Pro-poor Innovations? Determinants of Adoption of the Black Australorp Chicken Breed and Application of the Innovation Platform Concept in Malawi[1]

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List of Abbreviations Used

AIS	Agricultural Innovation System
ASWAp	Agriculture Sector Wide Approach
BA	Black Australorp
CTA	Technical Centre for Agricultural and Rural Cooperation ACP-EU
DAHLD	Department of Animal Health and Livestock Development
DFID	Department for International Development
DoI	Diffusion of Innovations
EPA	Extension Planning Area
FAO	Food and Agricultural Organisation
GDP	Gross Domestic Product
HDI	Human Development Index
IS	Innovation System
MoA	Ministry of Agriculture
MoAFS	Ministry of Agriculture and Food Security
NSO	National Statistical Office
RIU	Research into Use
SADC	Southern Africa Development Community
STS	Science, Technology and Society
ST system	Socio-technical-systems
UNDP	United Nations Development Programme
UNU-MERIT	United Nations University Maastricht Economic (and social) Research (and training) centre on Innovation and Technology

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1.0 Abstract

Agriculture is the economic backbone of most developing countries including Malawi. Introduction and promotion of externally developed agricultural technologies and application of the innovation system concept are considered crucial tools for enhancement of pro-poor agricultural productivity However, despite introduction of agricultural technologies, agricultural productivity among smallholders continues to be dismal and adoption rate of some technologies is far from satisfactory. Recently, application of the innovation system concept in agriculture is being promoted but studies on its appropriateness as a pro-poor approach in agricultural development is limited. My study focus is about the notion of "pro-poor agricultural technology" and the challenges associated with identifying, developing and promoting it. To understand this aspect, I will explore determinants that influence adoption (including adoption and discontinuance, non-adoption) and innovation processes of exogenously perceived pro-poor agricultural technologies in developing countries using the introduction of the Black Australorp breed in Malawi as a case study. I will also explore prospects of applying the Innovation Platform concept in the development, transfer, diffusion and promotion of agricultural technologies in the smallholder poultry sector from a pro-poor perspective drawing on lessons from pig innovation platforms used in Malawi. This paper outlines a brief background, theories and the methodological framework underpinning my research study .

2.0 Introduction

Malawi is one of the least developed countries in the world. It is primarily an agro-based economy with a population of 13,066,320 people (NSO, 2008) where 92% of the population live in rural areas (MoAFS, 2010). Approximately 85% of the rural population are resource poor subsistence farmers (MoA, 2006). According to World Development Indicators, Malawi is categorised within the low human development category with a Human Development Index (HDI) of 0.400.

Selected demographic characteristics of poverty in Malawi are shown in Table 1 below:

Table 1: Selected poverty indicators for Malawi

Indicator	Levels	Source
% below poverty line	73.4	UNDP, 2011
% living in severe poverty	40.4	UNDP, 2011
% affording more than three meals per day	56	NSO,2009
Life expectancy, yrs	54.2	UNDP, 2011
Human Development Index (HDI)	0.4	UNDP, 2011

The poverty situation as portrayed herein underscores the significance of evaluating interventions such as introduction of technologies in relation to their impact on poverty.

2.1 Agriculture and poverty

Agriculture is generally recognised and used as a tool to spur economic growth, reduce poverty and improve food and nutrition security and livelihoods in most poor developing countries (World Bank, 2010; MoAFS, 2010). In Malawi, agriculture accounts for 80% of the total workforce, over 80 per cent of foreign exchange earnings and 39% of gross domestic product (NSO, 2010; World Bank, 2010). The Malawi agricultural sector is dominated by crop production (with maize as the staple food crop and tobacco, cotton, coffee tea and sugar as cash crops) and complimented with livestock production (cattle, goats, pigs, poultry, and sheep). Majority of the farmers practice subsistence type of farming while few are involved in commercial farming enterprises (MoAFS, 2010). Over 70% of the agricultural output comes from rural smallholder producers (MoAFS, 2010). This category of people is therefore a target for agricultural interventions.

2.2 Livestock Production and Poverty Interface

Although largely ignored in many developing countries, the livestock sector (including poultry), plays a significant role in poverty reduction, food security and livelihoods (FAO, 2011; Sandford and Ashley, 2008; Randolph et al, 2007). Livestock is a traditional source of income; acts as a safety net (Livestock in Development, 1999) and contribute 12.9% of the global calories and 27.9% of protein (FAO, 2011). In Malawi, livestock contributes about 36% of the total value of agricultural products and about 8% to the total GDP (MoAFS, 2008). It is estimated that 60% of Malawians own one or more type of livestock (NSO, 2007).

2.2.1 Improving livestock productivity

Efforts to advance and improve productivity of the livestock sector are guided by the Malawi Livestock Policy which emphasises introduction of technologies and innovations such as introduction of improved breeds (MoA, 2006). As stipulated in the Malawi Livestock Policy, the overall goal of the poultry sector in Malawi is: '*....to attain adequate supply, consumption of poultry meat and eggs and raising of household income. through 'promotion of .... commercial breeds for meat and egg production and conservation of indigenous breeds of chickens'* (MoA, 2006, p.9). Promotion and introduction of other breeds was necessary because productivity of the local chicken was perceived to be very low. According to Kadigi *et al* (2001), local indigenous chickens are characterised by slow growth rates, low carcass weights (299g at 8 weeks of age) and low egg production (less than 50 eggs/hen/year).

However, adoption of most technologies has been low and performance of the sector has been far from satisfactory (Banda, 2006). An understanding of factors influencing success or failure of interventions such as introduction of new technologies to increase productivity is therefore crucial.

2.2.2 Rationale for the Study

My research is about the notion of "pro-poor agricultural technologies or innovations" and the challenges associated with identifying, developing and promoting them'. This topic is important because poverty reduction and food security strategies in sub-Saharan Africa, including Malawi, are predicated on increased agricultural productivity, with the introduction of technology being the cornerstone of productivity enhancement. To understand this, I will

focus on the determinants of the diffusion and adoption of the BA breed among smallholder farmers in Malawi.

The Government of Malawi introduced the Black Australorp (BA) breed to increase productivity of the local chicken through crossbreeding in the 1950s. The BA breed has Australian and English origins (Hams, 1978). The Government of Malawi is currently the key actor responsible for multiplication, distribution and promotion of the BA breed. The target clientele are resource-poor smallholder farmers most of whom live in rural areas (Ministry of Agriculture, 2006). for use by poor smallholder poultry farmers. By implication, the Government of Malawi considers the BA breed as a pro-poor 'appropriate and cost effective' technology that can have an impact on poor smallholder farmers (MoA, 2006).

Table 2. Malawi Livestock Population Estimates 2010/2011

Livestock Specie	Population, 2010	Population, 2011	Unit per capita, 2011[2]
Beef cattle	102,7397	1,060,221	0.08
Dairy cattle	42,457	50,339	0.00
Goats	3,893,922	4,442907	0.34
Sheep	214,230	228,649	0.02
Pigs	1,861,503	2,160,670	0.17
Indigenous chickens	18,813,710	21,683,889	1.67
Broilers	15,625,824	16,627,188	1.28
Layers	5,034,891	5,635,298	0.43
Black Australorps	579,353	725,711	0.06
All chickens	40,053,778	44,672,086	3.44
Rabbits	894,025	991,979	0.08
Guinea Fowls	1,172,683	1,350,585	0.10
Turkeys	120,170	145,486	0.01

Source: Department of Animal Health and Livestock Development (DAHLD), 2011.

[2] Based on 2008 National Population figures (NSO, 2008)

However, despite its introduction more than 60 years ago, the population of BA birds is very low suggesting low adoption rates. Currently, Malawi has a population less than 0.8 million BA birds compared to other breeds (see Table 2).

Using the 2008 population census (NSO, 2008), the per capita ownership of BA breed birds is at a paltry 0.06 birds. Gondwe *et al* (2001) also reported that only 0.6% of the population surveyed kept (hence adopted), Black Australorp birds. But why is the adoption of the BA breed low despite government efforts to introduce and promote the breed all these years? Available, though scanty literature on the Black Australorp breed in Malawi suggests that research has primarily concentrated on quantitative parameters such breeding and performance testing and ignored socio-technical aspects such as diffusion processes (Kadigi *et al*, 2001; Gondwe *et al*, 2001). These studies do not explain why the adoption rate is so low. This type of empirically generated information is lacking in Malawi, hence this case study will produce new and relevant data.

The key argument of my research is that without a detailed, context-specific, socio-technical analysis, the notion of "pro-poor technology" and the determinants affecting adoption of the BA technology in Malawi cannot be established. The BA breed like other agricultural technologies, may have a positive role to play in the lives of smallholder farmers in Malawi. However, the capacity of the technology to bring about productive change may be unrealised, so missing the targets for development, for reasons that are poorly understood by those promoting the technology. In this case, it is important to assess whether the conditions for a successful intervention are present. Leach and Scoones (2006) argued that 'technological choices and strategies for promoting technology uptake have to be attuned to local livelihoods, knowledge and social impacts' (p.25).

2.3 Contemporary approaches: innovation system perspective

Although not endogenous to developing countries, use and application of the innovation system approach or framework is currently considered crucial if farmers and the agriculture sector are to cope, exploit and compete in rapidly evolving technical and economic conditions (Hall, Mytelka and Oyeyinka, 2006, World Bank, 2006; Spielman, 2005; Hall *et al* , 2010).

In Malawi, the Department for International Development (DFID, UK) funded Research Into Use (RIU) Programme (RIU, 2011) has been promoting the Innovation Platform Concept in the pig sector where farmers use exotic imported pig breeds. However, this approach is not currently used in the smallholder sector. Spielman (2005, p.2) argued that there is little evidence on the application of the innovation systems framework in the agriculture sector in developing country agriculture as a solution to the complex challenges facing the sector. Leach and Scoones, 2006) argued that there is urgent need to develop and explore a relevant approach or framework that can be used to enhance diffusion and adoption of technologies that address pro-poor locally embedded priorities, perspectives and concerns (Leach and Scoones, 2006) cannot be over emphasised. I therefore intend to derive lessons, explore potential benefits and prospects of the innovation system concept or framework using innovation platform concept as a '*pro-poor approach*' in the diffusion and application of the technologies in the smallholder poultry sector.

2.4 Overarching Research Question

The overarching research question being addressed by this research study is as follows:

> *Considering the complex, dynamic and diverse settings of smallholder poultry farmers, what type of pro-poor 'innovative' pathways or approaches (alternatives) can be developed or adapted to ensure sustainable smallholder production innovation systems?*

From this perspective, I argue against the dominant narrative and perspective of 'technological fixes' as a panacea to agricultural related constraints and route to improved livelihoods of poor smallholder farmers in developing countries is not enough.

2.5 Aim

The aim of this study is therefore 'to explore the notion of "pro-poor agricultural technology or innovation" and the challenges associated with identifying, developing and promoting it'.

To achieve the aforementioned aim and address my key question, I will:

- Review the debate relating to the role of the smallholder poultry production sector and improving livelihoods of poor households in Malawi and developing countries in general.

This will include exploring different understandings, meanings and framings of technologies and innovations in relation to smallholder poultry production and any policy implications.

- Undertake an analysis of the smallholder poultry sector in Malawi and how it has changed over the last 10 years.

To understand the above processes and dynamics and to gain specific insights, I will undertake a case study and draw from the experiences of smallholder poultry farmers with special reference to farmers' experiences and determinants underpinning diffusion, adoption and innovation processes of the BA breed technology in Thyolo District, Malawi.

2.6 Contribution to new knowledge

Ultimately, my research topic links to and engages with debates about the nature and characteristics of "pro-poor technologies and/or innovations"; appropriate methods for introducing and promoting new technologies; and links between poverty reduction and agricultural productivity.

3.0 Theoretical Framework

The background to my conceptual framework originates from a Science Technology and Society (STS) perspective: a view that 'society shapes technology (the social shaping of technology) in contrast to the view that 'technology shapes society' and that and the assumption that technical change happens independent from society and social issues (MacKenzie and Wajcman, 1999), economic and political forces or social relationships (Wyatt, 2007). I argue that adoption of the BA breed 'may be' shaped and influenced by economical, social, political, cultural or technical factors (MacKenzie and Wajcman, 1999).

3.1 Innovation and Innovation Systems (IS) Approach

Innovation can be defined as 'new combinations ...of existing knowledge through a creative mind and intellectual efforts or an ongoing process of learning and searching aimed at creation of development of new products, new techniques, new forms of organisation and new markets. (Lundvall, 1992). On the other hand, an innovation system (IS) can be defined as:

'..a network of organizations, enterprises, and individuals focused on bringing new products, new processes, and new forms of organization into economic use, together with the institutions and policies that affect their behaviour and performance (World Bank, 2006:vi).

Key characteristics of innovation system approaches include a holistic and interdisciplinary perspective, emphasis on learning processes, non-linearity and interdependence, role of institutions and encompassing product and organisational or process innovations (Edquist and Hommen, 1999). In general, studies on innovation systems have primarily focussed on firms, industry and inventions on the technological frontier in developed countries (Mytelka, 2000). However, in recent times, use and application of the innovation system approach is considered crucial considering the rapidly evolving technical and economic conditions of the agricultural sector (Hall, Mytelka and Oyeyinka, 2006, World Bank, 2006) by going beyond the traditional research-extension-farmer linkages approach (Hall et al, 2010). Using this framework will allow me to conduct a holistic and contextual analysis of determinants of the BA breed adoption.

3.2 Diffusion of Innovations (DoI) Theory

Many factors affect adoption of agricultural technologies or innovations. These include complexity of the technology, land user's beliefs, opinions towards the innovation (Guerin, 1999), characteristics of user, the transfer and adoption process, role of extension agents, perceived and demonstrable benefits to users', effective networks, (AusVet, 2006) and adaptability of technologies to local conditions (Poulton, 2011). Rogers (2003) summarised attributes of innovations as relative advantage, compatibility, trialability, observability and complexity (Rogers, 2003; p.16). From the foregoing, adoption and technical performance of a technological innovation cannot be isolated from contextual settings or pre-existing circumstances (Glover, 2009) which can be technical, social, economic and institutional in nature (Smale et al, 2006). According to Geels (2004), technologies should be integrated in users' practices, organisations and routines such as learning and adjusting. Geels (2004) further emphasises the significance of inter-linkages between elements and integration of the 'social' and 'technical' aspects of innovation using the socio-technical-systems (ST-systems) perspective.

3.3 Social Technical Systems

The socio-technical systems concept has been defined as:

> *'....encompassing production, diffusion and use of technology .....as the linkages between elements necessary to fulfil societal functions…….Social technical systems…….consist of artefacts, knowledge, capital, labour, cultural meaning' (Geels, 2004).*

The significance of socio-technical systems is that it highlights the significance of diffusion and utilisation of technologies and fulfilment of societal functions (Geels, 2004). Drawing from this perspective, I will therefore also explore determinants of the diffusion and use (adoption) of the BA breed. This perspective will therefore complement the IS approach and attributes of innovations in the diffusion process. Ultimately, my study is underpinned and informed by multi-paradigmatic perspectives of innovation theories (innovation system framework – actors, functions, habits, interactions, linkages; diffusion of innovation theory – attributes of innovations and socio-technical systems- development, diffusion and use of technologies).

4.0 Methodology

My research will be qualitative in nature. From an epistemological point of view, qualitative research is an interpretivist strategy with emphasis on 'the understanding of the social world through an examination of the interpretation of that world by its participants' (Bryman, 2008, p.366). Lister (2004), arguing from pro-poor perspective, indicated that qualitative research can be used to uncover meanings and provide insights into the experience of poverty that may have important implications for the development of policy (Lister 2004) thereby giving the poor a 'voice' on issues that concern them . I will therefore use this approach to uncover responses of farmers to the introduction of the BA breed.

4.1 Research Strategy and sample population

The research strategy to be used in this research will be a case study. My case study will focus on smallholder poultry farmers from Dwale Extension Planning Area (EPA) in Thyolo District, Malawi. My sample population will include adopters of the BA breed, non-adopters and those who adopted but discontinued use of the BA breed. It is envisaged

that this process will provide me with a good insight of the adoption process, experiences and responses from three different perspectives. To get insights on experiences and lessons learned from the Livestock Innovation Platform concept, I will collect data from small-scale pig farmers participating in the Pig Innovation Platform under the Mulanje Pig Producers Association. Key actors involved with both the BA technology and the Innovation Platform will be identified and selected through the snowball sampling method (Bryman, 2008. A minimum of 35 actors will be interviewed.

4.2 Data collection tools

Data will be collected through examination of documents, focussed semi-structured interviews using interview guides and focus group discussions. Both semi-structured and focus group interviews will be audio-recorded and transcribed verbatim for analysis.

4.3. Data Analysis

Data analysis will involve thematic coding of transcripts. Where necessary, data will be analysed using Nvivo 8, a Computer Assisted Qualitative Data Analysis Software (CAQDAS).

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