Natural Resources (LUANAR) is an *agricultural university* set in a rural setting; while Mzuzu University (MZUNI), which is a conventional university and set in the peri-urban setting. As Malawi's economy is agro-based, agriculture and natural resource management, value addition and promotion of agricultural innovation in general is a key to growth and improvement of livelihoods and hence the selection of these two universities.

The overarching objective of the Malawi research component was to investigate the manifestation of universities' community engagement as they interact with external social partners, especially marginalized communities with the strategic aim of promoting innovation for inclusive development. The specific objectives of the study were (1) to review the role of HE in Malawi in the NSI; (2) to investigate the role of higher education systems (universities) in marginalized rural communities; (3) to ascertain how different types of universities in Malawi are organized and structured for interaction with external social partners, and marginalised communities; (4) to highlight the emerging instances of university-external social partner interaction that promote innovation for inclusive development; and (5) to identify the possible enablers and constraints on innovation that enhances livelihoods in informal setting.

6.2 Conclusions

The conclusions of this research are based on the results from the analyses of the major policy frameworks and their thrust relative to building an NSI to address the development challenges of poverty and a rain-fed led small-holder agriculture based economy in Malawi; of mapping of interaction of universities with local communities in order to innovate to address the communities' livelihoods problems; and of case studies of academics' interaction with marginalized communities to enhance livelihoods in which the communities plays a role in design and intent of the projects as enshrined in the innovations for inclusive development paradigm.

6.2.1The national system of innovation and higher education system

Malawi has the National policies and frameworks in place for STI development. Malawi has a distinctive NSI which is multi-layered, not well coordinated and often times disjointed. The NSI comprises of public institutions (ministries, parastatals and public universities); nongovernmental organizations (NGOs) and faith-based organizations (FBOs). These non-state actors (NSAs) are vital in poverty reduction efforts, food security and technology transfer. NSAs do very little research and often partner with public university as STI knowledge and technology partners in developing, testing and evaluating technologies.

The private sector in Malawi is also involved in application of STI through research and development but is yet to foster lasting partnerships with public universities given Malawi's low manufacturing base and limited research funding to promote STI and research. The little research that is carried out in public universities is externally-driven and not entrepreneurial-driven from industry. Malawi public universities are strongly aligned to agriculture, natural resources and smallholder farmers but are weakly aligned with commercial farmers and industry.

6.2.2 Patterns of university interaction with external social partners

Universities are at the centre of community development through their interaction with communities. The nature of the interaction very much depends on the mandate, culture and history of the public university. LUANAR is good at interacting with local agricultural communities informally while Mzuni often interacted with schools and other universities. Major outputs of interaction include skilled graduants, dissertations and academic publications. The channels of information are academically inclined such as public conferences, seminars or workshops, and students and not the best way to reach communities and marginalized groups.

Observed interactions resulting in innovations included knowledge transfer and generation, processes and improved organizational structures. It has also led to technology change, knowledge intensification, skills transfer, training and capacity development.

Research and outreach activities contribute to university visibility and reputation, income generation, the development of infrastructure and acquisition of vehicles, facilities and equipments for faculties and departments.

6.2.3 Enablers of innovation

The University Policy on social engagement has created an enabling environment for academics to engage with communities outside the university in line with key mandates of the University (teaching, research and outreach) but was not matched with financial resources from the university budgets. Research and outreach activities relied on external funding without direct financial contribution from the University or government.

Intellectual motivation and social conscious of the academics was a second key enabler. Academics teamed up and practiced what they know and passed knowledge and skills to the community in a demand-driven participatory way for the direct benefit of the communities. NGOs and government district officials worked closely with university staff to reach the grassroots in this quest.

6.2.4 Constraints of innovation

Limited financial resource within the university budget was the main obstacle to social engagement with communities. Government subvention does not provide seed money to the universities for research and outreach activities instead academics rely on external funds for research and outreach activities.

Lack of enabling infrastructure (transport, equipment and facilities) and formal markets for products of innovations also constrain uptake of innovations. At community level traditional beliefs not founded on science were also a hindrance to adoption of proven technologies (*e,g*. artificial insemination).

6.3 Recommendations

From the results of this study, a number of recommendations are made:

1. Universities should set aside operational budget support for academics who wants to engage in research and outreach with marginalized communities. Government must include research and outreach funding in subvention to public universities.

2. Universities should deepen their interaction with commercial farmers and manufacturing industry in order to tap financial resources from industry in an enterpreneural win-win arrangement.

3. Universities should develop a deliberate national policy on university interaction with external social partners. This should be part of a strategy to ensure that community engagement function of the universities deliver innovation that uplifts lives of people that are often marginalized or excluded from the formal sector economic activities.

4 Knowledge transfer between universities and communities is a two-way process where university staff and communities can learn from one another. Projects or interventions that universities plan to carry out with communities should be sustainable, suitable, inclusive and mutually beneficial.

5 For sustainable local engagement, universities in their interaction with communities should work closely with government structures, local NGOs and private sector where relevant. Nongovernmental organizations (NGOs) and Community Based Organizations (CBOs) would easily achieve their community developmental goals by closely working with universities. Universities will develop, test and evaluate knowledge, innovations and technologies while

NGOs and CBOs can provide proven local knowledge, financial resources and help disseminate technologies.

6 University managers should be in the fore front of university interaction with surrounding communities through development of appropriate university policies that encourages community-based demand –driven research and outreach activities.

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