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The Institutional Economics of Cultivated Mushrooms in Swaziland: a Study on Value chains, Transaction Costs and Collective Action
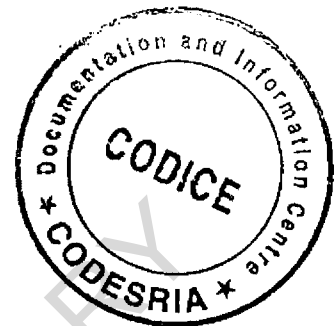
November 2013

THE INSTITUTIONAL ECONOMICS OF CULTIVATED MUSHROOMS IN SWAZILAND: A STUDY ON VALUE CHAINS, TRANSACTION COSTS AND COLLECTIVE ACTION

by

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Submitted in fulfilment of the academic requirements for the degree of
Doctor of Philosophy, Agricultural Economics

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Pietermaritzburg
November 2013

ABSTRACT

This study focuses on commercial mushroom production, a relatively new economic activity in Swaziland that seeks to assist rural-based small-scale farmers to diversify and improve their economic independence and livelihoods. The mushroom programme is in line with the National Development Strategy, which, among its major objectives, aims to address poverty-related challenges through the promotion of non-conventional high-value agricultural commodities that have not been explored by local farmers despite having a relatively high consumer demand in local and international markets. In attempting to provide an impetus to the mushroom industry, the Swaziland government currently offers free training in mushroom production, extension services, high quality spawn at a very nominal fee, and free substrate bags. Considering the geographical suitability and the magnitude of investment made towards the mushroom development programme, there is a need to understand why many farmers are not participating in the industry, and why Swaziland still imports more than 95 percent of locally consumed cultivated mushrooms. There has also been no research so far on the challenges and opportunities in producing, value adding, and marketing of mushrooms in Swaziland. This study was, therefore, an attempt to address these knowledge gaps. It also provided an opportunity to draw relevant policy and management implications to inform future strategies in the industry. The specific objectives of the study were to: (i) identify and examine the factors that influence households' decisions to participate in mushroom production; (ii) study the underlying mushroom production and market access constraints; (iii) examine the effects of transaction cost factors that influence mushroom producers' market channel choice decisions and the quantity of mushrooms sold in selected channels; and (iv) study the effects of organisational form on producers' participation in collective responsibilities.

Using cross-sectional data gathered from mushroom producers and non-producers, the results of the Two-Stage Conditional Maximum Likelihood and Two-Stage Probit Least Squares estimation methods revealed that farmers' decisions to participate in the mushroom enterprise are mainly influenced by institutional factors. Farmers who have undergone training in basic oyster mushroom production, are located in close proximity to input and output markets, and have positive perceptions towards mushrooms, are likely to participate in the mushroom industry. The development of positive perceptions towards mushrooms is predominantly influenced by the knowledge gained on their nutritional and therapeutical properties.

The value chain approach was used to identify the underlying factors constraining mushroom production and producers' participation in mainstream markets. Among the important findings, the study showed that producers' plans to expand production capacities are hampered by the difficulty to access key inputs and services, which are centralised and fully controlled by the government. Generally, local farmers produce below capacity in relatively small low-cost structures, which are also not well equipped. As a result, farmers apply very primitive management methods that eventually affect their productivity. These constraints are partly responsible for the extremely low locally produced volumes and inconsistent market supply, prompting local mushroom traders to rely on imports. Other constraints relate to the lack of diversification as farmers currently produce only the oyster mushroom, yet consumers are mostly interested in the button mushroom, which is favoured for its appearance and taste.

Currently, no cultivated mushrooms are exported from Swaziland and producers have not yet engaged in any form of mushroom processing. Instead, from what they harvest, it was found that about six to 10 percent is consumed at household level and the remainder sold through four channels identified as: (i) the farm gate; (ii) retail market (supermarkets); (iii) middlemen; and (iv) food services industry (restaurants/hotels). Among the four channels, the retail market and farm gate were, respectively, identified as the most preferred. Between the two, the retail market offers a comparatively higher producer price and a relatively more dependable market. Cragg's regression results revealed that producers who are likely to supply the retail market are those who manage a relatively large number of spawn impregnated bags, have a high labour endowment, own cold storage facilities, and are affiliated to mushroom producing groups. However, the difficulty in accessing market information and lack of bargaining power significantly constrains other producers' plans to supply the retail market; hence, they end up selling through less remunerative channels, such as the farm gate. Producers' decisions on the quantity of mushrooms supplied through the retail market are significantly affected by the difficulty in accessing transport and uncertainty about meeting the retailers' quality requirements.

Over 90 percent of mushroom producers in Swaziland currently participate in the industry through farmer groups. These groups are predominantly organised in two forms, depicted as model A and B, respectively. In model A, besides establishing their own by-laws, members produce mushrooms in one growing house where they share the costs and benefits of all pre-production, production and marketing activities. In model B, members also establish their
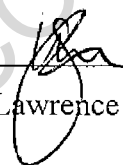
own by-laws and share all pre-production activities. However, instead of producing under one roof, each member manages his/her own growing house and members are at liberty to make their own marketing arrangements independently. The results of the Propensity Score Matching method indicated that producers affiliated to model B groups have significantly higher levels of cooperation, which is evidenced in making joint decisions and performing shared manual activities. Participation in such groups also improves producers' knowledge of the enterprise, and reduces the likelihood of internal free-riding.

The overall results of the study point to the need to strengthen farmer training in mushroom production and value-addition. In attempting to improve producers' access to key inputs and services, it is recommended that the government should relinquish its position (to the private sector) as the only provider of these services, allowing public institutions to assume a monitoring role. Producers' competitiveness and sustainable participation in the mushroom value chain can be enhanced by institutionalising and strengthening collective action, which can possibly enable them to achieve economies of scale benefits in the input and product markets, and improve their bargaining position. As indicated in the empirical chapters, market availability for mushrooms is not a challenge in Swaziland. However, the lack of a market information system, expert assistance in agribusiness management, poor value chain governance, and lack of vertical coordination, predispose producers to high marketing and transaction costs such that they end up selling through less remunerative marketing channels.

DECLARATION 1 - PLAGIARISM

I, *Majola Lawrence Mabuza*, declare that:

1. The research reported in this thesis, except where otherwise indicated, is my own original research.

2. This thesis has not been submitted for any degree or examination at any other university.

3. This thesis does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from those persons.

4. This thesis does not contain other persons' writing, unless specifically acknowledged as being sourced from other researchers. Where other written sources have been quoted, then:

    a. Their words have been re-written but the general information attributed to them has been referenced; or

    b. Where their exact words have been used, their writing has been placed inside quotation marks, and referenced.

5. This thesis does not contain text, graphics or tables copied and pasted from the internet, unless specifically acknowledged, and the source being detailed in the thesis and in the References section.

Signed:_____   Date:__19/02/2014__

Majola Lawrence Mabuza

Signed:_____   Date:__19/02/2014__

Professor G.F. Ortmann (Supervisor)

Signed:_____   Date:__19-02-2014__

Dr E. Wale (Co-supervisor)

DECLARATION 2 - PUBLICATIONS

The following publications (submitted, *in press*, and published) form part of the research presented in this thesis.

Publication 1 – Chapter 3 of this thesis

Mabuza, M.L., Ortmann, G.F. and Wale, E. 2012. Determinants of farmers' participation in oyster mushroom production in Swaziland: Implications for promoting a non-conventional agricultural enterprise. *Agrekon* 51(4):19–40.

Publication 2 – Chapter 4 of this thesis

Mabuza, M.L., Ortmann, G.F. and Wale, E. 2013. Socio-economic and institutional factors constraining participation of Swaziland's mushroom producers in mainstream markets: An application of the value chain approach. *Agrekon* 52(4):89–112.

Publication 3 – Chapter 5 of this thesis

Mabuza, M.L., Ortmann, G.F. and Wale, E. (*in press*). Effects of transaction costs on mushroom producers' choice of marketing channels: Implications for agricultural market access in Swaziland. *South African Journal of Economic and Management Sciences.*

Publication 4 – Chapter 6 of this thesis

Mabuza, M.L., Ortmann, G.F. and Wale, E. Does organisational form of farmer groups affect producers' participation in collective responsibilities? Evidence from smallholder mushroom producers in Swaziland. Currently under review with the *International Journal of Rural Management.*

The data collection, analyses, and discussion of empirical results for all the above-listed publications were conducted in their entirety by M.L. Mabuza with technical advice from Prof. G.F. Ortmann and Dr E. Wale. All figures, tables, and graphs were produced by same, unless otherwise referenced in the respective publications.

DEDICATION

This thesis is dedicated to the memory of my late parents.

ACKNOWLEDGMENTS

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LIST OF ABBREVIATIONS AND ACRONYMS

ANOVA	-	Analysis of Variance
ATT	-	Average effect of Treatment on the Treated
CASP	-	Comprehensive Agriculture Sector Policy
CBS	-	Central Bank of Swaziland
CDI	-	Crop Diversification Index
CP	-	Consumer Price
CSO	-	Central Statistics Office
DFI	-	Development Finance Institution
E	-	Emalangeni
EU	-	European Union
FAO	-	Food and Agriculture Organisation of the United Nations
FINCORP	-	Swaziland Development Finance Corporation
FSP	-	Food Security Policy
FSTU	-	Food Science and Technology Unit
GCC	-	Global Commodity Chain
GDP	-	Gross Domestic Product
GLOBALG.A.P	-	Global Good Agricultural Practice
GM	-	Gross Margin
GoS	-	Government of Swaziland
GVC	-	Global Value Chain
HIV	-	Human Immunodeficiency Virus
HVA	-	High-Value Agriculture
HVAC	-	High-Value Agricultural Commodity
IFAD	-	International Fund for Agricultural Development
ITC	-	International Trade Centre
ITF	-	Individual Tenure Farm
KWh	-	Kilowatt hour
LD	-	Livestock diversification
LR	-	Likelihood Ratio
MDU	-	Mushroom Development Unit
MIS	-	Market Information System

MM	-	Marketing Margin
NAMBoard	-	National Agricultural Marketing Board (Swaziland)
NAMC	-	National Agricultural Marketing Council (South Africa)
NDS	-	National Development Strategy
NEPAD	-	New Partnership for Africa's Development
NGO	-	Non-Governmental Organisation
NIE	-	New Institutional Economics
OLS	-	Ordinary Least Squares
PCA	-	Principal Component Analysis
PC	-	Principal Component
PP	-	Purchase Price
PRSAP	-	Poverty Reduction Strategy and Action Programme
PSM	-	Propensity Score Matching
RHS	-	Right hand side
SANBio	-	Southern Africa Network for Biosciences
SCP	-	Structure, Conduct and Performance
SID	-	Simpson Index of Diversity
SIDC	-	Swaziland Industrial Development Company
SNL	-	Swazi Nation Land
SP	-	Selling Price
SSA	-	Sub-Saharan Africa
TCE	-	Transaction Cost Economics
TTN	-	Tibiyo TakaNgwane
UNDP	-	United Nations Development Programme
UNIDO	-	United Nations Industrial Development Organisation
US$	-	United States Dollar
VMC	-	Variable Marketing Cost
VPC	-	Variable Production Cost
WFP	-	World Food Programme
2SCML	-	Two-Stage Conditional Maximum Likelihood
2SPLS	-	Two-Stage Probit Least Squares

CHAPTER 1

INTRODUCTION

1.1   Background

Like many Sub-Saharan African (SSA) countries, Swaziland is vulnerable to spells of drought and erratic climatic conditions, which often cause serious food shortages and increasing poverty levels (WFP/FAO, 2005). Despite these challenges, agriculture remains a critical sector in terms of food security and employment creation as it currently employs about 70 percent of Swaziland's total labour force (CBS, 2009). Sugarcane is Swaziland's leading agricultural export earner and has played a major role in stimulating the manufacturing industry, which has recently emerged as the leading contributor to the country's Gross Domestic Product (GDP) (Hassan, 2008; CBS, 2012).

As noted by Levin (1986) and the World Bank (2000), for example, Swaziland's over-reliance on a limited range of agricultural export products has had adverse effects on the country's economic stability. Such effects have become more apparent following the sugar trade reforms by the European Union (EU), which constitutes one of Swaziland's most lucrative markets (Gotor and Tsigas, 2011). In response, the Swaziland government embarked on a review of its policies with the aim of diversifying the country's agricultural export base. Policies were reviewed in line with developing sustainable economic activities likely to have an immediate and direct impact at household level, particularly in the rural areas where 75 percent of the one million population resides, of whom 63 percent live below the US$2/day poverty line (GoS, 2011a). This process culminated in the formation of three policy initiatives in 2005, namely (i) the Poverty Reduction Strategy and Action Programme (PRSAP); (ii) the Comprehensive Agriculture Sector Policy (CASP); and the (iii) Food Security Policy (FSP). Central in these policy instruments, which are all in line with the National Development Strategy (NDS) (see GoS, 1999), is a strong advocacy for investment in local production of high-value agricultural commodities (HVACs) that have not been explored by local farmers. These are commodities that do not form part of customary diets of the local population, but are mainly grown for their cash values in domestic and export markets (Jaffee and Morton, 1995; Temu and Temu, 2005).

HVACs have a relatively high income elasticity of demand and are favourable for expanded trade and value-adding activities (Teklu, 1996; Kumar *et al.*, 2011). The World Bank (2005) reported that in the mid-2000s, international trade in HVACs grew by seven percent per year compared to two percent for starchy staple commodities (e.g. cereals, roots and tubers). Most high-value agricultural enterprises are labour-intensive, have low gestation periods, and are capable of generating quick returns. As such, they provide substantial opportunities for rural employment creation, enhancing farm incomes, and reducing poverty in developing countries (Birthal and Joshi, 2009).

The demand for HVACs in developing countries is largely attributed to increased urbanization, which underlies the changes in people's diets (Rao *et al.*, 2006; Gulati *et al.*, 2007). Despite being the least urbanised continent, Africa has the highest growth rate of urbanisation (Njo, 2003). For instance, between 1980 and 1991, Africa's urban population grew at an average annual rate of about six percent such that by 1991 Africans residing in urban areas were about 29 percent of the population, increasing to 38 percent in 2007 (World Bank, 1993; United Nations, 2008). In Swaziland, the urban population rose from four percent in the 1960s to about 35 percent in 2007 (Miles, 2000; CSO, 2008). Rapid urbanization raises the problem of securing urban food and nutritional supplies. While urban agriculture could have a role to play as a source of food for urban dwellers (Obosu-Mensah, 1999), this may not be attainable in some African countries due to land constraints or the existence of by-laws that prohibit certain agricultural activities in some municipalities (Prain and Lee-Smith, 2010), a situation also found in Swaziland (see Tevera *et al.*, 2012). Notwithstanding such possible limitations, people who migrate to urban areas generally do so in search of better wage employment outside agriculture; hence, even if there are opportunities to engage in agriculture, urban dwellers' attempts may be precluded by the opportunity cost.

Urbanisation in developing countries has led to the gradual emergence of a 'middle-class' category of citizens who enjoy higher disposable incomes compared to their rural counterparts (Louw *et al.*, 2008). Given their circumstances, middle-class citizens are more likely to develop new consumption patterns and preference for processed and convenient (easy to cook) foods, allowing them to have more time for income-earning opportunities and leisure (Teklu, 1996; Popkin, 1999). In addition, as urbanization is also associated with women's participation in the workforce (Miles, 2000), the opportunity cost of time

for women, and their share of household income, can be an important determinant of households' expenditure and food consumption patterns (Hoddinott and Haddad, 1995). Research from developing countries frequently suggests that women participating in the urban labour force have less time available for traditional food preparation and often opt for high-value foods that are relatively easy and quick to prepare (Senauer *et al.*, 1986; Reardon *et al.*, 2003; Carrigan *et al.*, 2006; Gulati *et al.*, 2007). High-value foods are easily accessible from supermarket chain stores, which are better positioned to cater for modern lifestyles. The involvement of such outlets in food retailing provides an opportunity for rural-based farmers to participate in mainstream supply chains, enabling them to potentially generate substantial returns (Weatherspoon and Reardon, 2003; Rickard and Gonsalves, 2008; Emongor and Kirsten, 2009; Minten *et al.*, 2009). Apart from urbanisation, other studies (e.g. Telfer and Wall, 2000; Torres, 2003) have identified tourism as another leading contributing factor towards the economic importance of HVACs given their high demand in hotels, restaurants and other tourist destination areas.

Mushrooms are among the HVACs that have been earmarked by the Swaziland government to spearhead the country's fight against social challenges such as poverty and food insecurity (ITC, 1998; Commonwealth, 2001). Preference in Swaziland is currently given to the oyster mushroom considering its ease of production, less capital cost requirements, and the abundance of substrate materials[1]. First cultivated in Germany in the 1900s (Eger *et al.*, 1976), the oyster mushroom (*Pleurotus* spp) is popular for its fragrant odour and delicious flavour. It is currently ranked among the top three popularly consumed mushroom species in the world after button (*Agaricus* spp) and shiitake (*Lentinula* spp), respectively (Hall *et al.*, 2003; Chang and Miles, 2004). Different from the conventional agronomic enterprises found on customary Swazi Nation Land (SNL) (e.g. maize and beans), which are generally mono-seasonal and rainfall-dependent (GoS, 2002), mushrooms can be produced year-round and do not require large areas of land to grow as they are produced from enclosed structures, whose environment (temperature, light, and humidity) is controlled by the producer.

This form of diversification is capable of mitigating the effects of climate change on rain-fed agriculture (Kandulu *et al.*, 2012). It also provides rural dwellers with an opportunity

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[1] Substrate material refers to any substance on which mushrooms will grow. The substrate performs a similar function as soil in crop production.

to make returns within a short period of time as a single production cycle of maize, for instance, which takes about four to six months, is enough to produce approximately two cycles of oyster mushrooms (Chiroro, 2004). Moreover, there is a wide choice of oyster mushroom species that can be cultivated under different climatic conditions (Sher *et al.*, 2010) using a range of substrate materials, most of which are generated from agricultural, forest, and food processing waste (see Oie, 1991; Ragunathan *et al.*, 1996; Yildiz *et al.*, 2002; Baysal *et al.*, 2003). Given Swaziland's high level of agro-industrialization (based mainly on sugarcane, citrus, and woodpulp) (CBS, 2012), large quantities of waste are generated regularly; hence, cultivation of edible mushrooms could be one viable option for the bioconversion of such materials, which if not utilised can cause environmental hazards (Akavia *et al.*, 2009; Loss *et al.*, 2009).

Compared with other high-value food commodities (e.g. vegetables), cultivated mushrooms have high levels of proteins, vitamins, dietary fibre and inorganic minerals (Mattila *et al.*, 2001; Guillamón *et al.*, 2010). More importantly, they are effective in enhancing the human body's defence against various types of cancers, viral infections (including HIV), diabetes, constipation, and cardiovascular diseases (Wasser and Weis, 1999; Schneider *et al.*, 2011; Roupas *et al.*, 2012). Besides mushrooms' income generating potential through trade (see Marshall and Nair, 2009; Cai *et al.*, 2011), and their high nutritional and therapeutical properties, the enterprise also brings environmental benefits after harvesting. For instance, the spent substrate is valuable as a source of biofertilisers (Sagar *et al.*, 2009; Zhu *et al.*, 2012), growing media for horticultural plants (Medina *et al.*, 2009), and as a source of animal feed (Zhang *et al.*, 1995; Villas-Bôas *et al.*, 2002). Further research has established that the spent substrate can also be used to grow other mushroom species (Royse, 1992), control the spread of nematodes in soils (Thorn and Barron, 1984; Hibbett and Thorn, 1994), and in the production of green energy sources (Li *et al.*, 2011).

In attempting to give the mushroom-growing sector a prominent position in Swaziland, the government (through the Mushroom Development Unit (MDU)) currently offers free training in basic mushroom production, extension services, high quality spawn (mushroom seed) at a very nominal fee, and free substrate bags[2]. This intervention was pioneered by

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[2] Oyster mushrooms are grown from polyethylene bags filled with substrate material.

the United Nations Development Programme (UNDP) in 2001 and has been implemented through a collaboration with the government and Tibiyo TakaNgwane (TTN), a private local entity. Swaziland is also one of the six countries[3] supported by the New Partnership for Africa's Development (NEPAD) to promote mushroom production in Southern Africa as an intervention that seeks to reduce rural poverty and improve the production of medicinal products through mushroom processing. The NEPAD initiative commenced in 2009 and Swaziland participates as a host for a regional mushroom gene bank (SANBio, 2012). However, despite the geographical suitability, and the substantial support received from the public and private sectors, the mushroom industry in Swaziland is still characterised by a wide range of problems that have raised unanswered questions. For instance, periodic reports from the MDU indicate that the number of producers has been fluctuating since the programme was incepted in 2001. A typical case was the decline in the number of producers from 225 in 2004 to 39 in 2008 against an investment of about E4 million[4] made by the government to establish a fully-fledged mushroom laboratory and training facility in Malkerns (MDU, 2009a). There has also been no research so far on the challenges and opportunities of producing, value adding, and marketing of mushrooms in Swaziland. This study is, therefore, an effort in that direction as elaborated in the next section, which presents the detailed research problem and justification. The specific objectives are presented in Section 1.3, and Section 1.4 gives an outline of the rest of the thesis.

1.2   Research problem and justification

While profit margins for the oyster mushroom enterprise have been found to be relatively higher than conventional agronomic crop enterprises such as maize (Chiroro, 2004; Imtiaj and Rahman, 2008), the low level of participation in mushroom production by Swazi farmers poses challenging questions for the programme implementers, policy makers, and Swaziland's development partners. Despite introducing the programme in 2001 and conducting farmer training in several parts of the country, there remains a dearth of empirical information on why farmers have not included the mushroom enterprise in their

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[3] The other five countries include Angola, Malawi, Mozambique, Namibia, and Zambia.
[4] 'E' denotes Emalangeni, the Swaziland currency. E1 = US$ 0.0984 on 4th November 2013 (Central Bank of Swaziland, 2013).

farming systems. Given that mushrooms were not cultivated in Swaziland prior to 2001, the enterprise is relatively new to local farmers and is categorised as 'non-conventional' in Swaziland's agricultural context (Commonwealth, 2001). Since production decisions are normally made at household level, it is important to identify the factors that influence individual households to participate (or not) in oyster mushroom production. A study of this nature is important from a policy perspective as it will provide information on the socio-economic relevance of the enterprise and its acceptability in Swaziland. It will also inform pragmatic interventions required to improve participation of local farmers in the mushroom industry.

Inspite of the availability of niche markets for mushrooms in Swaziland, mainly comprised of supermarket chain stores and the food services sector (hotels and restaurants) (ITC, 1998), the volumes of locally produced mushrooms in such markets have been insignificant; hence, these buyers rely on imported supplies in their quest to meet consumer demands. With South Africa being the major trading partner for a number of Southern African countries, most of the operating supermarkets in Swaziland are sub-branches of South African chain stores. The predominant ones include Pick n Pay, Shoprite, and Spar (Emongor and Kirsten, 2009). Swaziland currently imports over 95 percent of locally consumed cultivated mushrooms, mainly from South Africa, valued at about E2.4 million annually with no recorded exports (Mamba, 2010; NAMBoard, 2012).

Considering that the government aspires to engage more local producers in the industry, it would be logical to identify and address the socio-economic and institutional factors constraining local production, and impeding current producers from participating competitively in remunerative supply chains. Understanding the nature of existing impediments, and how they can possibly be alleviated, will assist programme implementors and policy makers to develop improved implementation strategies required to achieve the programme's overall objective of improving rural livelihoods. While a considerable number of studies have been done in Southern Africa on this subject (see Ortmann and King, 2010, for a review), mushrooms have not featured in the debate and the findings and recommendations of previous studies cannot be generalised because of different commodity characteristics and countries' institutional environments (Delgado, 1999; Webber and Labaste, 2010). This study also differs from previous attempts by using a value chain approach, which reflects on the various activities and institutions involved

from production to the delivery of mushrooms and mushroom products to final consumers (Kaplinsky and Morris, 2001). This approach further enables the study to better identify unexploited opportunities and in response prioritise interventions that can possibly improve operations at various stages of the entire chain (Chitundu *et al.*, 2009; Rieple and Singh, 2011).

Consistent with other agricultural enterprises, mushoom producers can only realise significant benefits from their ventures if they operate within a commercialised setting and have access to remunerative product markets (Delgado, 1999). Such markets, as indicated earlier, are dominated by supermarkets and the food services industry, whose procurement strategies are mainly driven by consumer demands for quality standards and consistency in supply. Attempts to comply with these requirements come with profound challenges for smallholder producers as they are expected to adopt new production and marketing strategies that are generally complex and expensive to finance (Boselie *et al.*, 2003). For instance, producers need information on the safe use of recommended inputs and sustainable production procedures that need to be followed before the commodities leave the farm. The acquisition and processing of such information involve substantial costs, which can easily deter smallholders from venturing into high-value agriculture (HVA) (Narrod, *et al.*, 2009). Mushroom producers in Swaziland have a rare advantage in this regard as such information costs are currently borne by the government, which, as indicated earlier, provides free training and extension services, free substrate bags, and spawn at a nominal fee. However, possible problems are likely to arise in the marketing stage where no form of public or private support is currently rendered to producers. Mushrooms are highly perishable, implying that the marketing stage is invariably associated with a considerable level of transaction costs, which if not contained can ultimately affect producers' competitiveness in the value chain or perhaps increase to a level where markets may be adjudged to be 'missing' (de Janvry *et al.*, 1991).

As opposed to other food commodities that have a longer shelf life (e.g. grains and pulses), mushrooms require rapid and refrigerated transportation to consumption centres or immediate processing into less perishable forms. This limits the period of time during which mushrooms can be marketed as a fresh commodity or used as raw materials in processing. Such conditions normally subject producers to limited marketing flexibility as they often find themselves in an unfavourable bargaining position, particularly against

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buyers who have alternative sources of supply (Jaffee, 1995). Given these observations, it would be worthwhile to identify the forms of transaction costs that characterise the mushroom marketing environment, and study how they influence mushroom producers' channel choice decisions and the eventual quantity of mushrooms sold in selected channels. In attempting to improve the benefits associated with the enterprise, it is also important to identify possible means of reducing transaction costs as they are often considered an embodiment of barriers to market participation by resource-poor producers (Key et al., 2000; Matungul et al., 2001). Given the paucity of empirical studies of this nature in Swaziland, the results in this regard will be instrumental towards improving the general agricultural marketing environment, which constitutes an indispensable element in the advancement of Swaziland's on-going agricultural development programme (see FAO, 2011, for details).

Previous studies indicate that smallholders are less likely to comply with modern supply chain requirements if they are less integrated and less organized, have less physical, social and human capital, lack access to credit, and have no previous experience in high-value supply chains (Kersting and Wollni, 2012). Such factors impede producers from meeting buyers' food safety and quality control requirements, as well as the supply of standardized products on a continuous basis (Henson et al., 2005; Gulati et al., 2007; Narrod et al., 2009). In attempting to address these challenges, small-scale producers engaged in HVA have chosen to produce and market collectively through farmer organisations, an institutional innovation that has been widely accepted in most developing countries (see Kaganzi et al., 2009; Markelova et al., 2009; Mousteir et al., 2010; Shiferaw et al., 2011). Defined by Olson (1965) as the voluntary action taken by a group of individuals who share mutual interests and expect to achieve common benefits, collective action in agriculture raises the possibility for sharing skills and information among members as some could be more experienced and knowledgeable than others (Matungul et al., 2001). Farmers also enhance their chances to access financial services, innovation technology services, and policy advocacy (Delgado, 1999). Furthermore, co-operating partners, including government agencies and other service providers, generally prefer working with groups to individuals as they are able to reduce operational costs while promoting social control to ensure sustainability of interventions (de Haan, 2001).

In their quest to participate collectively in commercial agriculture, producers normally have to decide on the appropriate organisational or group form. Kruijssen *et al.* (2009) posit that in selecting the organisational form, it is important for producers to be considerate of its adaptability and responsiveness to internal as well as external factors. The common farmer organisations in Swaziland take various legal forms such as co-operatives, associations, and companies. However, of late, an increasing number of small-scale farmers have shown a strong preference for informal groups, which are mainly commodity-based and not governed by any legal instrument (Nkambule, 2008). These groups are relatively easy to form, flexible, and responsive to members' shifting needs. Having no externally imposed rules of managing their businesses, informal groups have a relatively wider latitude for decision-making, enabling them to swiftly respond to available opportunities.

Collective action among Swaziland's mushroom producers seems to be a very popular choice such that, currently, over 90 percent participate in the mushroom industry through farmer groups as opposed 'sole proprietors'. These groups operate in predominantly two organisational forms, depicted hereafter as model A and model B. In model A, besides establishing their own by-laws, members produce mushrooms in one production house where they share all pre-production[5], production, and marketing activities. In model B, members also establish their own by-laws and share all pre-production activities. However, instead of producing under one roof, each member manages his/her own production house and is at liberty to make his/her own marketing arrangements independently.

Since the inception of the mushroom development programme, most producing groups have operated using model A, and only recently have others opted for model B. Compared to model A, model B is relatively innovative in that while it embodies the 'traditional' notion of working together, it also allows members to use their individual entrepreneurial abilities in the production and marketing stages. However, the question that this study attempts to address is whether organisational form, as depicted by the difference between the two forms of mushroom producing groups, induces any effects on the performance of collective responsibilities by the members. Such effects (if any) are likely to bring various types of consequences on the groups' cohesion and sustainability. The novelty of this study

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[5] Pre-production activities are labour-intensive. They include substrate gathering, cutting, mixing, bagging, sterilization/pasteurisation, and spawning (see Gwanama *et al.*, 2011, for details).

is that while substantial literature is available on the determinants of small-scale farmers' participation in collective action (e.g. La Ferrara, 2002; Bernard and Spielman, 2009), and whether farmers do benefit from producing and/or marketing collectively (e.g. Wolni and Zeller, 2007; Bernard *et al.*, 2008; Fischer and Qaim, 2012), empirical evidence on the likely implications of organisational form on the members' collective behaviour remains scanty. Given the importance and popularity of collective action within the smallholder farming sector in most developing countries, a study of this nature is potentially beneficial to managers and policy makers of similar development programmes as it provides valuable insights into alternative means of coordinating commercial small-scale interventions.

From the above discussion, it is evident that the mushroom industry in Swaziland is confronted with several challenges that require research-based informed decisions. The overall study's contribution is beyond the provision of policy recommendations for Swaziland as the results could have an important bearing on the promotion of smallholders' participation in the production and marketing of non-conventional high-value agricultural commodities in other developing countries. The specific objectives of the study are presented in the following section.

1.3   Research objectives

The general objective of the study is to unpack the institutional constraints the mushroom industry in Swaziland currently faces and generate policy-relevant information that can possibly improve the mushroom value chain. This is achieved through the following specific objectives:

(i)   Identify and examine the factors that influence households' decisions to participate in mushroom production;

(ii)   Study the underlying mushroom production and market access constraints;

(iii)   Examine the effects of transaction cost factors that influence mushroom producers' market channel choice decisions and the quantity of mushrooms sold in selected channels; and

(iv)   Study the effects of organisational form on producers' participation in collective responsibilities.

These objectives are achieved by employing different conceptual and empirical methods whose results are presented in chapters three to six. The next section presents the outline of the thesis.

1.4   Outline of the thesis

The remainder of the thesis is organised as follows: Chapter two lays the foundation for the institutional economics of cultivated mushrooms in Swaziland. It begins with a review of the value chain concept, highlighting the different approaches used to analyse the various production and distribution processes of agricultural commodities and services. It also provides an overview of the economic importance of transaction costs in the smallholder agricultural sector. The last part of chapter two discusses the rationale for institutionalising collective action as a means of addressing the major constraints encountered by small-scale producers in their quest to competitively participate in the production and marketing of high-value agricultural commodities. Chapters three to six comprise estimation methods and empirical results presented in accordance with the specific objectives of the study. The results on the factors that influence households' decisions to participate in mushroom production are provided in chapter three. Chapter four presents the results of the socio-economic and institutional factors constraining mushroom production and producers' access to remunerative markets. The empirical estimation of the effects of transaction costs on producers' choice of marketing channels and the quantity of mushrooms sold in selected channels are presented in chapter five. Chapter six discusses the empirical analysis of the effects of organisational form on producers' participation in collective responsibilities. Chapter seven concludes the thesis with a presentation of the main findings of the study, policy recommendations, and implications for further research.

CHAPTER 2

THE RELEVANCE OF VALUE CHAIN ANALYSIS, TRANSACTION COSTS, AND COLLECTIVE ACTION IN PROMOTING SMALLHOLDERS' PARTICIPATION IN HIGH-VALUE AGRICULTURAL MARKETS

2.1   Introduction

Marketing is a very crucial element for transforming smallholders into commercial producers, a condition that may enable them to generate substantial household income and possibly improve their welfare. However, market participation, particularly in high-value agriculture, is not costless as the participants are often subjected to various forms of transaction costs, which if not contained could result in the exclusion of poorly-resourced smallholder producers. Value chain analysis provides a useful market-based approach that is well suited to provide a better understanding of how poor producers in developing countries can be assisted to participate competitively and sustainably in domestic, regional, and international trade. This chapter, therefore, begins with a review of the value chain concept, underlining its relevance in the smallholder agricultural sector. It also provides an overview of the economic importance of transaction costs in the production and marketing of high-value agricultural commodities. The last section discusses the relevance of collective action in attempting to reduce transaction costs encountered by smallholders engaged in high-value agriculture.

2.2   The value chain concept and analysis methods

2.2.1   The value chain concept

The value chain is defined by Kaplinsky and Morris (2001) as the full range of activities required to bring a product or service from conception, through the intermediary of production, delivery to final consumers, and final disposal after use. As opposed to the traditional exclusive focus on production, the concept stresses the importance of value addition at each stage, thereby treating production as just one of several value-adding components of the chain (UNIDO, 2009a). Although the 'value chain' terminology is often

used interchangeably with 'supply chain', the former relates to value creation via innovation in production, processing, and marketing (Webber and Labaste, 2010). The supply chain, however, refers to the logistical and procedural activities involved in the transfer of commodities from production to the delivery of a final product or service to the ultimate consumer (Kaplinsky and Morris, 2001). The supply chain mainly aims to reduce bottlenecks, outages or overstocks, lower transaction costs, and improve customer satisfaction (Webber and Labaste, 2010). Hence, the value chain is more inclusive as it incorporates supply logistics, value addition, transactions, and market linkages.

The importance of value chain analysis in the agricultural sector has largely been linked to the understanding of markets, particularly the underlying factors that limit or impede the participation and competitiveness of smallholder farmers (individually or collectively) in modern value chains (IFAD, 2010). Value chain studies have also augmented the knowledge of complexities, inter-linkages, distributional benefits, and institutional arrangements of production and marketing channels (Rich et al., 2011). Given the rich history of how this concept has evolved over the years, several techniques have been applied by researchers in the past to analyse value chains. A succint review of these techniques is provided in the next sub-section.

2.2.2 The evolution of value chain analysis methods

The first analytical method is the *filière*. This approach gained prominence in the 1960s where it was used to study contract farming and vertical integration in French agriculture, and later in West African countries that were under the French colony. It was generally applied to analyse input-output structures for agricultural commodities, assessing how public policies, investments, and institutions affect local production systems (Raikes et al., 2000). Premised on several theories and methodologies (including systems analysis, industrial organisation, institutional economics (old and new), management science, Marxist economics, and various accounting techniques) (Kydd et al., 1996), *filière* studies dealt primarily with local production systems and consumption, and generally overlooked areas such as international trade and processing (UNIDO, 2009a). Despite its gradual popularity even outside France, the *filière* has been avoided by some scholars who argue that its applicability is limited to domestic commodity chains; hence, it may not be appropriate in analysing the flow of commodities and services in a globalised setting

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(Raikes *et al.*, 2000; Kaplinsky and Morris, 2001). Kaplinsky and Morris (2001) add that this approach has also been criticised for providing static explanations of production relationships as it only describes relationships at a certain point in time and fails to explain internal dynamics in commodity or service flows, and changes in the status of value chain actors.

Another related approach is known as the sub-sector analysis. A sub-sector is defined by Shaffer (1973) as the vertical set of activities and interdependent array of organisations, resources, laws, and institutions involved in the production, processing and distribution of a closely related set of commodities. Historically, this approach was mainly used to study agricultural commodities, describing and evaluating the economic networks through which they are transformed and distributed to their ultimate consumers. Based on a framework premised on the industrial organisation theory (Holtzman, 2002), the sub-sector analysis places emphasis on how a commodity sub-sector is organized (structure), how the structure influences the behaviour of sub-sector participants (conduct), and ultimately how the sub-sector performs in the aggregate (performance). As a dynamic approach, the sub-sector analysis examines how markets and industries respond to changes in the form of shifting international supply and demand for a commodity, technological change in the food/fibre system, and new knowledge of organisational or management techniques (Staatz, 1997). This approach is also capable of identifying blockages and possible intervention strategies in the transformation and distribution of commodities (Buckley, 1997). Despite its usefulness across various fields, some researchers argue that the sub-sector approach is not suited to address most problems of sector-industry linkages. For instance, Staatz (1997) contends that it is not designed to analyse constraints within the firm to improve performance. It also tends to neglect the importance of commodity fungibility and diversification, and is less suitable to analyse activities that cut across several vertical production-distribution systems (Buckley, 1997; Staatz, 1997).

In the 1970s, Hopkins and Wallerstein pioneered the concept of commodity chains that is embedded in the world systems theory. This concept considers an ultimate consumable item and traces it back to the set of inputs used in its production, including prior transformations, the raw materials, transportation mechanisms, labour input into each of the material processes and food consumed by the labourers. Hopkins and Wallernstein's (1977) conviction is that by studying the processes constituting a particular commodity

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chain, it is possible to analyse the 'complex and concrete determinations of the global economy'. The commodity chain concept categorises all countries into three economic regions: (i) core regions, (ii) semi-periphery regions, and (iii) periphery regions. The general hypothesis is that core regions benefit most from the capitalist world economy compared to other regions. Therefore, stable governments, high wages, and a high import share of raw materials characterise core regions, whereas countries in the periphery regions lack strong stable governments, export merely labour-intensive raw materials, and have wages near subsistence level (Hopkins and Wallernstein, 1977). Although widely recognised and used by numerous scholars, the commodity chain approach has received its fair share of criticism. For instance, Dougherty (2008) argues that the commodity chain concept under-theorises the price mechanism, misses issues of terms of trade, ignores the key role of state policy in influencing commodity trajectories, and fails to fully accommodate non-physical commodities such as services and knowledge.

The value chain analysis emerged in the mid 1980's, having been popularised by Porter (1985) as an instrument for identifying the value of each step in an organisation's production process. It is utilised as a conceptual framework by organisations to detect their actual and potential areas of competitive advantage. Porter (1985) argues that in attempting to highlight such areas, the firm should be disaggregated into a series of activities. He identifies (i) primary activities, which directly contribute to add value to the production of goods and services, and (ii) support activities, which have an indirect effect on the final value of the product. The primary activities include internal logistics and operations, marketing and sales, whereas the support activities include strategic planning, human resource management, and technology development. The goal of all these activities is to offer the consumer a level of value that exceeds the cost of the activities; hence, resulting in a profit margin for the organisation (Roduner, 2004). With the value chain concept, Porter was able to emphasise that the profitability of a firm depends on how effectively it manages the various activities that create added value. Porter's approach is, however, restricted to the firm level, neglecting the analysis of upstream or downstream activities beyond the organisation. As such, his framework is largely regarded as a tool for assisting company's executive management in making internal strategic decisions (Faße et al., 2009).

Another method, known as the Global Commodity Chain (GCC), was introduced to the literature in the mid-1990s by Gereffi and others. Founded on the world systems theory, GCC researchers utilise the value chain framework to examine ways in which firms and countries are globally integrated, and to assess the determinants of global income distribution. The GCC analysis entails the identification of actors involved in the production and distribution of a particular good or service and mapping the kinds of relationships that exist among them. The ultimate goal is to understand where, how, and by whom value is created and distributed along the chain (Appelbaum and Gereffi, 1994). Hence, more recently, Gereffi et al. (2001) updated the 'Global Commodity Chain' (GCC) terminology to 'Global Value Chain' (GVC), which is more inclusive as indicated in Section 2.2.1. The GVC approach is cemented on four pillars, namely (a) input-output structure, (b) territorial (international) structure, (c) institutional framework, and (d) governance structure. Among these structures, governance has received the most attention as it is where the key notions of barriers to value chain entry lie. The GVC emphasises the different ways in which activities along the chain are coordinated. It views governance as the process of specifying, communicating, and enforcing compliance with key product and process parameters along the chain (Humphrey and Schmitz, 2004; Faße et al., 2009). As such, special attention is paid to the most powerful or lead firms, which are also known as chain drivers, given their influence over other chain participants and their presumed importance as potential agents of upgrading and development (Bair, 2005). What distinguishes lead firms from their followers or subordinates is that they control access to major resources (e.g. product design, new technologies or brand names) that generate the most profitable returns in the value chain.

The major hypothesis in GVC is that access to lead firms is a necessary condition for successful participation in global markets, particularly by exporters in developing countries (Gereffi et al., 2001). Lead firms do not only dictate terms of participation to their immediate suppliers, but they also transmit these conditionalities along the chain, often as far as the primary producers. In relation to possible forms of governance structures, global value chains can either be buyer-driven or producer-driven (Gereffi, 1994; 1999). Producer-driven value chains are those in which large, usually transnational manufacturers play the central role of coordinating production networks. This is characteristic of capital and technology-intensive industries such as automobiles, aircrafts, and computers (Raikes et al., 2000). The automobile industry offers a classic illustration of

a producer-driven chain, with multi-layered production systems that involve a large number of firms (including parents, subsidiaries, and sub-contractors) (Gereffi, 2001).

Buyer-driven value chains are mainly found in industries where large retailers and marketers do not make the branded products they trade in. Hence, they are 'manufacturers without factories' (Gereffi and Memedovic, 2003). These buyers play the pivotal role of setting up decentralised production networks in a number of developing countries that export the products. This pattern of trade-led industrialisation has become common in labour-intensive consumer goods industries such as garments, footwear, toys, housewares, consumer electronics, and a variety of handcrafts (Gereffi, 1999; 2013; Raikes *et al.*, 2000). Production is generally carried out by tiered networks of third world contractors producing finished goods for the international market. The specifications are supplied by the large retailers or marketers who order the goods. Buyer-driven commodity chains are also found in the high-value food industry, which is largely dominated by supermarket chains that primarily serve urban consumers (Weatherspoon and Reardon, 2003). In these chains, the supermarket chain stores determine the conditions such as volume of procurement, quality and safety standards, packaging requirements, and consistency of supply in response to consumer demands (Bienabe *et al.*, 2007). Other lead buyers have specifications of what type of product needs to be supplied, by whom, in what quantity, when, how it should be produced, and at what price (Bolwig *et al.*, 2010).

All the above-discussed analytical methods (from *filière* to GVC) make useful contributions to current value chain studies. Their different strengths and weaknesses make them complementary and indicate the potential usefulness of combining certain aspects from each. Drawing from the above discussion, the next sub-section presents the common dimensions that constitute value chain analysis in various fields.

2.2.3 The dimensions of value chain analysis

There are generally three main components explored in the value chain analysis (Kaplinsky and Morris, 2001; Rich *et al.*, 2011). The first component comprises the mapping of actors participating in the production and marketing of commodities and services. This represents the entire input-output process that brings a product or service from initial conception to the consumer's hands. The main segments in the chain vary

according to the industry, but typically include research and design, inputs, production, distribution and marketing, consumption, and in some cases the recycling of products after use. There is also the geographical component, which links value chain activities to the physical locations where these activities are carried out. Relevant geographies could be global, regional, national, or local (Kaplinsky and Morris, 2001).

The second component relates to governance analysis, which focuses on the structure of relationships and coordination mechanisms among the value chain actors. This component helps to better understand how the chain is controlled and coordinated, particularly when certain actors have more power than others (Gereffi *et al.*, 2009). The control and coordination in the chain is not only restricted to goods, but also includes capital, technology, standards, and brands, among other important elements. This dimension also involves the analysis of how the main inter-firm relationships in an industry are organised. Possible governance structures include markets (coordinated by price), hierarchies (coordinated through vertical integration) or networks (modular, relational or captive) (Gereffi *et al.*, 2005). These structures are measured and determined by the complexity of information between actors in the chain, how production information is codified, and the level of supplier competence (see Sturgeon and Gereffi, 2008, for details). The governance structures can change as the industry evolves, and vary from one level of the continuum to another (e.g. from markets to hierarchies). Recent studies (e.g. Gereffi *et al.*, 2009) have also found that some value chains are characterised by multiple and interactive governance structures.

The third component relates to the estimation of how benefits (in terms of income) are distributed among value chain actors. This type of analysis is central to understanding how the participation of marginalised actors (e.g. poorly-resourced producers) is affected by the operation of the chain, and how they may be affected by any future policy intervention. This can be achieved through the estimation of the net income for each actor, as a percentage of total added value (UNIDO, 2009b).

Some researchers (e.g. Weber and Labaste, 2010; Torero, 2011) argue that value chain analysts often fail to consider the institutional environment in which value chain actors operate. As a consequence, the analysis fails to identify potential interventions for value chain performance and growth. Hence, the institutional environment can be considered as

an additional dimension in value chain analysis. All value chains operate in environments that are shaped by the macroeconomic landscape, policies and regulations, institutional elements, and facilitating services. This includes local and international standards, trade regulations, and market forces that typically shape the business environment (Ortmann, 2000; Kaplinsky and Morris, 2001). The rules and regulations can be set up by actors within the chain or established by external actors like governments, NGOs, certification bodies and service providers (Ponte, 2009; Riisgaard, 2009). Institutional elements may fall into laws, finance, technologies, human development, standards, property rights, and research and development (UNIDO, 2009a).

Research and development institutions are important in coming up with innovations in product development, and other processes that allow for better handling, storage and transportion of commodities, whereas financial institutions are conduits for capital loans and investments. Facilitating services, which mainly improve operations within the value chain, include transport, storage, communications, and import and export services (UNIDO, 2009a). Transportation, for instance, becomes an important factor in the timely delivery of goods, which is vital in preserving product quality and value. An efficient transport system can translate to savings in delivery costs, quality deterioration, and wastage. Information and communications technology (ICT) is important in attaining responsiveness to consumers' requirements and reliability in delivering the right kind of product and volume required by the market (Ortmann, 2000). Therefore, advances in ICT are likely to reduce costs and make relevant information more readily available to value chain actors, including consumers.

The next section presents the economic importance of transaction costs in high-value agriculture. The discussion begins with the definition of the transaction cost concept.

2.3   Transaction costs in high-value agriculture

2.3.1   Transaction costs defined

Transaction cost economics (TCE) falls under the realm of New Institutional Economics (NIE), a body of theory embraced within the frame of neo-classical economics. The NIE, however, offers new insights of reality in relation to certain restrictive market assumptions

that are central to neoclassical economics (see Harriss *et al.*, 1995, for details). The NIE evolved from Old Institutionalists (e.g. Commons, 1934), who dispute the notion that economic systems evolve as a result of the rational-maximising self-seeking behaviour of individuals. Instead, they contend that economic systems evolve as a result of adjustments to existing institutions prompted by technological change (Rutherford, 1994).

TCE has developed over a considerable period of time, having gained prominence from Ronald Coase's study on the 'Nature of the Firm', where he acknowledged that the price mechanism cannot on its own co-ordinate production as there are other costs of using the price mechanism, i.e. transaction costs (Coase, 1937; 1998). Transaction costs include costs of discovering what prices should be, and negotiating contracts for exchange. The transaction cost phenomenon was given impetus by Oliver Williamson whose considerable contribution was to integrate the developing concepts with information asymmetry and property rights to formulate a predictive theory about the choice of organisational structure in an industry, given the optimising behaviour of firms and the limited cognitive capacity of individuals (Williamson, 1975). A further exposition of transaction costs is provided by Eggertson (1990) who highlights the thin line between information costs and transaction costs. He contends that transaction costs are not identical to information costs. Instead, when information is costly to attain and interpret, various activities related to the exchange of property rights between economic agents give rise to transaction costs.

Although perceived differently by scholars from various fields (see Allen, 1999), transaction costs are generally conceptualised as costs incurred for carrying out any exchange between firms in a market or a transfer of resources between stages in a vertically integrated firm, when the traditional neoclassical economic theory assumption of perfect and costless information is relaxed (Hobbs, 1996a; 1996b). In the field of marketing and trade, transaction costs relate to the costs incurred in searching for a partner with whom to exchange a product or service, screening potential trading partners to ascertain their credibility, bargaining with potential trading partners to reach an agreement, transferring the product or service, monitoring the agreement to ensure that its conditions are honoured, and enforcing the exchange agreement (Jaffee, 1995). These costs are classified in the literature based on whether they are incurred before (*ex ante*) or after (*ex post*) the actual exchange. They are further categorised into information costs, negotiation (bargaining) costs, and monitoring and enforcement costs (Williamson, 1985). Information

costs, which arise *ex ante*, include the costs incurred by economic agents in the search for information about products, prices, inputs, and trading partners (Key *et al.*, 2000). Negotiation costs include the costs of negotiating and drawing exchange agreements. Monitoring and enforcement costs occur *ex post* and generally relate to the costs of ensuring that the pre-agreed terms of the transaction are fulfilled (Hobbs and Kerr, 1999). Examples could be monitoring the quality of goods from a supplier or monitoring the actions of a supplier or buyer, and the costs of seeking restitution in instances where contract terms have been flouted by either party.

Others classify transaction costs according to whether they are tangible or intangible (e.g. Loader and Hobbs, 1996). Tangible costs are those to which monetary values can be attached with relative ease. Examples include transfer costs, communication costs and legal costs, whereas intangible transaction costs arise due to adverse selection and/or moral hazard (Loader and Hobbs, 1996). Adverse selection arises as a result of the potential for *ex ante* opportunism because private information is hidden by one party prior to a transaction (Arrow, 1984). This may happen, for instance, in agricultural credit schemes where potential borrowers, who are most likely to produce an undesirable (adverse) outcome (i.e. the bad credit risks), are those who most actively seek loans and stand a chance to be selected as lenders may not have the full information in relation to their creditworthiness (Swinnen and Gow, 1999). Because of the unobservability of such pertinent private information, the lender ends up with a set of clients in which the high risk segment of the population is over-represented. As a consequence of this adverse (borrower) selection, the lender could be forced to raise interest rates, leading to another version of adverse effects as the institution may become unattractive even to average risk groups (Douma and Schreuder, 1992).

Moral hazard arises as a result of the potential for *ex post* opportunism because of information asymmetry or hidden actions of transacting parties (Douma and Schreuder, 1992). The anticipation that such hidden actions are possible may also prevent the transaction altogether. When the actions of one party (e.g. the agent) cannot be observed by another (e.g. the principal), yet these actions have a direct bearing on the economic returns of both, the former has an incentive to act opportunistically in attempting to capture any gains possible. The principal may incur transaction costs in monitoring the actions of the agent and enforcing the terms of a pre-agreed contractual arrangement (Hobbs and

Kerr, 1999). An example is cited by Smith and Godwin (1996), where they found that insured farmers have a tendency to undertake riskier production options than do uninsured farmers. Once the insurance company (principal) provides cover for possible accidents, there is an incentive effect on the behaviour of clients (agent) who may act with less caution, and in some instances with malicious intent (Sadoulet and de Janvry, 1995). For the insurance company, it becomes difficult and costly to investigate whether the damage was indeed caused by uncontrollable accidents or whether the behaviour of the insured had anything to do with the damage or loss.

Transaction costs can also be categorised based on whether they are proportional or fixed. Proportional transaction costs change in accordance with how much the economic agent sells or buys (Key *et al.*, 2000). An example could be transfer costs expressed on a per unit (of commodity) basis. Fixed transaction costs are independent of the quantities sold or bought, and examples include information, bargaining, and monitoring costs (Key *et al.*, 2000; Alene *et al.*, 2008). Another category identified by North (1987) is referred to as 'non-market transaction costs'. This category includes resources spent in waiting, acquiring permits to engage in business, cutting through red tapes, and sometimes bribing officials while performing the exchange function.

Given the above discussion, it could be inferred that TCE is underpinned by bounded rationality, opportunism, and information asymmetry, all of which become more apparent in the presence of uncertainty or complexity (Jaffee, 1995; Hobbs and Kerr, 1999). Bounded rationality postulates that while economic agents intend to make informed rational decisions, their ability to accurately evaluate alternative possible decisions is limited by their own cognitive powers (Williamson, 1985). Opportunism relates to economic agents seeking to exploit a situation to their own advantage in order to capture economic rents (Moschandreas, 1997). Worth indicating, however, is that TCE does not imply that all transactors always act opportunistically, rather, it acknowledges that the risk of opportunism is often present given the difficulty to distinguish *ex ante* honest actors from dishonest ones (Douma and Schreuder, 1992). In a world of perfect and costless information, the allocation of resources to enforce exchange agreements would be unnecessary. However, as observed by Stigler (1961), information is not costless, and because of the existence of information asymmetries, transaction costs arise either directly from these asymmetries or indirectly as a result of economic agents' attempts to mitigate

them. The next sub-section identifies various socio-economic and institutional factors that give rise to transaction costs in the production and marketing of HVACs in developing countries.

2.3.2 Sources of transaction costs in the production and marketing of high value agricultural commodities

A large number of high-value agricultural programmes in developing countries promote the participation of smallholder producers as they are likely to generate substantial income from selling their commodities through remunerative supply chains (see McCullough *et al.*, 2008). Notwithstanding the likely benefits, producers' attempts to participate in lucrative markets are often precluded by different types of transaction costs. In the international context, transaction costs alone could be a major barrier to trade for many individuals and firms. Most rural-based producers do not have a 'good' understanding of the market, for instance, how it works and why prices fluctuate, and have relatively less experience in performing or participating in market-related negotiations (Markelova *et al.*, 2009). Given the absence of market information systems (MIS) in most developing countries, particularly in Sub-Saharan Africa (SSA) (Shepherd, 2007), producers have little or no information on market conditions and prices. The lack of timely access to salient and accurate information on prices, locations of effective demand, preferred quality characteristics of high-value commodities, and alternative marketing channels places smallholder producers in a relatively weak bargaining position against traders.

Other compounding problems relate to infrastructural constraints. Producers, food processors, and agricultural traders in SSA mostly endure substantial risks and incur considerable costs due to the inadequate, underdeveloped and sometimes dilapidated transport and communications infrastructure (Riverson *et al.*, 1991). Such infrastructural problems constrain the physical movement of commodities and communication between economic agents (Jacoby, 2000; Seetanah, 2012). If commodities have to move within regions characterised by poor infrastructure, direct transactions between buyers and sellers could be difficult; hence, necessitating the involvement of middlemen who have their own cost implications (Biglaiser, 1993).

Other institutional factors, such as lack of collective marketing also increase transaction costs between buyers and sellers, particularly if producers are sparsely located and supply small quantities inconsistently. However, acting collectively could enable producers not only to reduce costs of accessing inputs, but also improve their bargaining position with buyers and intermediaries, and share marketing information among members (Markelova et al., 2009; Tita et al., 2011). Collective marketing may also reduce their marketing costs as costs previously incurred by individuals could be shared by the entire membership (Fox, 1979; Bosc et al., 2001; Fischer and Qaim, 2012). Transaction costs also vary according to the nature of the product. Perishable products are usually associated with high transaction costs due to rapid transportation (from production to consumption centres) and cool storage requirements (Pingali et al., 2005). Perishability also limits the period of time during which a product can be marketed as a fresh commodity or used as a raw material in processing. Where HVACs are used for processing, processors are usually subjected to high transaction costs as the product will be repeatedly screened and graded for quality at every respective stage in the value chain (Jaffee, 1995). In attempting to prolong the freshness and quality of perishable commodities, producers and market intermediaries are required to invest in highly specialised transport and storage facilities. However, poor (or lack of) rural electrification in some developing countries (Bernard, 2010) places constraints on where production and processing activities can be located.

The identification of sources of transaction costs is, therefore, an important step towards informing the process of establishing institutions and strategies required to improve the participation of poorly-resourced producers and processors in remunerative value chains. While some countries have instituted various programmes aimed at reducing transaction cost-related barriers to market participation, the monitoring and evaluation of these interventions is hampered, in part, by the difficulty of quantifying such costs (see Pingali et al., 2005). The challenges encountered in measuring transaction costs are discussed in the next sub-section, which further highlights efforts that have been made by some scholars in attempting to attach monetary values.

2.3.3 Measuring/quantifying transaction costs

TCE has been widely criticised for the gap between theoretical developments and the paucity of results relating to the direct measurement of exchange-related costs (Hobbs and

Kerr, 1999; Royer, 2011). Researchers who attempt to measure transaction costs have to overcome various forms of difficulties. Among those noted in the literature is the absence of theoretical consensus over the precise definition of transaction costs (see Ramstad, 1996; Allen, 1999; 2006). The many coexisting definitions offer influential conceptual insights, but have not been translated into unified accepted operational standards. For some researchers, it is difficult to separate transaction from production, and other managerial costs (Benham and Benham, 2005). Another noted difficulty is that if transaction costs are very high, some transactions may not take place at all. However, if by any chance transactions take place, it may not be in an open market setting where there is monetary exchange; hence, making it difficult to attach monetary values (Royer, 2011). Williamson (1985) asserts that the difficulty in quantifying transaction costs could be mitigated by conducting comparative institutional assessments, whereby one mode of exchange is assessed against another. His contention is that "it is the difference rather than the absolute magnitude of transaction costs that matters" (Williamson, 1985:22). Given these challenges, not much literature is available on the quantitative analysis of transaction costs, particularly in the area of agricultural marketing. With very few exceptions (e.g. Gabre-Madhin, 2001; Royer, 2011), notable empirical studies that have attempted to quantify transaction costs are mainly in the environmental and ecological economics field (e.g. Falconer, 2000; Falconer and Saunders, 2002; McCann et al., 2005; Mettepenningen et al., 2009). These studies are generally focused on evaluating the magnitude of transaction costs associated with the conception and implementation of several public programmes and policies.

Information required to measure transaction costs can be gathered through various means, including surveys and use of secondary data. However, such methods are likely to produce unreliable results and conclusions. For instance, researchers using surveys or interviews will rely on the mental ability of respondents to recall past activities (Mettepenningen et al., 2009), whereas the availability of quality records will determine the reliability of studies conducted using secondary data (Falconer, 2000; Falconer and Saunders, 2002). In attempting to counter such challenges, other studies have managed to measure transaction costs through the use of simulations, where the researcher gets involved in all the activities of interest (Benham and Benham, 2005). Another approach used by Mettepenningen et al. (2009) to measure transaction costs incurred by farmers engaged in European agro-environmental schemes, prompted the respondents to register the labour inputs and time

required to perform the activities of interest. This exercise was supplemented with data generated from a survey in the same regions to provide additional insight on the nature and extent of transaction costs. While this seemed a very costly procedure, Mettepenningen *et al.* (2009) contend that such data gathering practices are capable of producing a very informative and reliable dataset. However, despite using the 'improved' data gathering procedures, the major impediment arises when attempting to convert the time and labour inputs into monetary values. This is where some scholars (e.g. Smith, 1992; Wang, 2003) propose the use of opportunity cost measures to estimate transaction costs. In line with this proposal, Falconer and Saunders (2002) applied country standard hourly rates to estimate the amount a producer would have paid somebody to perform a similar task.

Given the effects of transaction costs in high-value agricultural production and marketing, some researchers (e.g. Bienabe *et al.*, 2004; Shephered, 2007; Jia and Huang, 2011), as indicated in Section 2.3.2, argue that changes in institutional arrangements such as the introduction of collective marketing can play an important role in addressing the varied problems highlighted in the preceding sections. Widely recognized for its role in the management of common pool resources, collective action was introduced in Sub-Saharan African agriculture during the colonial period through farmer cooperatives for the purpose of promoting production of cash crops by peasant farmers (Hussi *et al.*, 1993). Of late, small-scale farmers have been found acting collectively in the production and marketing of highly perishable and non-staple food commodities traded through modern supply chains (Narrod *et al.*, 2009). The process leading to collective action among poorly-resourced smallholders in developing countries is discussed in the next section.

2.4   Collective action in smallholder agriculture

2.4.1   The process leading to collective action in smallholder agriculture

A schematic visualisation of the process leading to collective action in the production and marketing of HVACs is presented in Figure 2.1. The fundamental step towards collective action is for members to acknowledge that as individuals they do not have all the required information, resources, and competency to address a particular problem (Wondolleck and Yaffee, 2000; Mostert *et al.*, 2007). As indicated in Figure 2.1, the problem is usually triggered by external factors, which individual members can hardly control on their own.

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┌─────────────────────────────────┐        ┌─────────────────────────────┐
│            CAUSE                │        │          DRIVERS            │
│ -Constraints to produce and     │        │ -Changes in food            │
│  market individually            │        │  preferences                │
│ -Willingness and ability to     │        │ -Conditions set by value    │
│  collaborate                    │        │  chain lead actors          │
│ -Foreseeable benefits resulting │        │ -Government policy          │
│  from collaboration             │        │                             │
└─────────────────────────────────┘        └─────────────────────────────┘
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```
┌─────────────────────────────────┐        ┌─────────────────────────────┐
│ -Problem definition             │        │         STRUCTURE           │
│ -Solution formulation           │        │ -Market environment         │
│ -Solution implementation        │        │ -Product characteristics    │
│ -Assessment of the costs and    │        │                             │
│  benefits of the solution       │        │          CONDUCT            │
│                                 │        │ -Collusive behaviour among  │
│                                 │        │  market participants        │
└─────────────────────────────────┘        └─────────────────────────────┘
```

SOCIAL LEARNING   SOCIAL CAPITAL   COLLECTIVE ACTION

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┌──────────────┐    ┌──────────────┐     ┌──────────────────┐
│ -Exchange of │    │ -Trust       │     │ Performance      │
│  ideas and   │    │ -Reciprocity │     │ -Effectiveness   │
│  experiences │    │ -Connectedness│    │ -Efficiency      │
│ -Shift from  │    │ -Rules, norms│     │ -Equity          │
│  multiple    │    │  and sanctions│    └──────────────────┘
│  cognition to│    └──────────────┘
│  collective  │                         ┌──────────────────────────┐
│  cognition   │                         │ Possible outcomes        │
└──────────────┘                         │ -Increased access to     │
                                         │  markets                 │
                                         │ -Increased access to     │
                                         │  resources               │
                                         │ -Increased bargaining    │
                                         │  power                   │
                                         │ -Risk reduction          │
                                         │ -Economies of scale      │
                                         │ -Supply control          │
                                         │ -Reduced transaction     │
                                         │  costs                   │
                                         │                          │
                                         │ Possible threats         │
                                         │ -Free riding             │
                                         │ -Internal conflicts      │
                                         │ -Inability to satisfy    │
                                         │  contracts               │
                                         └──────────────────────────┘
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Figure 2.1: The process of collective action towards improving small-scale producers' participation in modern value chains

Source: Adapted from Kruijssen *et al.* (2009)

One example is the failure by individual producers to access high-value markets, characterised by quality standards, demands for consistency, and reliability in supply. The conditions which trigger collective action in HVA are usually influenced by external drivers (e.g. lead actors in the value chain), who control access to major resources that generate the most profitable returns in the value chain. As noted in section 2.2.2, lead firms will not only dictate terms of participation to their immediate suppliers, but through globalisation, they are also capable of transmitting these demands along the entire value chain, even as far as primary producers in developing countries (Gereffi *et al.*, 2001).

Given that efforts to conform to lead actors' demands come with financial implications that are often beyond individuals' means, producers are likely to act collectively, especially if they have a certain level of interconnectedness, motivation, and the willingness to work as a group (McCarthy *et al.*, 2004). Figure 2.1 shows that in attempting to address such problems, producers engage one another, sharing diverse viewpoints and experiences to develop a common framework of understanding and the basis for joint action. Through this form of engagement, known as social learning, producers will be able to define the problem together, search for and implement solutions, and assess the costs and benefits of a solution for a specific practice (Koelen and Das, 2002).

The concept of social learning, which has a long varied history traced to Bandura (1971), entails the shift by individuals from being separate cognitive agents with multiple perspectives to a group with shared attributes and values, and ready to address social challenges collectively (Koelen and Das, 2002). A number of scholars (e.g. Olson, 1965; Coleman, 1988; Ostrom, 1990; Ostrom, 1992; D'Silva and Pai, 2003; Meinzen-Dick *et al.*, 2004; Oh *et al.*, 2004; Upton, 2008) attribute the success of collective action to the strength of social capital, amongst other factors. Social capital, a broadly defined concept in economics, is considered as the norms, trust, and social networks that exist between individuals (Putnam, 1993). The presence and assurance of trust among individuals facilitates the potential for reciprocity and emergence of cooperative behaviour (White and Runge, 1995). It follows, therefore, that interventions which enhance trust among members are likely to contribute to successful collective action. Figure 2.1 indicates that the regular interactions that take place within the group also feed back into the social learning process, strengthening the nature of social capital over time (Kruijssen *et al.*, 2009). In addition, the

participatory process used by members to set their own goals, set and enforce their own rules, enables the members to have ownership of the problems and solutions, an attribute that can possibly enhance the group's sustainability (Vollan, 2012).

In their quest to participate in HVA, producers are expected to decide on the appropriate form of collective action. While the choice of organisational form is likely to be influenced by the ease of establishment, Kruijssen *et al.* (2009) suggest that producers should be considerate of the organisational form's adaptability and responsiveness to the market environment, which is mostly influenced by consumers' changing demands. Another important point to note is that the viability of some farmer organisations in SSA has largely been undermined by internal disputes arising from misappropriation of funds, corruption, and lack of accountability to members (Chirwa *et al.*, 2005). Therefore, in attempting to curb opportunistic behaviour, particularly from the group's leadership or certain members who may be more enlightened than the majority, producers should consider organisational forms that are permissible within the laws of the country. This could create room for independent and transparent systems of auditing, and quick investigation and resolution of corruption cases, which may sometimes fail to be settled through the groups' internally developed rules and regulations (Shiferaw *et al.*, 2011). However, some analysts (e.g. Fuller, 1981) contend that legal rules and interventions of the government courts are sometimes ineffective in resolving collective action problems, and are likely to undermine the strength of self-governed organisations. Without denying the validity of this point, Ostrom and Ahn (2009) posit that the country's legal system and regulatory framework should not be ignored as they play a vital role in sustaining social cooperation. They contend that the broad understanding of existing formal laws can influence members' views and contributions in crafting their own rules meant to curtail opportunistic behaviour or solve collective action problems.

In relation to market participation, the decision process for the preferred form of organisation requires the use of certain indicators. For this purpose, Kruijssen *et al.* (2009) propose the use of the 'structure, conduct and performance' (SCP) analysis, as shown in Figure 2.1. The SCP concept was enunciated by Bain (1951) and has been applied in various fields, including the study of marketing chains (see Scarborough and Kydd, 1992; Sexton, 2000). The basic premise of the SCP model is that the structure of the market determines the conduct of sellers and buyers, which, in turn, influences the performance of

the market (Scarborough and Kydd, 1992). The structure describes the market chain environment, considering in particular factors such as the number of buyers and sellers operating in a chain, relative ease of participants to enter and exit the market, extent of product characteristics (perishability, differentiation, and quality requirements), and the vertical coordination mechanisms used. Conduct refers to the coordination between actors or the patterns of behaviour that market participants adopt to adjust to the market in which they trade. Examples of conduct include price-setting behaviour, product development and promotion policies, buying and selling practices, and behaviour towards rivals (Sexton, 2000). Anything other than competitive behaviour or conduct among firms can lead to undesirable performance outcomes. Regarding conduct, the analysis typically focuses on any evidence of collusive behaviour among firms, anti-competitive pricing (oligopoly pricing or below-cost pricing designed to eliminate weaker competitors), and any collusive market-sharing agreements of firms that decide not to compete (Holtzman, 2002).

Typical SCP analysis tends to assess market performance in terms of whether marketing margins are consistent with costs and value added by the respective value chain actors, and whether the degree of market concentration is low enough to allow competition, which is, in turn, assumed to drive down costs incurred by various actors (Scarborough and Kydd, 1992). Regarding collective marketing, performance can be viewed in accordance with the extent to which the market results in outcomes that are preferred by the farmer group (Holtzman, 1986). As indicated in Figure 2.1, the groups' concern in the market may be measured in terms of effectiveness, efficiency and equity (Kruijssen *et al.*, 2009). Effectiveness relates to the matching of supply and demand at each stage of the value chain, and can be measured by the stability of supply, the maintenance of product quality, the duration of the delivery process, and the product variety and assortment. Efficiency refers to the optimal use of resources such that they create the most benefit, and prices are in line with costs. Where markets are 'efficient', supply and demand interact without impediment or distortion, and prices move quickly to reflect changes in the demand or supply of commodities. Given that markets are rarely efficient, Jasdanwalla (1977) posits that a marketing structure could be said to be relatively efficient if it offers commodities at prices that reflect realistically the demand and supply situation. In an equitable value chain, another condition that is difficult to achieve in reality, margins and bargaining power are expected to be distributed among the value chain actors proportinately with the levels of

investment made or total value added (Marion, 1976; Kruijssen *et al.*, 2009; UNIDO, 2009b; IFAD, 2010).

While collective action has the potential to overcome many of the production and marketing problems faced by smallholders in developing countries, its existence and functioning is not without difficulties, as indicated in Figure 2.1. In some instances, even if farmers show the willingness to collaborate and investment capital is available, collective action may still not be successful or sustainable (Singleton, 1999; Stockbridge *et al.*, 2003). The factors underlying the above conditions are discussed in the next sub-section.

2.4.2 Factors that affect the likelihood of successful collective action

The relative costs and benefits of producers' participation in collective action are likely to differ across members. This may depend on a number of structural factors, including member attributes (age, education, gender, location, production capacity, asset endowment, education, and previous collaborating experience), characteristics of the common commodity or economic activity, and the external environment (Araral, 2009; Ostrom, 2010).

Farmers' participation in collective initiatives has also been found to be affected by their socio-cultural and economic heterogeneity. Economic heteregeneity refers to the differences in wealth, income, and access to credit, among other attributes, whereas socio-cultural heterogeneity refers to differences in ethnicity, religion, and cultural perception of the common resource or economic activity (La Ferrara, 2002; Ruttan, 2008). The effect of social heterogeneity on collective action can either be positive or negative. Ruttan (2006) contends that social heterogeneity could have negative effects resulting from different social norms, which make creating and enforcing decisions more costly. Socio-cultural homogeneity, however, could lead to a stagnation of ideas and may foster institutional inertia, thereby resulting in lower overall institutional capacity as opposed to communities with greater socio-cultural diversity (McCarthy *et al.*, 2004; Katungi *et al.*, 2007). Regarding the wealth status of members, Wade (1988) posits that wealth heterogeneity makes finding agreements that are mutually beneficial to all more difficult as wealthy members find it in their interest to assume leadership and benefactor roles within the group. In Kenya, wealthy members among livestock keeping communities were found not

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to be in favour of collective initiatives given that their opportunity cost of time were higher than that of relatively poor members (Ouma and Abdulai, 2009). On the contrary, Chakrabarti *et al.* (2001) in Poteete and Ostrom (2004) found higher levels of collective action in Indian communities characterised by greater heterogeneity in wealth, among other factors.

The extent to which households or group members depend upon a common commodity or economic activity for their livelihoods is another important condition that facilitates collective action (Wade, 1988; Gabremedhin *et al.*, 2004; Mushtaq *et al.*, 2007; Araral, 2009). Dependency captures the level at which the household needs the commodity or economic activity for its subsistence (Naidu, 2009). Dietz *et al.* (2003) contend that the commodity (or economic activity) must be salient enough to the members for them to decide to invest their resources towards its sustainable management. Therefore, in communities characterised by a relatively high number of alternative livelihood options, chances of members working together on a particular activity are likely to be less as such exit options can weaken social cohesion, making it difficult to make and enforce collective decisions (Bardhan, 1993).

Some collective initiatives face various challenges in establishing the rules on which their organisations are based. They also face considerable difficulties in monitoring and enforcing compliance, and to secure commitments from group members to abide by collectively agreed rules (Stockbridge *et al.*, 2003). Other groups experience the problem of having free-riders, whereby individuals benefit with limited or no investment in the generation and maintenance of the organisation (Stroebe and Frey, 1982; Albanes and van Fleet, 1985; Ostrom, 1990). Drawing from the rational choice theory, Olson (1965) argues that an individual member's decision to engage in collective action depends on the comparison of expected benefits and costs. Therefore, rational and self-interested individuals will act to achieve their personal rather than group interests, and will have an incentive to free-ride whenever an opportunity arises.

The conventional belief is that free-riders will be easily noticed in small groups, and members of small groups are likely to believe that their contributions will make a difference; hence, inducing contributions from others (Olson, 1965). However, in large groups member contributions are difficult to trace and there is less information about each

member to verify individual behaviour (Hardin, 1982). Therefore, an increase in group size will increase the costs of reaching internal agreements about coordinated strategies, and monitoring members' participation in collective activities (Sandler, 1992; Ostrom, 2010). Worth noting is that the effect of group size in collective action remains contentious, as some studies could not find a significant relationship between group size and free-riding (e.g. Marwell and Ames, 1979; Lipford, 1985), while others (e.g. Agrawal, 2000) posit a curvilinear relationship between group size and collective action. Agrawal (2000) contends that large groups are likely to have high occurrences of conflicts and monitoring costs, whereas with small groups it may be difficult to generate the resources needed to engage effectively in collective action. The free-rider problem may also arise outside the group. For instance, when individual producers refuse to become members of bargaining farmer groups, but capture the benefits of the negotiated terms of trade (Cook, 1995). Other institutional problems normally encountered by farmer organisations, particularly traditional cooperatives, emanate largely from ill-defined property rights. These include the horizon problem, portfolio problem, control problem, and influence cost-related problems (see Cook, 1995; Cook and Iliopoulos, 1999; Ortmann and King, 2007, for details).

Meinzen-Dick et al. (2004) indicate that most difficulties and failures associated with group-based development initiatives arise as a result of less attention being accorded to understanding how collective action arises to deal with different issues, and how it can possibly be sustained. Therefore, it is important to understand where collective action is likely (or unlikely) to emerge and/or persist. With reference to the production and marketing of HVACs, Hellin et al. (2009) caution that a better understanding of high-value markets could enable producers to make rational decisions on when to act collectively and also recognise when it is not worthwhile. In support, Kaganzi et al. (2009) argue that it would be illogical for farmers producing undifferentiated commodities with no price premium for quality to organize as the transaction costs associated with market access would be relatively low. Instead, they (Hellin et al., 2009; Kaganzi et al., 2009) posit that collective production and marketing would be justified if there are relatively few traders for the commodity, if high investment costs are required to enter a specific remunerative supply chain, when there are limited services (e.g. finance, transport, etc.) in the area, when buyers can offer some form of support (perhaps through contracts with attractive arrangements in terms of price and continuity of purchase), and if farmers can access lower

cost inputs through bulk purchases. Shiferaw *et al.* (2011) add that collective action would be justified if the above expected benefits are likely to outweigh the associated costs of complying with collective rules and norms.

2.5   Summary

This chapter highlights the institutional concepts that are empirically examined in the ensuing chapters of the thesis. Among the important points drawn from this chapter is that while most early work on value chains centred on improving competitiveness of different supply channels, recent efforts have instead focused on increasing the competitive and profitable participation of poor producers in remunerative modern value chains within a globalised setting. This chapter also highlights that if the costs of organising transactions are high, traded volumes will be reduced and resource efficient production patterns will fail to develop, leading to low distributional efficiency. In the absence of proper institutions meant to reduce transaction costs, smallholder producers, in particular, could find themselves excluded from participating in remunerative value chains. Using lessons drawn from the management of common pool natural resources, the literature indicates that through collective action, farmers will be more able to obtain the necessary market information, achieve quality standards and produce on a larger scale when they combine their resources, enabling them to penetrate markets that would otherwise be out of reach for individual producers. Collective action also facilitates the provision and coordination of other important services (e.g. training, extension, and credit), which would otherwise be more costly to offer to a large number of sparsely located individual farmers. By providing an enabling environment for farmer groups to thrive, developing countries can advance agricultural commercialization, enabling rural dwellers to improve their income-generating capacity; hence, assuming a position to address pressing challenges such as poverty and household food insecurity.

The following chapters (three to six) comprise empirical methods and research results presented in accordance with the four specific objectives of the study. The next chapter discusses the factors that influence households' decisions to participate in mushroom production in Swaziland.

CHAPTER 3

DETERMINANTS OF FARMERS' PARTICIPATION IN OYSTER MUSHROOM PRODUCTION IN SWAZILAND: IMPLICATIONS FOR PROMOTING A NON-CONVENTIONAL AGRICULTURAL ENTERPRISE[6]

3.1 Introduction

This chapter presents the empirical methods, results and discussion of the factors that influence farmers' decisions on whether or not to participate in oyster mushroom production. The rest of the chapter is organised as follows: Section 3.2 outlines the methodology, which constitutes the conceptual and empirical model, and data collection procedures. Section 3.3 presents the empirical results, while section 3.4 concludes the chapter with a summary of the findings.

3.2   Methodology

3.2.1   Conceptual and empirical model

Previous studies (e.g. Damianos and Skuras, 1996; Barlas *et al.*, 2001) provide a natural setting within which farmers' decisions to produce non-conventional agricultural products can be analysed. Assume household agricultural enterprises are denoted by j, where $j = 1$ for the inclusion of the mushroom enterprise to existing enterprises and $j = 0$ for the current crop and livestock enterprise(s). The non-observable underlying utility function that ranks the preference of the i^{th} farmer is given by U. Although the utility function is unobserved, the relation between the utility derivable from a j^{th} enterprise is postulated to be a function of the following factors:

$$U_{ij} = F(D_{ij}, C_{ij}, I_{ij}, P_{ij}) + \varepsilon_{ij} \qquad\qquad j = 1, 0; i = 1,\dots\dots,n$$

$$U_{ij} = V_{ij} + \varepsilon_{ij} \qquad\qquad\qquad (3.1)$$

where U_{ij} is the unobserved or latent utility level attained by the i^{th} farmer, V_{ij} is the explainable part of the latent utility that depends on demographic attributes (D_{ij}), farm

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characteristics (C_{ij}), institutional factors (I_{ij}), farmers' perceptions (P_{ij}), and the random error term (ε_{ij}). Following the random utility framework, the i^{th} farmer's choice for adding the mushroom enterprise to existing agricultural enterprises (M) as opposed to remaining without mushrooms (O) is assumed to depend on the additional utility derived from mushrooms relative to that derived from existing enterprises, which is denoted in this case by y_i. Therefore, y_i is specified as:

$$y_i = (V_{Mi} + \varepsilon_{Mi}) - (V_{Oi} + \varepsilon_{Oi}) = (\varepsilon_{Mi} - \varepsilon_{Oi}) + (V_{Mi} - V_{Oi}) \tag{3.2}$$

Hence, a typical farmer in Swaziland will decide to incorporate the mushroom enterprise to his current enterprises if:

$$(V_{Mi} + \varepsilon_{Mi}) > (V_{Oi} + \varepsilon_{Oi})$$

$$U_{Mi} - U_{Oi} > 0 \tag{3.3}$$

To implement the model empirically, it is assumed that there is an unobserved or latent variable, y^* that generates the observed variable y, which represents a farmer's decision of whether or not to produce mushrooms. When $y^* > 0$, the farmer produces mushrooms and $y = 1$ is observed. When the farmer does not produce mushrooms, then $y = 0$ is observed. For the i^{th} farmer, the latent variable y_i^* is assumed to be related to observed factors that include demographic attributes (**D**) such as household labour endowment (X_1), gender (X_2) and age (X_3 and X_3^2); farm characteristics (**C**), which include the level of crop enterprise diversification (X_4) and livestock enterprise diversification (X_5); institutional factors (**I**), including affiliation to community development groups (X_6), information sources, segmented into extension officers (X_7), radio (X_8), newspapers (X_9), other mushroom producers (X_{10}) and Non-Governmental Organisations (NGOs) (X_{11}). Other institutional factors include being informed about the nutritional and therapeutical attributes of mushrooms (X_{13}) and receiving training in basic oyster mushroom production (X_{14}). Farmers' decisions may also be influenced by the proximity to markets for inputs and products (X_{12}) and their perceptions (**P**) towards mushrooms (X_{15}). The measurement and full discussion of these variables is provided in section 3.2.2. Otherwise, the structural model is specified as:

$$y_i^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \delta_1 X_3^2 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} \\ + \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} + \beta_{14} X_{14} + \beta_{15} X_{15} + e_i \tag{3.4}$$

where the X's represent explanatory variables, β's and δ represent coefficients to be estimated, while e_i is the random error term with a zero mean. y_i^* is linked to y_i as follows:

$$y_i = \begin{cases} 1 \text{ if } y_i^* > 0 \\ 0 \text{ if } y_i^* \leq 0 \end{cases}, \tag{3.5}$$

implying that the production of mushrooms is a dichotomous decision; hence, equation (3.4) can either be estimated using a Logit or Probit model. The probability that $y_i = 1$ is expressed as:

$$\Pr[y_i = 1] = \Pr[y_i^* > 0] = \Pr[\beta'X_i + e_i > 0] = \Pr[e_i > -\beta'X_i] = \Pr[e_i \leq \beta'X_i] = F(\beta'X_i) \tag{3.6}$$

where $\Pr[\cdot]$ is a probability function and $F(\cdot)$ is the cumulative distribution function (Long, 1997). Assuming e_i follows the standard normal distribution, the above probabilistic model yields the Probit model (Green, 2003). However, in view of the possible reciprocal causality between the dependent variable and farmers' perceptions, as noted by Negatu and Parikh (1999), simultaneous equations were used for estimation. Given that the decision to produce y_i is discrete (see equation 3.5), while the variable of perceptions (X_{15}) is continuous (see section 3.2.2), a two-stage model was considered, where equation (3.7) represented the decision model, whereas equation (3.8) represented an OLS function for factors influencing farmers' perceptions towards mushrooms.

$$y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \delta_1 X_3^2 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10}$$
$$+ \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} + \beta_{14} X_{14} + \beta_{15} X_{15} + e_1 \tag{3.7}$$

$$X_{15} = \alpha_0 + \alpha_2 X_2 + \alpha_3 X_3 + \xi_1 X_3^2 + \alpha_6 X_6 + \alpha_7 X_7 + \alpha_8 X_8 + \alpha_9 X_9 + \alpha_{10} X_{10} + \alpha_{11} X_{11} + \alpha_{13} X_{13}$$
$$+ \alpha_{14} X_{14} + \alpha_{16} X_{16} + \xi_2 y_i + e_2 \tag{3.8}$$

where the X's and y_i (in equation 3.8) are independent variables, α's, β's, δ, and ξ's are parameters to be estimated, while e_1 and e_2 are error terms. In order to identify equation (3.7), and by extension the whole system of equations, an exogenous variable for household education (X_{16}) was added in equation (3.8). The reduced-form equations were subsequently expressed as:

$$y_i = \Pi_1 X_1 + \Pi_4 X_4 + \Pi_5 X_5 + \Pi_{12} X_{12} + \Pi_{16} X_{16} + \upsilon_1 \tag{3.9}$$

$$X_{15} = \gamma_1 X_1 + \gamma_4 X_4 + \gamma_5 X_5 + \gamma_{12} X_{12} + \gamma_{16} X_{16} + \upsilon_2 \tag{3.10}$$

where the X's are predetermined variables, Π's and γ's are reduced-form coefficients, while υ_1 and υ_2 are error terms.

The Two-stage Probit Least Squares (2SPLS) model was used to estimate equation (3.8), while equation (3.7) was estimated using the Two-Stage Conditional Maximum Likelihood

(2SCML) model. Following Maddala (1983) and Alvarez and Glasgow (1999), the 2SPLS was implemented by first estimating the reduced function (3.9) using the Probit model. The parameters generated were used to compute a predicted value for $\hat{y}_i$, which was consequently substituted for the endogenous variable y_i as it appears on the right-hand side (RHS) of equation (3.8). Equation (3.8) was re-estimated with $\hat{y}_i$ serving as an instrument in the equation. The disadvantage of the 2SPLS is that it produces biased standard errors (Alvarez and Glasgow, 1999). However, this was corrected following Mooney (1996) and Hassan and Birungi (2011) by producing consistent parameter estimates along with bootstrapped standard errors. Unfortunately, there is no simple correction for the standard errors when the second stage estimation involves a binary choice equation, such as the Probit (Alvarez and Glasgow, 1999). It was for this reason that equation (3.7) was estimated using the 2SCML, developed by Rivers and Vuong (1988). The 2SCML has an advantage in that besides producing consistent and efficient estimates, it mitigates the problem of incorrect standard errors while providing a practical means of testing the hypothesis of exogeneity using a Likelihood-Ratio (LR) test (Rivers and Vuong, 1988). However, what could be considered as its main limitation is that it assumes interest in only the structural parameters of the Probit equation. The 2SCML estimation was implemented by first estimating the reduced function (3.10) using OLS and obtaining residuals, which were labelled as $\hat{p}$. $\hat{p}$ was then added to the Probit function (3.7) on the RHS as a substitute for the endogenous variable (X_{15}). In order to apply the LR test for exogeneity, equation (3.7) was estimated twice; firstly, without $\hat{p}$ and, secondly, with $\hat{p}$ (Smith, 1987). The LR test function is computed as:

$$\lambda = -2(\ln \hat{L}_R - \ln \hat{L}_U) \tag{3.11}$$

where $\ln \hat{L}_R$ is the log of the likelihood for the Probit model estimated without $\hat{p}$, whereas $\ln \hat{L}_U$ is the log of the likelihood for the Probit model estimated with $\hat{p}$. λ has a chi-square distribution with R (df), where R is the number of endogenous variables in the Probit equation (Rivers and Vuong, 1988). From equation (3.6), the marginal effects for continuous variables in the Probit model were estimated as (Green, 2003):

$$\partial \Pr[y_i = 1] / \partial X_i = \Phi(\beta' X) \beta \tag{3.12}$$

where $\Phi(t)$ is the standard normal density function, while the marginal effects for a binary variable (say d), were estimated as:

$$\text{Prob}[y_i = 1 | \bar{x}_{(d)}, d = 1] - \text{Prob}[y_i = 1 | \bar{x}_{(d)}, d = 0] \tag{3.13}$$

where $\bar{x}_{(d)}$, denotes the means of all the other variables in the model. The next sub-section presents the dependent and independent variables used in the empirical model.

3.2.2 Dependent and independent variables

Three farmer categories were identified from the survey. The first category comprised mushroom producers, whereas the second category comprised farmers who, at the time of the survey, were found not producing mushrooms but were in the process of making preparatory measures to embark on production. The last category comprised farmers who were found not producing mushrooms and had no intentions to participate in the industry. None of the interviewed farmers indicated to have produced mushrooms previously and stopped at some point, and similarly, none of the current mushroom producers indicated an intention to cease production in the near future. The three categories were accordingly identified as:

0 = not producing and completely unwilling to produce mushrooms

1 = not currently producing but willing to produce mushrooms

2 = currently producing and willing to continue producing mushrooms

Given the above setting, the model could be estimated intuitively with an ordered dependent variable, with the assumption that:

$y_i = 0$ if $y^* \leq 0$

$y_i = 1$ if $0 < y^* \leq \mu$

$y_i = 2$ if $y^* \geq \mu$ (3.14)

where μ is some threshold value between the three categories. To check whether the above assumption is true in this case, equation (3.7) was estimated using an ordered Probit model, where a test of parallel regressions was conducted (Long, 1997). With the results showing a significant ($p<0.01$) chi-square value of 112.517 (16df), the use of an ordered dependent variable was consequently discarded in favour of a dichotomous variable comprised of producers (a combination of category one and two) and non-producers (category zero). Nichola (1996) also argues that despite respondents not producing the crop of interest during the survey period, respondents in category one should be merged with those in category two to form one category of producers. Based on field observations and the available literature, the following explanatory variables were included in the model.

Demographic attributes: Demographic attributes are reported by Abadi Ghadim and Pannell (1999) to have a significant influence on farmers' decision-making processes. The relationship between the decision to produce mushrooms and the age of household head is expected to be negative. This is based on the notion that younger farmers are relatively progressive, more receptive to new ideas and better understand the benefits of non-conventional agricultural enterprises (Abadi Ghadim and Pannell, 1999). Although older farmers have greater experience and skills than younger ones, in some instances, older farmers are less energetic (Damianos and Skuras, 1996) and have a strong emotional connection with producing conventional products as they are often more risk averse (Abadi Ghadim and Pannell, 1999). With regard to gender, the general belief is that African women play a prominent role in agriculture; hence, they are relatively more receptive to innovations than men (Chipande, 1987). However, Doss and Morris (2001) have found that farmers' production decisions depend primarily on access to resources rather than on gender *per se*. If, for instance, producing mushrooms depends solely on knowledge gained through training, and if in a particular community only women are permitted to undergo training, then in that context mushroom production will not benefit men and women equally.

Notwithstanding the importance of indigenous knowledge in agriculture, the level of formal education attained is used as an indicator for a respondent's ability to acquire, process and effectively use information about mushrooms. The assumption is that education facilitates learning, which, in turn, is presumed to instil favourable perceptions towards the socio-economic benefits of mushroom production (Singh, 2000). However, as observed by Lapar *et al.* (2003), the expectation may be reversed when there are competing and relatively more remunerative employment opportunities in other sectors requiring skills that are enhanced by advanced formal education. Considering the general level of education in the sample, the variable for education was captured using the proportion of household members who have gone beyond primary education. The inclusion of other household members in this case was based on the notion that despite having the household head making the final decision of whether or not to produce mushrooms, the views and contributions of other members are likely to have an influence on the direction of the decision. On account of the above debate, no *a priori* prediction was made on the direction of effect.

Labour is an important requirement in mushroom production; hence, households with a relatively high labour endowment are more likely to cope with the requirements of the enterprise. Considering members who were identified to participate in household agricultural activities, household labour endowment was measured following Langyintuo and Mungoma (2008) in man-equivalents as: members less than 9 years = 0; 9 – 15 = 0.7; 16 – 49 years = 1; and above 49 years = 0.7. The concept of man-equivalents was adopted to account for labour contribution differences among household members. The inclusion of all categories (even school-attending children) is based on the fact that school-attending children normally participate in household agricultural activities, especially outside school-attending hours including weekends and holidays.

Farmer's perceptions towards mushrooms: Considering that mushrooms are not plants but fungi, it is not easy to differentiate between poisonous and edible ones, while some species, in spite of being edible, are known to induce respiratory allergy in humans during production (Helbling *et al.*, 1998). Hashemi and Damalas (2011) posit that given such circumstances farmers are bound to have perceptions towards the enterprise and these perceptions are likely to have an influence on its acceptability. Perceptions can either develop from gaining information or from one's experience with mushrooms (Negatu and Parikh, 1999). Farmers' perceptions were captured using numeric responses to 11 questions, which covered a broad spectrum of contextual issues related to mushrooms (see Table 3.3). Principal Component Analysis (PCA) was then applied to extract a composite measure of perceptions from the responses, which was subsequently used as an explanatory variable (X_{15}) in equation (3.4). PCA results are also reported in Table 3.3.

Horizontal crop and livestock diversification index: Given that mushroom production is considered as a 'new enterprise' in the context of this study, it would be beneficial to establish the type of farmers (in terms of agricultural enterprise diversity) that are likely to produce mushrooms as an additional enterprise. With the assumption that the level of diversification is influenced by the intention to minimise agricultural income variability, highly diversified households are likely to participate in mushroom production, depending on how well mushrooms complement existing agricultural enterprises (Anosike and Coughenour, 1990). However, it is also important to note that while the mushroom enterprise could be less complex and perhaps complement existing enterprises, some farmers could be sceptical about trying out a relatively new enterprise without knowing the

associated risks. Therefore, the coefficient for diversification may either be positive or negative. A crop diversification index (CDI) was used to capture the allocation of arable land to different crops by each household. Following Malik and Singh (2002), CDI was computed as:

$$CDI = 1 - \sum_{i=1}^{n} P_i^2 \qquad i = 1, 2, \ldots, n \text{ (number of crop enterprises)} \qquad (3.15)$$

where CDI is the crop diversification index and P_i is the proportionate area of the i^{th} crop. The index ranges from zero to one, with one indicating the highest diversification. In the absence of a common denominator (e.g. hectares for crops) or market values of the different livestock enterprises, the CDI, which may also be used in the form of a Simpson Index of Diversity (SID) to measure livestock diversification (Joshi *et al.*, 2004), could not be used in this case. Instead, livestock diversification (LD) was computed using the authors' simple computation, which considered the total number of enterprises in the sample and the number of livestock enterprises owned by each household. Accordingly, LD was computed as:

$$LD = \frac{\sum_{i=1}^{n} D_i}{N} \qquad i = 1, 2, \ldots, n \text{ (number of livestock enterprises)} \qquad (3.16)$$

where LD is the livestock diversification index, D_i denotes the livestock enterprises owned by the household and N is the total number of livestock enterprises in the sample. In order to avoid the effects of outliers, for a household to qualify as an owner of a livestock enterprise, the number of animals owned had to be equal to or greater than the sample mean of that particular livestock enterprise. LD ranges between zero and one, with one indicating the highest diversification.

Source of information: The effectiveness of providing information on a new subject to farmers depends largely on the source. If information is obtained through sources trusted by the recipient, there is a high likelihood that positive perceptions will develop (Adegbola and Gardebroek, 2007). With a farmer to mushroom extension officer ratio of 271:14 in Swaziland (MDU, 2010), other possible channels normally used to provide information on mushrooms, particularly raising awareness, include radio, print media and, to some extent, other producers. Each information source was represented by a dummy variable, assuming one when used and zero otherwise.

Training in mushroom production and awareness of nutritional attributes of mushrooms: Training reduces the perceived complexity of an innovation among farmers and enhances the observability and adaptability to their own environment (Foster and Rosenzweig, 1995). Training in basic mushroom production is currently offered by the Mushroom Development Unit (MDU), while aspects related to food preparation, processing and nutrition fall under the mandate of the Food Science and Technology Unit, which collaborates with the Home Economics Section and several NGOs. The two variables are expected to have a positive relationship with the decision to produce mushrooms. Both variables were captured using dummies, where one was allocated to respondents who have been trained in basic oyster mushroom production or informed about the nutritional and therapeutical attributes of mushrooms and zero for those not exposed to these interventions.

Membership in organisations: The study hypothesises a positive relationship between associational membership and mushroom production. While profitability is a key ingredient in starting up an enterprise, the effect of social capital, in the form of associational membership and regular exchange of information is likely to have a positive influence on decisions by members to diversify their agricultural enterprises (Munasib and Jordan, 2011). Membership in a community organisation provides an opportunity for members to obtain either information or informal training from others who may have already started producing mushrooms. Some extension providers have also institutionalised the group approach for delivering extension services. This variable was captured using a dummy where one was allocated to members of community organisations and zero to non-members.

Proximity to markets: Although mushrooms can be sold at the farm gate to community members, preliminary investigations indicate that besides offering comparatively better exchange prices, retail outlets (mainly comprising supermarkets) provide a reliable market as selling through the farm gate subjects producers to rely on unpredictable consumer turnout. However, as established by Staal *et al.* (2002), given that mushrooms are highly perishable, households located further from towns/cities (where markets are located) could be subjected to high marketing and transaction costs and consequently find it more difficult to take up the enterprise. Similarly, it could be difficult to acquire some production inputs (e.g. wheat bran) and packaging supplies for use after harvesting.

Distance to the nearest town/city was captured as: 1= less than 1km; 2 = 1 − 2km; 3 = 2.1 − 3km; 4 = 3.1 − 4; 5 = 4.1 − 5; 6 = 5.1 − 10km; and 7 = above 10km. The next sub-section presents the sampling and data collection procedures.

3.2.3 Data collection

Contrary to the 39 total number of mushroom producers reported in 2008 (see Section 1.1), the MDU records indicated that as at November 2010 the number of producers had increased to 271 (MDU, 2010). This increase was attributed to the mushroom training programme implemented by the MDU, which covered more constituencies in 2009 than in previous years. For reasons provided in chapter one, all these producers currently specialise in oyster mushrooms. From the 271 mushroom producers, a representative sample of 159 was drawn, following the Krejcie and Morgan's (1970) procedure. Producers were then stratified according to location and the number of respondents per location was determined with probability proportional to population size. Given that the analysis in this study required a reliable representation of both producers and non-producers, some areas with relatively less number of producers who still constitute the original 159 sample of producers, were excluded in this case. Hence, the data that were used were gathered from areas purposively selected on the basis of having relatively more households involved in mushroom production. These areas are identified in Table 3.1 as; Ncandweni, Sinceni, Ngcina, Mangweni, Ka Shoba, Mbangweni, and Zombodze.

Table 3.1: Sampled mushroom producers and non-producers, Swaziland 2010/11

Area[a] [A]	Households within location [B]	Population of producers [C]	Population of non-producers[b] [D]	Producers sampled [E]	Non-producers sampled [F]
Ncandweni	49	16	33	9	18
Sinceni	57	16	41	9	22
Ngcina	71	35	36	21	20
Ka Shoba	84	21	63	12	35
Mangweni	136	81	55	48	30
Mbangweni	73	38	35	22	19
Zombodze	81	25	56	15	31
Total	551	232	319	136	175

Notes: [a] Areas with relatively few producers were purposively excluded; [b] [D] = [B] - [C]
Sources: Mushroom Development Unit, Ministry of Agriculture (2010); Central Statistics Office (2010).

Besides having a relatively large number of mushroom producers, these areas are also a representation of diverse agro-ecological and livelihood zones. Non-producers were drawn from the same regions using enumeration areas to determine the number of households per location. These enumeration areas are normally used by the Central Statistics Office (CSO) to conduct agricultural censuses. Upon establishing the total number of households within each location, the Krejcie and Morgan's (1970) procedure was again applied to determine the sample size for each location where the resulting number of respondents was less (minus) the households already identified as mushroom producers. Interviews with respondents were conducted between December 2010 and January 2011, and the number of interviewed households per location is shown in Table 3.1.

The following sub-section presents the empirical results. It begins with an overview of the descriptive statistics of variables used in the analytical model, followed by a discussion of the PCA results. The sub-section concludes with a discussion of the significant factors influencing farmers' decisions of whether (or not) to participate in mushroom production. All estimations in this chapter were carried out using STATA 11 (StataCorp, 2009).

3.3   Empirical results and discussions

3.3.1   Descriptive statistics of variables used in the Two-Stage Conditional Maximum Likelihood and Two-Stage Probit Least Squares regression models

The descriptive statistics of the variables used in the regression models are summarised in Table 3.2. The average age of household heads was 52 years, and the majority (53 percent) were women of whom about 61 percent were involved in mushroom production. The respondents were engaged in diversified crop enterprises, including cotton, cereals, legumes and tubers. Apart from the common cattle and goat enterprises, respondents were found raising indigenous and commercial pigs, broilers and indigenous chickens. About 56 percent of the respondents reported to have some knowledge about the nutritional attributes of mushrooms and how they are prepared/cooked. However, among the 56 percent, only 63 percent produce mushrooms while the rest have decided not to produce. Sources of information about mushrooms that were mentioned include NGOs (38 percent), other mushroom producers (24 percent), radio (four percent), government extension officers (nine percent) and newspapers (nine percent).

Table 3.2: Descriptive statistics of variables used to determine farmers' participation in mushroom production in Swaziland, 2011

[A] Variable	[B] Unit	[C] % of Total sample (N=311)	[D] % of [C] from *Cat.* 0[†] (N=124)	[E] % of [C] from *Cat.* 1[†] (N=187)	[F] χ^2-value
Categorical variables					
Gender of household head (GENDER)	Male	46.6	41.4	58.6	0.258
	Female	53.4	38.6	61.4	
Community organisation membership (COMM_ORG)	Member	45	37.1	62.9	0.791
	Non- member	55	42.1	57.9	
Source of information – Extension officer (EXT_OFFICER)	Yes	8.7	18.5	81.5	5.623[**]
	No	91.3	41.9	58.1	
Source of information – Radio (RADIO)	Yes	3.5	27.3	72.7	0.755
	No	96.5	40.3	59.7	
Source of information – Newspaper (NEWSPAPER)	Yes	8.7	48.1	51.9	0.845
	No	91.3	39.1	60.9	
Source of information – Other mushroom producers (OTHER_PROD)	Yes	24.1	48	52	2.724[*]
	No	75.9	37.3	62.7	
Source of information – NGO (NGO)	Yes	37.6	31.6	68.4	5.322[**]
	No	62.4	44.8	55.2	
Knowledge about nutritional attributes of mushrooms (NUTRITION)	Yes	55.9	36.8	63.2	1.573
	No	44.1	43.8	56.2	
Training in oyster mushroom production (TRAIN_PRODN)	Yes	20.6	17.2	82.8	17.296[***]
	No	79.4	45.7	54.3	

Continuous variables					
Variable	Unit	Total sample mean (N=311)	Mean *Cat.* 0[†] (N=124)	Mean *Cat.* 1[†] (N=187)	*t*-value
Age of household head (AGE)	Years	52	50	53	1.579
Household size (MAN_EQUIV)	Man-equiv.	4.4	4.6	4.74	0.494
Hhld. members above primary education (HHLD_EDUC)	Number	2	3	2	-3.982[***]
Crop diversification (CROP_DIVERS)	Index (CDI)	0.44	0.43	0.45	-0.032
Livestock diversification (LIVST_DIVERS)	Index (LD)	0.2	0.18	0.21	2.132[**]
Perceptions (X_{15})	PC	-0.11	-0.25	0.17	4.100[***]

Ordered variables					
Variable	Unit	Total sample Mode (N=311)	Mode *Cat.* 0[†] (N=124)	Mode *Cat.* 1[†] (N=187)	χ^2-value
Distance to town/city (DIST_TOWN)	km[*]	7	7	7	5.830

Notes: [†]0 = non producers; and 1 = producers

[*]1= less than 1km; 2 = 1 – 2km; 3 = 2.1 – 3km; 4 = 3.1 – 4; 5 = 4.1 – 5; 6 = 5.1 – 10km; and 7 = above 10km

[*],[**],[***] represent 10%, 5% and 1% levels of significance, respectively

Source: Survey data (2011)

The results in Table 3.2 indicate that about 45 percent of the respondents were affiliated to community organisations of whom 63 percent are engaged in mushroom production. From the 21 percent of respondents who reported to have received basic training in mushroom production, 83 percent produce mushrooms, while 17 percent do not produce mushrooms and have no intention to do so. Table 3.2 also indicates that mushroom producers and non-producers have significantly different perceptions towards cultivated mushrooms. These perceptions, as indicated earlier, were computed using PCA and the results are presented in the next sub-section.

3.3.2   Farmers' perceptions towards mushroom production

Farmers' perception scores towards cultivated mushrooms were first tested for reliability using Cronbach's alpha, which was 0.78, implying that the responses were related enough to constitute a reliable composite measure (Cronbach, 1951). In order to avoid the problem of assigning a greater weight to variables with larger variances, PCA was conducted using a correlation matrix (Krzanowski, 1987), and the results are presented in Table 3.3.

Table 3.3: Principal component analysis of farmers' perceptions towards cultivated mushrooms in Swaziland, 2011

	Principal components			
	1	2	3	4
Eigenvalues	3.50	1.84	1.14	1.02
% of variance explained	32.10	16.69	10.35	9.27
Cumulative % of variance explained	32.10	48.78	59.14	68.40
Variables	**Component loadings**			
Mushroom production can reduce unemployment [c]	0.745	-0.394	-0.346	-0.134
Mushroom production can improve household income [c]	0.730	-0.322	-0.375	-0.152
Compared to other common enterprises, mushroom production has high financial returns [c]	0.694	-0.363	-0.018	0.100
Large quantities of mushrooms can be produced from structures occupying small portions of land [c]	0.691	-0.325	0.051	0.003
Mushrooms are tasty and enjoyable [c]	0.519	0.451	-0.079	0.422
Mushroom production is an enterprise suited to women [d]	0.570	0.576	-0.006	-0.225
Mushroom production is an enterprise more suitable for the poor [d]	0.512	0.548	0.084	-0.281
Mushroom production is an enterprise that does not depend on rainfall [c]	0.365	-0.206	0.674	0.230
Mushroom production is an enterprise that requires less capital investment [c]	0.490	-0.188	0.563	0.057
Mushrooms are a good source of nutrients [c]	0.389	0.490	-0.211	0.607
Mushrooms are poisonous and can cause health problems [d]	0.322	0.432	0.217	-0.486
Kaiser-Meyer-Olkin measure of sampling adequacy = 0.709; Bartlett's test of sphericity χ^2 = 1123.875 (p<0.01)				

Notes: [c]: 5=strongly agree; 4 = agree 3 = neutral; 2 = disagree; and 1 = strongly disagree
[d]: 1=strongly agree; 2 = agree 3 = neutral; 4 = disagree; and 5 = strongly disagree
Component loadings greater than │0.30│ are highlighted in bold print.
Source: Survey data (2011)

The use of PCA was appropriate to provide significant reductions in dimensionality as evidenced by the Kaiser-Meyer-Olkin and Bartlett's test of sphericity results (Tobias and Carlson, 1969). Using the Kaiser criterion of retaining PCs with eigenvalues greater than one (Kaiser, 1960), four PCs were retained, which collectively account for 68% of total variation of the original variables. Applying the rule of thumb proposed by Koutsoyiannis (1992) for observations above 50, PC loadings greater than $|0.30|$ are considered to indicate a strong association between perception scores and the PCs. These loadings are highlighted in Table 3.3 in bold print. In view of the above, PC_1 was identified as a reliable measure of perceptions as it not only accounted for a larger share of the variation in the original variables, but had all estimated coefficients above $|0.30|$. Hence, PC_1 was retained and subsequently used as a proxy variable for perceptions (X_{15}) in the 2SPLS and 2SCML estimations. The next sub-section presents the empirical results and discussion of the factors influencing farmers' decisions of whether (or not) to participate in mushroom production.

3.3.3 Determinants of farmers' participation in oyster mushroom production

Having detected no significant multicollinearity among the independent variables, the 2SPLS and 2SCML models were subsequently estimated, and the second stage results are presented in Table 3.4. Both models are significant [Wald χ^2 ($p<0.01$)], indicating a high explanatory power of the joint association of factors influencing perceptions and farmers' decisions of whether or not to produce mushrooms. The Likelihood Ratio test for the 2SCML model yields a significant ($p<0.1$) chi-square value of 3.288 (1df), suggesting the presence of endogeneity between perceptions and the decision to produce mushrooms. Hence, the use of two-stage estimation procedures is justified. The following discussion and recommendations for policy are, therefore, based on the OLS and unrestricted Probit regression models.

Table 3.4: Estimates of the second-stage equations of 2SPLS and 2SCML explaining the determinants of farmers' participation in mushroom production in Swaziland, 2011

Variables	2SPLS OLS			2SCML Restricted Probit				2SCML Unrestricted Probit			
					Marginal values				Marginal values		
	Coeff.	Bootstrap Std. error	z-value	Coeff.	∂y/∂x	Std. error	z-value	Coeff.	∂y/∂x	Std. error	z-value
MAN_EQUIV				-0.007	-0.003	0.012	-0.23	-0.007	-0.003	0.012	-0.23
GENDER	0.141	0.1238	1.14	-0.105	-0.040	0.059	-0.68	-0.128	-0.049	0.059	-0.83
AGE	0.010	0.0221	0.46	0.025	0.010	0.012	0.81	0.023	0.009	0.012	0.73
AGE^2	-0.0001	0.0002	-0.43	-0.0002	-0.0001	0.0001	-0.65	-0.0002	-0.0001	0.0001	-0.57
CROP_DIVERS				0.220	0.084	0.095	0.88	0.239	0.091	0.095	0.96
LIVST_DIVERS				0.765	0.292	0.156	1.87*	0.791	0.302	0.155	1.94*
COMM_ORG	-0.014	0.0956	-0.14	0.055	0.021	0.059	0.36	0.056	0.022	0.059	0.37
EXT_OFFICER	0.276	0.1998	1.38	0.674	0.225	0.093	2.42**	0.642	0.216	0.096	2.25**
RADIO	0.359	0.1773	2.02**	0.553	0.187	0.119	1.57	0.512	0.175	0.123	1.42
NEWSPAPER	-0.051	0.2818	-0.18	0.015	0.006	0.114	0.05	0.030	0.011	0.114	0.10
OTHER_PROD	-0.246	0.1917	-1.28	-0.042	-0.016	0.084	-0.19	-0.007	-0.003	0.085	-0.03
NGO	0.269	0.1579	1.70*	0.425	0.158	0.073	2.17**	0.391	0.146	0.074	1.96**
HHLD_EDUC	-0.666	0.6430	-1.04								
DIST_TOWN				-0.116	-0.044	0.027	-1.65*	-0.119	-0.045	0.027	-1.70*
NUTRITION	0.217	0.0970	2.24**	0.108	0.041	0.060	0.69	0.077	0.030	0.060	0.49
TRAIN_PRODN	0.026	0.0844	0.31	0.797	0.271	0.062	4.34***	0.799	0.271	0.062	4.37***
$\hat{p}$								0.141	0.054	0.031	1.73*
$\hat{y}_i$	0.268	0.6633	0.40								
Constant	-0.474	0.6016	-0.79	-0.337				-0.240			
Observations	311			311				311			
Wald χ^2	51.53***			35.54***				40.15***			
R^2	0.097										
Pseudo R^2				0.1017				0.1097			
Predicted probability				65%				66%			
Log likelihood				-187.866				-186.222			
LR test for exogeneity (1df)								3.288*			

Note: *, **, *** represent 10%, 5% and 1% levels of significance, respectively

Source: Survey data (2011)

In contrast to Hashemi and Damalas (2011), no significant relationship was established between coefficients for perceptions and demographic attributes. Instead, estimates from the OLS regression model indicate that farmers' perceptions towards cultivated mushrooms are positively influenced by information received through radio and NGOs, and farmers' knowledge about nutritional and therapeutical attributes of cultivated mushrooms. As one of the popular and easily accessible media channels, radio is used by development agencies to engage citizens on various development initiatives, which among other areas focus on smallholder agriculture, and food and nutrition programmes. As reflected in Table 3.4, the nutrition attribute of mushrooms seems to have a comparatively stronger effect on improving people's perceptions towards the mushroom enterprise. This could be attributed to the promotion of healthy diets among citizens who, with the knowledge gained, are now consuming cultivated mushrooms as part of their diets. In view of the high demand for cultivated mushrooms, those who produce them can either sell (to improve availability) or consume at household level.

Results from the unrestricted Probit model indicate that farmers who receive information about cultivated mushrooms from the government and NGOs have a significantly higher likelihood of making a decision to participate in the enterprise. The key message drawn from the results is that while other sources are being utilised by farmers, they are not perhaps competent enough to relate the technical aspects of how to effectively manage a mushroom enterprise. Hence, besides developing positive perceptions towards mushrooms, the farmers' ultimate decision of whether or not to produce mushrooms will largely be influenced by the effectiveness of the information source. The importance of extension officers in this regards is consistent with previous findings by Adegbola and Gardebroek (2007). Farmers who have undergone training in basic mushroom production have a significantly higher likelihood of eventually producing mushrooms compared to those who have not been trained. Those who have positive perceptions towards cultivated mushrooms are also more likely to take up the enterprise. The coefficients for enterprise diversification are both positive; however, only the estimated coefficient for livestock enterprise diversification is significant. In contrast to Barlas et al. (2001), the results suggest that diversified households are more likely to participate in a non-conventional enterprise, particularly if it complements existing agricultural enterprises and enhances prospects of reducing household income variability.

Farmers who are located further from markets are less likely to produce mushrooms, perhaps because it would be difficult to procure some inputs and access the retail market after harvesting. By virtue of being a perishable commodity, if mushrooms are transported over long distances without proper storage, producers could be compelled to either sell at a reduced price (due to shrinkage) or not sell at all due to advanced spoilage.

3.4   Summary

The main objective of this chapter was to identify the determinants of farmers' participation in mushroom production using cross-sectional data from rural Swaziland. The empirical results indicate that farmers who receive information related to cultivated mushrooms from government extension officers and NGO's, and have undergone training in basic oyster mushroom production, are likely to participate in mushroom production. Other farmers who are likely to produce mushrooms are those who practice diversified agriculture and have positive perceptions towards cultivated mushrooms. Farmers' positive perceptions towards mushrooms were found to be mainly influenced by the knowledge gained on mushrooms' nutritional and therapeutical properties. The results also indicated that it is generally difficult for farmers located in remote places to participate in the mushroom industry. Although some of these farmers could have different substrate materials available in abundance in their areas, the proximity to the nearest town/city could inflate the cost of accessing other production inputs. Such farmers could be faced with the same challenge after harvesting as they would be required to transport their mushrooms over a long distance; hence, exposing the mushrooms to unfavourable conditions, which may eventually result in loss of value. Given these findings, it seems that with the exception of perceptions and the level of diversification, farmers' decisions to participate in the mushroom enterprise are largely influenced by institutional rather than household and farm-related factors.

Key policy interventions that can possibly improve the uptake of the mushroom enterprise include strengthening of the farmer training programme and improving the number of extension personnel. The dissemination of information on the nutritional and therapeutical properties of mushrooms is also important in changing prospective producers' perceptions towards cultivated mushrooms. Evidence drawn from this study also suggests that policy interventions aimed at creating an enabling environment for the enterprise may remain

ineffective unless they are paralleled by improvements in rural infrastructure and access to sources of inputs and product markets. The next chapter discusses the socio-economic and institutional factors constraining the participation of Swaziland's mushroom producers in mainstream markets.

CHAPTER 4

SOCIO-ECONOMIC AND INSTITUTIONAL FACTORS CONSTRAINING PARTICIPATION OF SWAZILAND'S MUSHROOM PRODUCERS IN MAINSTREAM MARKETS: AN APPLICATION OF THE VALUE CHAIN APPROACH[7]

4.1   Introduction

This chapter presents the empirical findings of the value chain analysis used to identify the underlying factors constraining local mushroom production and producers' participation in mainstream markets. The rest of the chapter is organised as follows: The next section outlines the data collection procedure. Results are presented in section 4.3 in a format that follows the mushroom value chain, highlighting the main activities and related constraints encountered in every stage. Section 4.4 concludes the chapter with a summary of the results.

4.2   Data collection

A snowball method (Goodman, 1961) was used to collect data from different value chain actors. Initially, data were collected from mushroom producers who identified input sources and mushroom buyers. Interviews with input suppliers and market intermediaries also identified other actors and institutions influencing the value chain. Using information from the Mushroom Development Unit (MDU) under the Ministry of Agriculture, producers in Swaziland as at December 2011 comprised 11 farmer groups, whose respective members are located in more or less the same communities, and 74 individuals found in various locations. As highlighted in chapter one, farmer groups operate in predominantly two models identified as A and B (see section 1.2, for details). Considering that the results of this chapter were expected to inform the analytical framework used in chapter five, which has a component that requires household variables to study mushroom producers' choices of marketing channels, it was found reasonable to use data generated from individual producers and members affiliated to groups that operate using model B. Among the 11 groups, only two (Mbangweni and Zombodze) were found using model B.

From a total of 38 members from Mbangweni and 25 from Zombodze, interviews were conducted with 36 members from Mbangweni and 24 from Zombodze, respectively. From the list of 74 registered individual producers, 43 owned production structures but had not started producing at the time the interviews were conducted. Therefore, 31 producers from this category were interviewed, bringing the number of interviewed producers to 91. The full description of these producers is provided in chapter five. Data from producers were gathered between December 2011 and January 2012, whereas interviews with other value chain actors were conducted between June and July 2012. Questions for the latter survey were structured such that the data and information provided were in harmony with the period when producers were interviewed.

Given the very low number of identified input suppliers and other value chain actors (see Appendix A), it was not necessary to generate samples. Therefore, interviews were conducted with representatives from all stakeholders identified in Appendix A. Additional information came from site visits where activities related to mushroom production and marketing were directly observed. The next section presents the study results in a format that follows the mushroom value chain, highlighting the main activities and constraints encountered in every stage.

4.3   Empirical results and discussions

The first two sub-sections discuss of the activities and related constraints encountered in the production and marketing processes. Major institutional factors constraining mushroom production, marketing, and value-addition are also discussed. The section concludes with an outline of proposed interventions meant to enhance market access and facilitate the movement of mushrooms within the value chain.

4.3.1 Production phase

a) Input supply (spawn and substrate)

The first activity in mushroom production relates to spawn (seed) development, which since 2001 has been done by the government through the MDU, located in Malkerns (central Swaziland). Government's justification for having one spawn supplier is that, as

the industry is relatively new, consumers need to be protected from poisonous types of mushrooms, and producers from unscrupulous suppliers who may provide them with a low quality product. The spawn is sold in 350 ml bottles at a cost of six Emalangeni (E6) each. These bottles are collected by MDU field staff from bars and restaurants after being discarded as waste material, whereas substrate bags from which the mushrooms are grown, are donated by the government of Thailand and distributed by the MDU to producers for free.

Different combinations of growing substrates that have been tried and recommended for oyster mushrooms in Swaziland include: (i) 90 percent sugarcane bagasse and 10 percent wheat bran, (ii) 90 percent grass straw (*Panicum maximum*) and 10 percent wheat bran, and (iii) 45 percent grass straw, 45 percent maize cobs and 10 percent wheat bran (MDU, 2009b). However, sugarcane bagasse is no longer available to local farmers as sugar mills use it to produce ethanol. As such, most (95 percent) producers have resorted to using grass straw and wheat bran, whereas the rest use a combination of grass straw, maize cobs and wheat bran. Although grass straw is abundantly available in most rural areas, producers prefer to buy than to spend time cutting grass from the wild. The major supplier of grass straw is Mabhuda farm in Siteki (north-eastern Swaziland) where a bale costs between E250 and E350 per 250kg, depending on the season. However, because of Mabhuda farm's location, the MDU buys the grass in bulk for onward sale to farmers at E200 per 90kg. Wheat bran is obtained from agricultural retail outlets, whereas maize cobs are generally collected for free after maize has been shelled. Before the spawn is inoculated (planted), the substrate material has to be cut into smaller pieces and pasteurised. Cutting grass or maize cobs into the required sizes and mixing with water and wheat bran are a labour-intensive activity. The technology used for this purpose, also donated by the government of Thailand, is available in only four areas countrywide and producers have to make arrangements to access the service at a cost of E20 per bale of 90kg. After inoculation, the bags are kept in an incubation room for about three to four weeks and will thereafter be ready to produce mushrooms. The incubation room is only available in Malkerns and can only accommodate 3 200 bags at a time. After this period, the bags are withdrawn and transported by the MDU to the producers' growing houses. Currently, producers are not charged for transportation of inoculated bags. While some producers have managed to construct their own incubation houses, their plans to increase production capacities are constrained by the limited number of access points for spawn and

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substrate preparation technology. It was found that the relatively more active and progressive farmers produce at most two (instead of the possible three) cycles in one growing house per year, leading to low and inconsistent supplies to the market.

b) Management of mushroom growing house

Producers raise their own capital to erect production houses and purchase inputs, except for substrate bags as indicated earlier. They use different forms of low-cost growing houses constructed from locally available material. In line with the training offered, over 75 percent of producers have growing houses measuring 3m by 4m by 3m. Despite that these houses can take up to 2 000 substrate bags at a time (FAO, 2001), respondents, however, were found producing below capacity as the houses carried between 400 and 1 000 substrate bags (15cm diameter and 30cm long).

Standard practice also dictates that a growing house should have, among other items, a thermometer and hygrometer for regulating temperature and humidity, respectively. However, none of these items was used by the interviewed producers, who instead indicated that they regulate the conditions using their intuition, especially after spotting certain anomalies from the mushrooms. This kind of subjective practice, also favoured by some (e.g. Gwanama *et al.*, 2011), often leads to erroneous decisions that are partly responsible for low production volumes. Even though the industry is currently dominated by small-scale producers, in attempting to commercialise mushroom production, producers should be trained on how to use these instruments and encouraged to use them as part of the daily growing house management practice. The following sub-section discusses the mushroom marketing process. It presents the major mushroom marketing channels, showing the distribution of gross margins among the different market participants.

4.3.2 Marketing of oyster mushrooms

Mushrooms are highly perishable commodities, and as such their marketing is invariably associated with high transaction costs. As opposed to other food commodities that have a longer shelf life (e.g. grains), mushrooms require rapid and refrigerated transportation to consumption centres or immediate processing into less perishable forms. In contrast to other countries, where similar mushroom programmes are implemented with a marketing

component (see Zamil and Cadilhon, 2009), producers in Swaziland do not have this privilege as they have to make their own marketing arrangements. Currently, no cultivated mushrooms are exported from Swaziland and producers have not yet engaged in any form of mushroom processing (Mamba, 2010; NAMBoard, 2012). Instead, from what they harvest, it was found that about six to ten percent is consumed at household level and the remainder sold through four channels identified as: (i) the farm gate; (ii) retail market (supermarkets); (iii) middlemen; and (iv) food services industry (restaurants/hotels). The marketing channels can be depicted as follows:

Channel I (Farm gate): Producers → Consumers;

Channel II (Retail market): Producers → Supermarket → Consumers;

Channel III (Middlemen): Producers → Middlemen → Supermarket →Consumers; and

Channel IV (Food services industry): Producers → Restaurant/hotel →Consumers.

About 528kg of fresh oyster mushrooms were traded by the respondents between November 2011 and January 2012 through the identified channels. Further analysis indicated that 42 percent was sold through the farm gate, 52 percent through the retail market, whereas two percent and four percent, respectively, were sold through middlemen and the food services industry. Buyers at the farm gate generally comprise locally based community members, whereas in the retail market and food services industry they include mainly the urban working class, tourists and customers with special diet preferences. Middlemen consist of a very few "entrepreneurial" mushroom producers who are able to negotiate with some retail outlets. These producers buy already-packed mushrooms from their counterparts at the farm gate price for onward sale at a better price; hence, benefitting from the margin. Although some producers who sell to such middlemen are aware of the price differences, in most cases they are compelled by lack of skills and confidence to negotiate with retailers. For others it is the lack of refrigerators that compels them not to rely on unpredictable buyer turnout from community members. A summarised flow of mushrooms from production to consumption is presented in Figure 4.1 below.
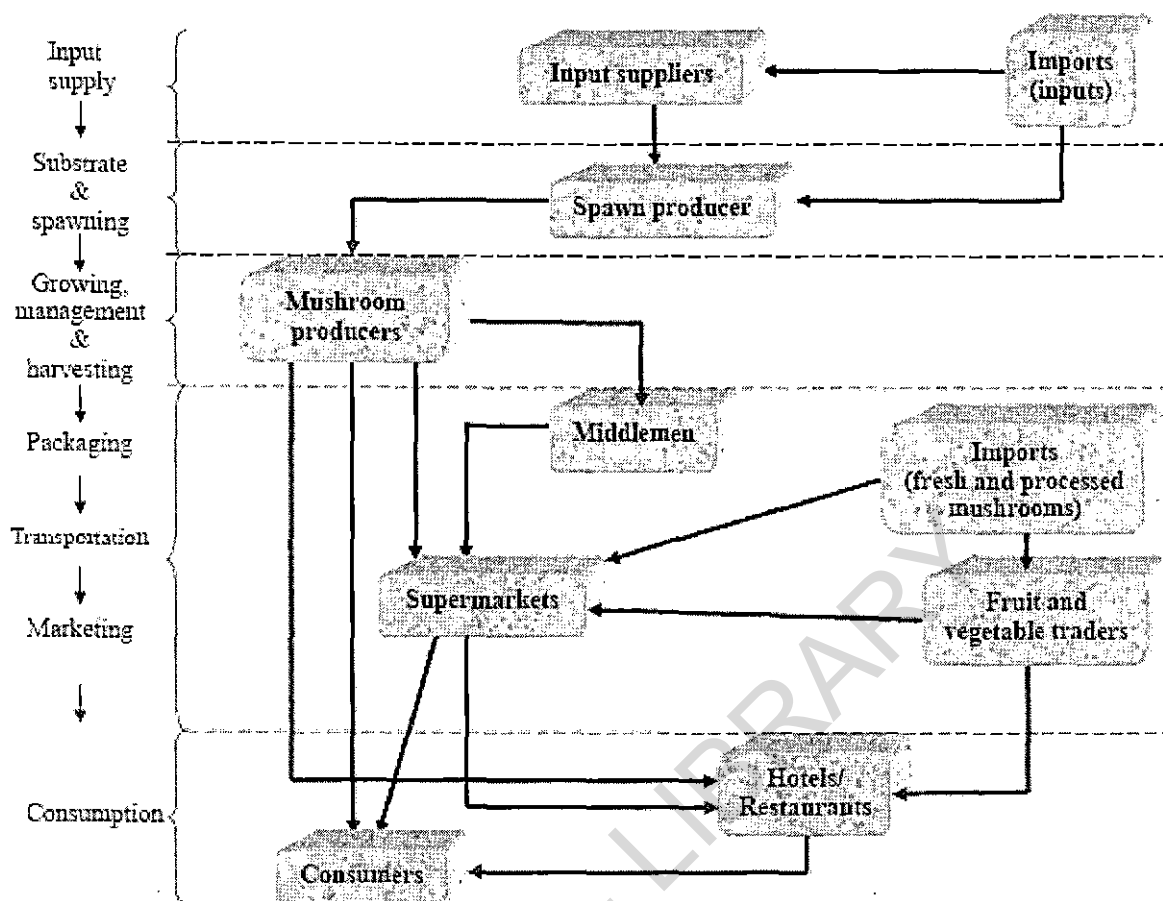
Figure 4.1: Product flow map for cultivated oyster mushrooms in Swaziland
Source: Authors' presentation (2011/12)

Due to the very low volume of locally produced mushrooms, supermarket chain stores, the major mushroom traders, often source a large proportion of their mushroom stock through their South African-based distribution centres. Compared with other Southern African countries, South Africa has a much advanced and better coordinated mushroom industry, which is dominated by large-scale producers and processors; hence, they are able to export fresh and processed cultivated mushrooms to different parts of the world, including several African countries (see NAMC, 2011). As shown in Figure 4.1, together with restaurants and hotels, supermarkets also buy from local fruit and vegetable traders who import mushrooms from South African fresh produce markets. In the absence of stock from private traders, restaurants and hotels buy imported mushrooms from local supermarkets. Unfortunately, details on imports from supermarkets and fruit and vegetable traders could not be obtained due to the sensitivity of such proprietary information. However, information gathered from both market intermediaries indicates that the button mushroom (*Agaricus* spp), currently not produced in Swaziland, has a comparatively higher consumer

demand than the oyster mushroom. In conformity with previous findings (e.g. Mayett *et al.*, 2006), consumers' preference of the button is mainly attributed to its flavour and appearance. Even though mushroom buyers appreciate the initiative taken by local producers to venture into such an industry, they are particularly concerned about producers' lack of capacity to supply the required volumes of different types of mushrooms, maintaining supply consistency and, to some extent, the inability to meet the required standards. The next sub-section discusses the distribution of gross margins among the identified participants in different mushroom marketing channels.

4.3.3 Distribution of gross margins along alternative mushroom marketing channels

Following Hardesty and Leff (2009), the variable costs and returns summarised in Table 4.1 were estimated using value chain actors' description of the chronology of activities performed from the period when mushrooms are cultivated to the point when they are finally sold to consumers. Computations were made on a per unit basis (kg of fresh mushrooms) for a producer who manages an enterprise of 400 substrate bags, the minimum enterprise size for interviewed producers, assuming he/she supplies an equal amount of mushrooms to the identified alternative marketing channels. One production cycle takes about three to four months, and within this period, mushrooms are harvested regularly, with the quantity produced declining gradually over time. A full production cycle will have about four peak harvests, also known as flushes (Gwanama *et al.*, 2011). Even though producers do not use hired labour, their labour costs were estimated based on the average time taken to perform each activity and the official minimum wage rate for agricultural general labourers (GoS, 2007). In channel I for instance, after the production stage labour is required for harvesting, weighing and packaging, and selling mushrooms to community members. Selling at the farm gate has no transportation cost as consumers buy the mushrooms from where they are produced at an average price of E41/kg. Considering the cost of packaging material and opportunity cost of labour, the farm gate's variable marketing cost was estimated at E5.71/kg.

Table 4.1: Estimated gross margins for market participants in different mushroom marketing channels, Swaziland, 2011/12

Marketing channels[†]	Market participants	Production and marketing costs	E/kg	Ratio of gross margin to consumer price[♣] (GM/CP)*100
I	Producer	Variable production cost (VPC)	8.99	64% (Producer)
		Variable marketing costs (VMC)	5.71	
		Consumer price (CP)	41.00	
		Gross margin (GM) = CP - (VPC+VMC)	26.30	
II	Producer	Variable production cost (VPC)	8.99	50% (Producer)
		Variable marketing costs (VMC)	10.34	
		Selling price to retailer (SP)	51.80	
		Gross margin (GM) = SP - (VPC+VMC)	32.47	
	Retailer	Purchase price (PP)	51.80	17% (Retailer)
		Variable marketing costs (VMC)	1.59	
		Consumer price (CP)	64.53	
		Marketing margin (MM) = CP - PP	12.73	
		Gross margin (GM) = MM - VMC	11.14	
III	Producer	Variable production cost (VPC)	8.99	42% (Producer)
		Variable marketing costs (VMC)	5.09	
		Selling price to middlemen (SP)	41.00	
		Gross margin (GM) = SP - (VPC+VMC)	26.92	
	Middleman	Purchase price (PP)	41.00	1% (Middleman)
		Variable marketing costs (VMC)	10.21	
		Selling price to retailer (SP)	51.80	
		Marketing margin (MM) = SP - PP	10.80	
		Gross margin (GM) = MM - VMC	0.59	
	Retailer	Purchase price (PP)	51.80	17% (Retailer)
		Variable marketing costs (VMC)	1.59	
		Consumer price (CP)	64.53	
		Marketing margin (MM) = CP - PP	12.73	
		Gross margin (GM) = MM - VMC	11.14	

Notes:
[†]Channel I: Producers → Consumers;
Channel II: Producers → Supermarkets → Consumers; and
Channel III: Producers → Middlemen → Supermarkets→Consumers.
Channel IV is not included in Table 5.1 for reasons explained in the text.
[♣]The ratio of gross margin to consumer price measures how much out of every E1 of sales to consumers a market participant earns in the respective channels.
Source: Survey data (2011/12)

In channel II the average producer price for the retail market is E51.80/kg. Upon receiving the already-packed mushrooms, supermarkets screen them for quality using their own procedures, which are mainly based on visual inspection for browning, weight loss and microbial spoilage. Producers who sell to the retail market travel distances of at least 10

km, with about 64 percent required to travel over 30 km. Most (84 percent) of these farmers rely on public transport, which exposes the mushrooms to unfavourable conditions. Given that mushrooms emerge in flushes, as indicated earlier, the number of trips to the market is dictated by the quantity harvested. On average, producers make ten return trips per cycle, each covering about 70 km using public transport. Transport cost was estimated at E4.63/kg, labour cost at E3.79/kg, and the remainder (E1.92/kg) being the cost of packaging material. The average consumer price from supermarkets is E64.53/kg with variable marketing costs averaging E1.59/kg. Variable marketing costs for retailers consist mainly of labour costs for receiving, screening, weighing, pricing and packaging. The cost of labour was estimated using the average time taken to perform the afore-listed activities and the official minimum wage rate for the retail and distribution sector (GoS, 2011b). In supermarkets, mushrooms are displayed in refrigerators and generally sold out within a day. Even though data on the price of electricity was gathered (E0.99/KWh), the analysis did not incorporate storage costs as the refrigerators are used to display other types of food items at the same time. In channel III, middlemen buy the already-packed mushrooms from producers at E41/kg and transport them using their own vehicles to retailers where they are sold at an average price of E51.80/kg. Estimations indicate that middlemen spend an average of E9.26/kg on transport and E0.95/kg on labour.

Another category of buyers identified in sub-section 4.3.2 is the food services industry (restaurants and hotels), which adds value by cooking the mushrooms as part of different recipes. Given that mushrooms are rarely cooked alone, but in combination with various food products and ingredients, costing the value added by the food services industry proved to be an insurmountable challenge. Hence, the value chain analysis does not include channel IV. Under the current programme, where farmers are supported with free substrate bags and transportation of inoculated bags, the variable cost of producing oyster mushrooms is about E8.99/kg. Without this kind of support, the enterprise would still be profitable even though variable production costs would increase by approximately E3.57/kg. Table 4.1 indicates that producers currently enjoy higher gross margins (in absolute value (E/kg) and as a proportion of the consumer price) compared with other participants in alternative marketing channels. The proportion, however, reduces with an increase in the marketing channel's number of participants. The estimations indicate that producers currently earn relative gross margins of about 64 percent from selling at the farm gate, 42 percent from selling through middlemen, and 50 percent from selling directly to

retailers. Although the gross margins are lower from selling directly to the retail market, mainly as a result of transportation costs, a large quantity (52 percent) of the mushrooms was traded through this channel as supermarkets offer a comparatively higher producer price and a relatively more dependable market. Besides the absence of written marketing contracts and having less bargaining power in setting exchange prices, producers who sell through the retail channel do not have to rely on unpredictable buyer turnout as is the case with the farm gate option. While the middlemen provide an important link between some producers and retailers, a very small quantity of mushrooms was traded through channel III. Worth noting as well is that the benefits attained by middlemen are far less attractive compared with those of other market participants in the value chain. This is largely attributed to the fact that middlemen hardly add any value from what they buy from their counterparts. Hence, retailers have no incentive to buy their supplies at prices different from those offered to other producers.

Producing at full capacity (2000 spawn-impregnated bags) from the small growing houses (3m by 4m by 3m) can generate returns over variable costs of about E11,498.00 in a period of three to four months. This amount is not negligible for rural dwellers in Swaziland, most of whom are unemployed and have limited livelihood options. The mushroom enterprise provides an alternative economic activity, particularly for households located in drought-stricken areas where rain-fed agriculture has been almost impossible since the early 2000s. Producers, though, can still increase income and improve consistency in market supply by establishing their own incubation rooms, improving management practices and staggering production schedules. The major institutional factors constraining mushroom production and value-addition are discussed in the following sub-section.

4.3.4   Institutional environment

Certain organisations, because of their internal policies or regulations, make decisions and undertake various programmes that have important implications for value chain activities. Although not directly involved in the production and distribution of products and services in the industry, these organisations are likely to influence the institutional environment, and consequently, the performance of certain activities by other value chain actors (Webber and Labaste, 2010; Trienekens, 2011). Four such organisations were identified in the study as the MDU, Food Science and Technology Unit (FSTU), National Agricultural

Marketing Board (NAMBoard) and the supermarket chain stores. Besides producing and selling spawn, the MDU is responsible for training farmers in mushroom production, importation of substrate bags, and act as a link between the government and stakeholders in the mushroom industry. Since 2009, the MDU has trained over 970 people in basic oyster mushroom production and only about a third of this number are currently engaged in mushroom production. However, as one of the industry's lead actors, the MDU has not convened a single stakeholders' consultative forum since 2001. Such forums could enable value chain actors to establish networks and allow the MDU to receive feedback on areas that require improvement. The FSTU, also under the Ministry of Agriculture, is mandated to offer training services in food processing and value addition. However, this unit does not have the capacity to impart the skills required by producers to venture into mushroom processing and value-addition. Despite the various forms of mushroom processing opportunities (see Rai and Arumuganathan, 2008), not a single local farmer has received training in this field since 2001. Worth highlighting though is that substantial investment in commercial processing and value-addition is also constrained by Swaziland's unfavourable regulatory framework. For instance, Swaziland's Canning Control Act (GoS, 1961) gives the power for controlling the development of food processing to the Minister of Agriculture through issuing of licences. This Act, which also gives the Minister the prerogative to issue an exclusive licence to "any person for such period as he may deem fit", hinders the participation of prospective investors. Therefore, attempts to improve the general food processing environment in Swaziland would require a comprehensive revision of such counterproductive legislation.

NAMBoard is a government parastatal responsible for the overall coordination of agricultural marketing and trade, and issuance of permits to traders willing to import agricultural products. It was gathered that when the mushroom programme was incepted in 2001, a formal market was established with NAMBoard, which collected mushrooms from producers using refrigerated transport. However, because of the limited production capacity and inconsistent supply, NAMBoard withdrew its support, leaving producers to establish their own marketing arrangements. Worth highlighting is that mushrooms are listed under NAMBoard's scheduled products, implying that for every import of mushrooms, the parastatal receives an import levy equivalent to 7.5 percent of the total value. While the collected levies are meant to protect the local industry, government's regulations dictate that NAMBoard should use the generated revenue to develop local

capacity to produce the same commodity (GoS, 2011c). Despite Swaziland importing over 240 tons of locally consumed cultivated mushrooms valued at about E2.4 million annually (NAMBoard, 2012), no tangible investment has been made by NAMBoard in the mushroom industry thus far.

By virtue of being the most preferred selling point for local mushroom producers, and the convenient source of supply for consumers, supermarkets' procurement policies may not only have consequences on the inclusion and exclusion of certain actors in the value chain, but also long-term prospects for the entire mushroom industry in Swaziland. Given their leverage, some supermarkets have gone to the extent of negotiating with local producers to supply them with button mushrooms instead of the oyster, as the latter has a comparatively less consumer demand. By so doing, supermarkets have sent a signal that even though the oyster mushrooms could be relatively easier and less costly to produce, in order for producers (and other actors) to participate competitively and sustainably in the value chain, they should consider diversifying towards other types of mushrooms in response to consumer demand.

In view of the possible increase in market supply (as a result of diversification, improved production capacity, and staggered production schedules), parallel plans are required to establish an integrated value chain governance system to coordinate the movement of mushrooms from initial producers to ultimate consumers. Drawing from the identified constraints, the next section presents possible options that could be considered in fulfilling the above expectations.

4.4   Possible interventions for upgrading the mushroom value chain governance and coordination system

Even though the current programme prioritises the oyster mushroom, this chapter highlights the existence of a broad market for other types of mushrooms, especially the button. This is an opportunity for producers to diversify within the industry, a decision that may not be difficult to make, given the knowledge and experience gained thus far. However, the same cannot be said about aspiring farmers who have not been trained as they cannot seize the available opportunity. The major constraint in this case is that the MDU is the only organisation with the capacity to provide such expertise. Considering

their low staff complement, it would take a while to train a substantial number of aspiring producers. This calls for the government to either increase its staff complement and facilities or alternatively establish strong alliances with NGOs to complement their training and extension programmes. Another option would be to train and identify lead farmers in strategic locations and, thereafter, facilitate farmer-farmer interactions to impart similar skills to other aspiring producers. Otherwise, opportunities to engage the private sector could also be explored. However, caution should be exercised to ensure that farmers are offered quality training and are not charged exorbitant fees.

As farmers diversify to incorporate other types of mushrooms, a demand for more production inputs will be created. Substrate availability should not be a major challenge given the abundance of agricultural and industrial waste in Swaziland. However, considering that spawn production and the technology used for substrate preparation are currently centralised and only offered by the MDU, it would benefit the entire industry if the government could privatise some of the services and allow the MDU to assume a monitoring role. As one of the lead actors in the industry, the MDU could also take the initiative to launch consultative forums with stakeholders in an attempt to establish networks and synergies among value chain actors, and possibly forge strategic public-private partnerships (PPPs). Central to this approach is the identification of a common interest space, within which activities may emerge from objectives shared by both partners. It is through such networks that prospective investors could be identified to take up opportunities, particularly in areas where Swaziland currently relies on imports (and donations) even for simple technologies (e.g. substrate cutting and mixing machinery) that could be manufactured and supplied by local entrepreneurs. Through the establishment of collaboration structures, stakeholders could also devise strategies for influencing the removal of counterproductive legislation currently stifling value-addition.

The lack of a prescribed quality management and tracing system for traded mushrooms is another area worth looking into. While buyers did not identify quality as their major concern, the absence of easily measurable quality standards subjects producers to having their mushrooms bought at lower prices or even rejected without informed justifications. Furthermore, as the industry expands, a parallel trade in wild mushrooms is likely to emerge. In the absence of mushroom food safety regulations, this kind of trade could compromise the lives of consumers and the industry's reputation as desperation for income

could lead to opportunists selling even the poisonous type of mushrooms to unsuspecting consumers. These issues could also be addressed through the proposed stakeholder forums.

With the current lack of coordination in mushroom marketing, major buyers are not spared from encountering transaction costs, given the small-scale exchanges they engage in with individual producers. However, changes that could allow the same volume of business to be concentrated in a smaller number of relatively larger and more secure transactions would benefit buyers and producers alike. This can be made possible by promoting collective marketing through the existing farmer groups. Collective marketing would also enable producers to strengthen their bargaining position, share, and reduce marketing and transaction costs related to the search for buyers, monitoring transactions and transportation of mushrooms to distant markets. In view of the sparse distribution of producers, marketing and transaction costs could also be reduced by establishing collection centres (fitted with temperature-controlled storage facilities) in strategic areas, and using refrigerated transport to convey mushrooms from these centres to mainstream markets. These assets would be important in preserving product quality and freshness. While mushroom producing groups could raise the capital required to fund such investments from their own resources, it would take them a while to do so considering their economic status. Alternative funding could be sourced from state-owned Development Finance Institutions (DFIs) such as Swazibank, Swaziland Industrial Development Company (SIDC), and Swaziland Development Finance Corporation (FINCORP), which were established with a mandate to finance small and large-scale local enterprises, including agribusinesses (Msibi, 2009). Building on a successful model used since the early 1990's to finance sugarcane production by previously inexperienced farmers on customary SNL, these DFIs have recently expanded their portfolios to finance even commercial horticultural and livestock enterprises on both Individual Tenure Farms (ITFs) and customary SNL. In contrast to commercial banks, which require collateral and are generally not keen to finance small-scale agribusinesses, local DFIs have adopted a pro-poor financial innovation that uses contracts between producers and buyers as a collateral substitute. A tripartite agreement is then entered into by the producers, financier and buyer to facilitate repayment, which the financier reclaims directly from the buyer (Msibi, 2009).

However, given that current mushroom producers generally have limited agribusiness exposure, some form of outside assistance would be required to improve their

competitiveness in the value chain. Engaging a facilitator who would, among other expectations, provide information and technical assistance could enhance producers' prospects to even venture into export markets. While a number of agencies, such as NGOs (Fischer and Qaim, 2012), could be considered, NAMBoard would be better suited for this role. Despite its subdued performance since its establishment in 1985, some positive lessons could be drawn from NAMBoard's recent experience in linking local vegetable producers with export markets and the attainment of Global Good Agricultural Practice (GLOBALG.A.P) certification. Hence, an option that could be viable under the current environment, would be to use the revenue generated from mushroom import levies to fund the establishment of collection centres and purchase of refrigerated means of transport, which would initially operate under the joint management of NAMBoard and mushroom producing groups. NAMBoard, working jointly with farmer groups, would assume the responsibility to find remunerative markets. As conditions improve and producers graduate to a position where they can manage the processes on their own, government may then consider withdrawing its support gradually. In order to sustain the groups' activities and cover collection centres' operational expenses, a small fee per kg of mushrooms sold could be deducted from individual sales and deposited into a working capital fund. Group members can also be responsible for providing security to avoid misuse and theft of the investment. Similar strategies have been successfully implemented towards assisting Kenyan small-scale milk and banana producers (see Staal *et al.*, 1997; Fischer and Qaim, 2012). However, coordination in the milk sub-sector was later affected by politically-related factors (Staal *et al.*, 1997), an unfortunate incident that other developing countries could probably learn from.

4.5   Summary

This chapter applied the value chain approach to identify the underlying factors constraining mushroom production and producers' participation in mainstream markets in Swaziland. Among the important findings in this chapter is that producers' plans to expand production capacities are hampered by the difficulty to access key inputs such as spawn, substrate preparation technology, and incubation services, which are centralised and fully controlled by the government. Most farmers produce below capacity in relatively small, low-cost structures, which are also not well equipped. As such, they apply relatively primitive methods to regulate the temperature and humidity in the growing houses. These

constraints are partly responsible for the extremely low locally produced volumes and inconsistent market supply, prompting local mushroom traders to rely on imports. Other constraints relate to the lack of diversification as farmers currently produce only the oyster mushroom, yet buyers are mostly interested in the button mushroom, which is favoured by consumers for its appearance and taste.

Currently, no cultivated mushrooms are exported from Swaziland and producers have not yet engaged in any form of mushroom processing. Producers trade their mushrooms through four channels identified as: (i) the farm gate; (ii) retail market (supermarkets); (iii) middlemen; and (iv) food services industry (restaurants/hotels). Among these four channels, the retail market is currently the most favoured because it offers a stable market and a relatively high producer price. Although producers currently attain higher gross margins in absolute value and as a proportion of consumer price compared to other participants in alternative marketing channels, more benefits could be realised if certain services currently offered by the government (e.g. training, spawn production and distribution) could be privatised, allowing public institutions (e.g. MDU) to assume a monitoring role.

In view of the possible increase in market supply (as a result of diversification, improved production capacity, and staggered production schedules), Swaziland would benefit from establishing an integrated value chain governance system to improve market access and facilitate the movement of mushrooms from producers to ultimate consumers. Having identified the predominant mushroom marketing channels, the next chapter presents the empirical results and discussion of how transaction costs affect producers' selection of these channels and the quantity of mushrooms to trade through the preferred channels.

CHAPTER 5

EFFECTS OF TRANSACTION COSTS ON MUSHROOM PRODUCERS' CHOICE OF MARKETING CHANNELS: IMPLICATIONS FOR AGRICULTURAL MARKET ACCESS IN SWAZILAND[8]

5.1   Introduction

This chapter presents the empirical methods, results and discussion of the effects of transaction costs on producers' choice of marketing channels and the quantity of mushrooms supplied. The rest of the chapter is structured as follows: Section 5.2 outlines the methodology, which constitutes the conceptual framework, empirical model, and data collection procedures. Section 5.3 discusses the empirical results, while section 5.4 concludes the chapter with a summary of the findings.

5.2   Methodology

5.2.1   Conceptual framework

In deciding where to sell a particular commodity, producers base their decisions not only on the price they expect to receive, but also on additional costs related to transacting in available markets (Jaffee, 1995). Considering that transaction costs alone could be a major barrier to market participation, farmers are more likely to choose to supply their commodities through a channel that has less transaction costs in their quest to maximise profit (Key *et al.*, 2000). However, transaction costs have a large unobservable component; hence, they are difficult to quantify. As indicated in chapter two, such challenges have unsurprisingly resulted in the dearth of literature on the direct measurement of exchange-related costs, particularly in the area of agricultural marketing (Hobbs and Kerr, 1999). Where attempts have been made previously, researchers (e.g. Gabre-Madhin, 2001; Royer, 2011) have based their estimation on the opportunity costs of alternatives, which are also not easily identifiable or quantifiable. As such, aspects like market information search and bargaining procedures are rarely included in most studies and are unlikely to be comprehensive when included. Despite Collins and Fabozzi's (1991) contention that no one approach of conceptualising and estimating transaction costs is best in all

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[8] This chapter gave rise to the following publication: Mabuza, M.L., Ortmann, G.F. and Wale, E. (*in press*). Effects of transaction costs on mushroom producers' choice of marketing channels: Implications for agricultural market access in Swaziland. *South African Journal of Economic and Management Sciences.*

circumstances, in attempting to address the above-indicated inherent challenges, this study borrows from the framework postulated by Vakis *et al.* (2003), which provides a dependable setting for studying producers' channel choices and quantity supplied as a function of commodity prices and two broad categories of proportional and fixed transaction costs.

Following Vakis *et al.* (2003), if there exist J available markets where a certain quantity of mushrooms q_i can possibly be sold, the producer's marketing strategy is conceptualised to be influenced by a number of factors. Firstly, selling in market J for a given transaction i could be associated with proportional transaction costs TC_{ij}^p that may arise due to various factors including the distance d_{ij} and time m_{ij} to reach market j_i, and other individual-specific characteristics z_{ij}^p such as the difficulty to access transport. This can be expressed as:

$$TC_{ij}^p = TC^p(d_{ij}, m_{ij}, z_{ij}^p). \tag{5.1}$$

Secondly, the producer considers the expected price p_{ij} likely to be received from alternative markets. The price is decomposed into:

$$p_{ij} = \bar{p}_j \pm B(q_i, z_i^b) \tag{5.2}$$

where $\bar{p}_j$ is a market specific price and $B(q_i, z_i^b)$ is the potential price mark-up that the producer expects to receive. The mark-up depends on the quantity of mushrooms sold q_i and other bargaining-related attributes such as product quality z_i^b. Finally, selling in market j_i could also be associated with fixed transaction costs $TC^f(z_{ij}^f)$ that are invariable with the quantity sold and include costs like searching for potential buyers and obtaining information about prices, markets, or types of possible contractual arrangements.

Based on the above, and for a given transaction i, a producer chooses to sell q_i in the j_i market that yields the highest net profit among the $k = 1,..., J$ alternative markets. This can be expressed as:

$$j_i = \max_k \left\{ \Pi_{ik} = q_i \cdot [(\bar{p}_{ik} \pm B(q_i, z_i^b) - TC_{ik}^p(d_{ik}, m_{ik}, z_{ik}^p)] - TC^f(z_{ik}^f), k = 1,..., J \right\}. \tag{5.3}$$

So, assuming there are two alternative markets (j_1 and j_2), a producer will choose to sell to j_1 if

$$\left\{ \Pi_{1k} = q \cdot [(\bar{p}_{1k} \pm B(q_1, z_1^b) - TC_{1k}^p(d_{1k}, m_{1k}, z_{1k}^p)] - TC^f(z_{1k}^f) \right\} >$$

$$\left\{ \Pi_{2k} = q \cdot [(\bar{p}_{2k} \pm B(q_2, z_2^b) - TC_{2k}^p(d_{2k}, m_{2k}, z_{2k}^p)] - TC^f(z_{2k}^f) \right\}. \tag{5.4}$$

However, he/she will sell to j_2 if $\Pi_{2k} > \Pi_{1k}$, and will be indifferent if $\Pi_{2k} = \Pi_{1k}$. The empirical model used to study the effects of transaction costs on producers' choice of marketing channels is discussed in the following sub-section.

5.2.2 The empirical model

Upon realising some marketable surplus, producers usually make two types of decisions in relation to their marketing strategy. The first decision relates to the choice of a marketing channel, and the second on the quantity of the produce to supply through the selected channel. With very few exceptions (e.g. Shiimi *et al.*, 2012), most previous related studies (e.g. Hobbs, 1997; Gong *et al.*, 2007; Woldie and Nuppenau, 2011) have analysed the effects of transaction costs on these two choices using the Tobit model, implying that farmers make these decisions simultaneously. The broader inference of these studies is that farmers' supply of commodities is price inelastic, an attribute which entails that farmers are less likely to adapt to changing market conditions, making them more susceptible to conditions set by buyers. Other researchers (e.g. Katchova and Miranda, 2004), however, contend that such marketing decisions are made sequentially, suggesting that producers pay attention to market conditions, and with the information gathered, they first decide whether or not to participate in a particular channel prior to making the decision on the proportion of the commodity to sell through the selected channel. Sequential decisions are analysed using two-step approaches such as the Cragg's model, also known as the double-hurdle model (Green, 2003).

Within a simultaneous decision-making framework, the dependent variable is captured as the proportion of the commodity sold through the preferred channel. Given that producers who do not participate in this channel will record zero percent of the commodity sold, the dependent variable becomes censored at a threshold of zero, necessitating the use of a Tobit model (Green, 2003). The principal underlying assumption of the Tobit is that the probability of channel choice also increases the average quantity of the commodity supplied; hence, the effect of a particular variable will be the same on the choice of marketing channel and the proportion of quantity supplied (Burke, 2009). It is against such

attributes of the Tobit that Cragg (1971) proposed the more flexible double-hurdle model, which allows the outcomes to be determined by separate stochastic processes. Following Green (2003), Cragg's model is specified as follows:

Channel choice equation

$$\Pr[y_i^* > 0] = \Phi(x_i'\gamma), \qquad z_i = 1 \text{ if } y_i^* > 0$$
$$\Pr[y_i^* \leq 0] = 1 - \Phi(x_i'\gamma), \qquad z_i = 0 \text{ if } y_i^* \leq 0 \qquad (5.5)$$

Quantity decision

$$E[y_i | z_i = 1] = x_i'\beta + \sigma\lambda_i \qquad (5.6)$$

where γ and β are coefficients to be estimated, y is the observed use of the preferred marketing channel, and x represents the factors hypothesised to affect the producers' marketing behaviour. Cragg's model is a combination of the Probit in equation 5.5 (choice of marketing channel) and a Truncated regression model in equation 5.6 (quantity sold), which can be estimated independently. If $z_i = x_i$ and $\gamma = \beta/\sigma$, Cragg's model reduces to the Tobit model, causing the variables to influence the channel choice decision and quantity supplied in the same manner. In attempting to get an indication of whether marketing decisions by mushroom producers in Swaziland are made simultaneously or sequentially, a Likelihood Ratio (LR) test is conducted wherein the Tobit is tested against Cragg's model by respectively estimating the Tobit, Probit and Truncated regression models using the same variables, and thereafter computing a Likelihood Ratio (LR) statistic as follows (Green, 2003):

$$\lambda = -2[\ln L_T - (\ln L_P + \ln L_{TR})] \qquad (5.7)$$

where $\ln L_T$ = log of the likelihood for the Tobit model; $\ln L_P$ = log of the likelihood for the Probit model; and $\ln L_{TR}$ = log of the likelihood for the Truncated regression model. λ has a χ^2 distribution with R (df), where R is the number of independent variables plus the constant. The Tobit model is rejected in favour of Cragg's model if λ exceeds the appropriate χ^2 critical value. The next sub-section discusses the dependent and explanatory variables used in the empirical model.

5.2.3 Dependent and explanatory variables

a) Dependent variable

As indicated in chapter four, no cultivated mushrooms are currently exported from Swaziland and producers have not yet engaged in any form of mushroom processing. Instead, from what they harvest, about six to ten percent is consumed at household level and the remainder is sold through four channels identified as: (i) the farm gate; (ii) retail market (supermarkets); (iii) middlemen; and (iv) food services industry (restaurants/hotels). Some producers reported to have sold mushrooms through different channels, indicating that the options are not mutually exclusive. On account of these observations, and for ease of analysis, producers who sold to more than one outlet ($j_1,....,j_4$) were adjudged to prefer selling through j_1 if a greater proportion of their marketable surplus was sold through j_1 compared to what they sold to other j outlets. Subsequent to the re-classification according to preference, two marketing channels were found prominent, and these were supermarkets (or retail outlets) used by 53 percent of the respondents and the farm gate used by 47 percent. Considering the above observations, the dependent variable was formulated around the retail market option; hence, a value of one was assigned if the producer sold through the retail market channel and zero if the produce was sold at the farm gate. For the quantity model, the dependent variable was the proportion of mushrooms sold through the retail channel, ranging between 0 and 100 percent.

b) Explanatory variables

Transaction cost variables were measured by ranking producers' responses to a list of questions related to the constraints they encounter in marketing their mushrooms. The set of questions were classified into three components, namely (i) information and search costs; (ii) negotiation, bargaining, and transfer costs; and (iii) monitoring and enforcement costs. The adopted measurement criterion works on the premise that transaction costs are assumed to be observable if, *ceteris paribus*, a particular type of transaction cost is higher in channel (j_1) than in channel (j_2), and different producers consistently specify the same ranking whenever the two situations are considered (Cheung, 1998). The explanatory variables are discussed below and summarised in Table 5.1.

Table 5.1: Variables included in the Tobit and Cragg's regression models

Dependant variables			
Variable	**Description**	**Measurement**	
Marketing channel through which mushrooms are sold	Selling at the farm gate or retail market?	1= retail market; 0 = farm gate	
Proportion of mushrooms sold	% of total mushrooms sold	0 – 100	
Household characteristics			
Variable	**Description**	**Measurement**	**Expected sign**
1. Education level of producer	Category last attended	1= Illiterate; 2= Adult education; 3= Primary; 4= Secondary; 5= High school; 6= College/Vocational 7= University	+
2. Household labour endowment	Man-equivalents	Less than 9 yrs=0; 9-15=0.7; 16-49=1; above 49=0.7	+
Production			
3. Size of production	Spawn-impregnated bags[a]	Number	+
4. Ownership of refrigerator	Does the household own a refrigerator?	1=yes; 0=no	+
5. Group membership	Is the producer a member of a mushroom producing group?	1=yes; 0=no	+
Information and search costs			
6. Knowledge of prices in alternative markets	Was the price in alternative markets known before selling the mushrooms?	1= yes; 0 = no	-/+
7. Difficulty in accessing price information	How difficult is it to access price information?	1=not an issue of concern; 2=very easy; 3=easy; 4=difficult; 5=very difficult	-
Negotiation, bargaining and transfer costs			
8. Search for trading partner	How difficult is it to locate exchange partners/buyers?	1=not an issue of concern; 2=very easy; 3=easy; 4=difficult; 5=very difficult	-
9. Transportation difficulty	How difficult is it to transport your produce to the market?	1=not an issue of concern; 2=very easy; 3=easy; 4=difficult; 5=very difficult	-
10. Bargaining power	Who sets the exchange price?	1=producer; 0= buyer or both	+
Monitoring and enforcement costs			
11. Quality uncertainty	Is there uncertainty that your mushrooms will not meet the expected quality of preferred buyer?	1=yes; 0= no	-

Note: [a]'Spawn-impregnated bags' are substrate bags that have been inoculated with the mushroom seed, known as spawn (Gwanama *et al.*, 2011).

Information and search costs

Prior to making any exchange, producers will, among other expectations, be required to establish who to sell their mushrooms to and the prices at which to sell them. By so doing, they will incur information costs whose magnitude depends on the time taken to conduct the search. Going into production without the knowledge of current prices in alternative markets creates some uncertainty in that despite making their own price expectations, producers will have no guarantee that they will eventually receive that price unless they know in advance which price the buyer will agree to buy at (Hobbs, 1997). Similar to

Woldie and Nuppenau (2011), information cost due to such price uncertainty was measured by considering whether farmers knew the price in alternative markets ahead of transacting, while the search for price information and trading partner(s) were measured by taking into account the difficulty with which the two were accomplished, respectively.

Negotiation, bargaining and transfer costs

Smallholder farmers are generally price takers and the level of transaction costs is likely to increase if they need to travel long distances to reach their point(s) of sale (Pingali *et al.*, 2005). While transportation costs may not be considered by some researchers as a transaction cost component, the inclusion of transport-related variables in this study was meant to account for the opportunity cost of producers' time spent in organising transport to convey their mushrooms to distant markets. Farmers' bargaining position was considered as a measure of their influence on exchange agreements, particularly in the setting of exchange prices. Gong *et al.* (2007) and Woldie and Nuppenau (2011) found that farmers who produce in bulk tend to enjoy relatively more bargaining power and are likely to influence buying terms. Therefore, it is expected that producers would be inclined to supply a greater proportion of their commodity through a channel where they have a better bargaining position.

Monitoring and enforcement costs

One of the key monitoring costs considered in the study is quality uncertainty. While there are currently no formal quality standards for traded mushrooms in Swaziland, supermarkets, the major buyers, generally screen delivered mushrooms for quality based on visual inspection for browning, weight loss and microbial spoilage. Producers' returns are likely to be lower than anticipated if mushrooms do not meet the buyers' expected quality standards. Mushrooms are highly perishable products and, as observed by Fraser (1995), if the producer faces some uncertainty about selling his/her mushrooms due to quality considerations, perishability could be of grave concern as he/she may either sell at a reduced price (due to shrinkage) or not sell at all due to advanced spoilage. The inclusion of this variable was based on evidence provided by Hobbs (1997) and Gong *et al.* (2007) who found that high levels of quality uncertainty are more likely to result in producers selling their mushrooms through a channel with no stringent quality requirements. No

variable was included in the model to capture enforcement costs as none of the farmers had valid contracts of any form with their buyers, except verbal agreements for those supplying retail outlets. Furthermore, no conflicts were reported that perhaps warranted follow-up visits or calls from producers as a result of delayed or defaulted payments.

Household and production attributes

While it is generally believed that transaction costs reflect the character of the market, others (e.g. Pingali *et al.*, 2005) posit that transaction costs are mainly entrenched in the characteristics of individual producers and the environment they live in. In particular, Pingali *et al.* (2005) argue that the time taken to search, process and act on market information decreases with better education. Others (e.g. Fafchamps and Hill, 2005) have found that farmers who produce in large quantities are more likely to travel to the market in search for relatively higher exchange prices. These two factors were, respectively, analysed by considering producers' level of education and the number of spawn-impregnated bags they manage. In addition, given the perishability of mushrooms and the amount of work required in the enterprise, it was found prudent to include other variables to account for ownership of cooling facilities (refrigerators) and household labour endowment, respectively. Considering members who were identified to participate in household agricultural activities, household labour endowment was measured following Langyintuo and Mungoma (2008) in man-equivalents (see Table 5.1). The identified members include even school-attending children who also participate in household agricultural activities, especially outside school-attending hours including weekends and holidays. The following sub-section presents the data collection procedure.

5.2.4   Data collection

The analysis for this chapter relied on the same dataset of 91 producers used in chapter four, whose descriptive statistics are presented in sub-section 5.3.1. The next sub-section presents the study's empirical results. It begins with an overview of the descriptive statistics of variables used in the analytical model, followed by a discussion of the significant factors affecting producers' channel choice decisions and quantity of mushrooms supplied. All estimations in this chapter were carried out using STATA 11 (StataCorp, 2009).

5.3 Empirical results and discussions

5.3.1 Descriptive statistics of variables used in the Tobit and Cragg's models

The descriptive statistics are summarised in Table 5.2 below.

Table 5.2: Descriptive statistics of variables used in the Tobit and Cragg's regression models

[A] Variable	[B] Unit	[C] % of *Total respondents* (N=91)	[D] % of [C] from *Retail* (N=48)	[E] % of [C] from *Farm gate* (N=43)	[F] χ^2-value
Categorical variables					
Gender of producer	Female	74.7	55.9	44.1	1.061
	Male	25.3	43.5	56.5	
Membership in mushroom producing group	Member	65.9	53.3	46.7	0.024
	Non- member	34.1	51.6	48.4	
Ownership of refrigerator	Yes	58.2	64.2	35.8	6.622***
	No	41.8	36.8	63.2	
Knowledge of producer price in alternative markets	Yes	37.4	55.9	44.1	1.622
	No	62.6	42.1	57.9	
Bargaining power (who sets the producer price?)	Producer	64.8	28.8	71.2	38.560***
	Buyer or both	35.2	96.9	3.1	
Quality uncertainty	Yes	36.3	75.8	24.2	10.999***
	No	63.7	39.7	60.3	
Type of transport used[b]	Own vehicle	Percentage	13.2	91.7	8.3	63.705***
	Public transport	Percentage	48.4	84.1	15.9	
	By foot	Percentage	11	0	100	
	No need to travel	Percentage	27.5	0	100	

Variable	Unit	Mean of *Total respondents* (N=91)	Mean *Retail* (N=48)	Mean *Farm gate* (N=43)	*t*-value
Continuous variables					
Age of producer	Years	50	50	49	-0.588
Labour endowment	Man-equiv.[†]	4.8	4.6	4.8	-0.356
Number of spawn-impregnated bags	Bags	502	401	581	-2.462**
Producer price[b]	E/kg^3		51.80	41.00	-3.505***

Variable	Unit	Mode of *Total respondents* (N=91)	Mode *Retail* (N=48)	Mode *Farm gate* (N=43)	χ^2-value
Ordered variables					
Difficulty in accessing price information	Modal score[†]	3	4	3	14.500***
Difficulty in locating trading partner	Modal score[†]	3	3	3	5.931
Difficulty in accessing transport	Modal score[†]	1	1	1	5.032
Producer's education level	Modal score[†]	4	4	3	12.144**
Distance to market[b]	Modal score[♦]	0	7	0	79.021***

Notes:
[b] indicates variables not included in the regression model
[†]Refer to Table 6.1 for measurement of variables
[♦] 0=no need to travel; 1=less than 1km; 2=1-2km; 3=2.1-3km; 4=3.1-4; 5=4.1-5; 6=5.1-10km; 7=above 10km
Source: Survey data (2011/12)

Table 5.2 indicates that the average age of interviewed producers is 50 years, and the majority (75 percent) are women. Almost 58 percent own refrigerators, of whom 36 percent sell at the farm gate, while the rest supply the retail market. The producers have a relatively low level of education as slightly over 65 percent did not go beyond secondary school. About 63 percent indicated that they do not have access to price information in alternative markets and 58 percent of producers in this category sell their mushrooms at the farm gate. Of the 65 percent who indicated to be selling at prices set by themselves, 71 percent sell at the farm gate, while the remainder use either their own vehicles or public transport to convey mushrooms to the nearest retail outlets. Producers who sell at the farm gate have lower uncertainty about the quality of their mushrooms which they sell at relatively less producer prices. Due to poor customer turnout in some areas, only 11 percent indicted to occasionally walk around the neighbourhood in search for buyers as a means to avoid losses resulting from spoilage. Farmers who are more inclined to sell to the retail market are those who manage a significantly higher number of spawn-impregnated bags. About 66 percent of the producers are affiliated to mushroom producing groups, of whom 53 percent prefer the retail market to the farm gate. Although retail suppliers appear to be significantly better educated, Table 5.2 indicates that these same producers face considerable difficulty in trying to access price information. These results are not surprising given that Swaziland does not have a Market Information System (MIS). The emperical results and discussion of the effects of transaction costs on producers' channel choice decisions and the quantity of mushrooms supplied are presented in the next sub-section.

5.3.2 Factors affecting channel choice and quantity supplied

Having detected no significant multicollinearity among the explanatory variables, the regression models were subsequently estimated, and the results are presented in Table 5.3. With a Likelihood Ratio (LR) of 99.63 at 12df ($p<0.01$), the Tobit model was rejected in favour of Cragg's model, suggesting that mushroom producers are more likely to make their marketing decisions of channel choice and quantity supplied sequentially. Consistent with Fafchamps and Hill's (2005) findings, the results indicate that farmers who produce relatively more (in terms of the number of spawn-impregnated bags) have a high likelihood of selling their mushrooms to the retail market. Producers' quest to supply the retail market

is also enhanced by ownership of refrigerators, which allows them to store the mushrooms for a couple of days before transporting them.

Table 5.3: Regression results for factors influencing the choice of marketing channel and proportion of mushrooms sold by producers in Swaziland, 2012

Explanatory variables	Tobit			Probit			Truncated regression		
		Marginal effects			Marginal effects			Marginal effects	
	β	$\partial y/\partial x$	z-value	β	$\partial y/\partial x$	z-value	β	$\partial y/\partial x$	z-value
Constant	-63.560 (49.370)			-1.031 (1.460)			64.067*** (17.535)		
Producer's education level	14.256** (5.889)	8.252** (3.423)	2.41	0.255 (0.177)	0.088 (0.061)	1.44	3.772 (2.920)	3.344 (2.666)	1.250
Labour endowment	2.388 (2.867)	1.382 (1.663)	0.83	0.194** (0.093)	0.067** (0.032)	2.07	0.135 (1.367)	0.120 (1.214)	0.100
Number of spawn-impregnated bags	0.066*** (0.022)	0.038*** (0.013)	2.90	0.003*** (0.001)	0.001*** (0.000)	2.98	0.018 (0.013)	0.016 (0.012)	1.390
Ownership of refrigerator	29.167** (14.800)	16.376** (7.533)	2.17	1.426*** (0.405)	0.487*** (0.128)	3.80	-0.444 (6.293)	-0.393 (5.573)	-0.070
Knowledge of prices in alternative markets	-12.331 (14.549)	-7.021 (8.106)	-0.87	-0.903** (0.435)	-0.321** (0.152)	-2.10	6.622 (6.955)	5.754 (5.851)	0.980
Difficulty in accessing price information	-11.665* (6.829)	-6.753* (3.928)	-1.72	-0.488* (0.290)	-0.168* (0.105)	-1.60	-1.152 (3.217)	-1.022 (2.854)	-0.360
Difficulty in locating trading partner	7.842 (6.463)	4.540 (3.639)	1.25	0.156 (0.198)	0.054 (0.070)	0.77	-3.562 (2.892)	-3.158 (2.579)	-1.220
Difficulty in accessing transport	-5.550 (5.377)	-3.213 (3.157)	-1.02	-0.175 (0.170)	-0.061 (0.058)	-1.05	-5.246** (2.526)	-4.651** (2.213)	-2.100
Bargaining power	-77.578*** (15.887)	-46.357*** (8.6112)	-5.38	-3.584*** (0.653)	-0.763*** (0.070)	-10.91	-4.647 (6.313)	-4.148 (5.749)	-0.720
Group membership	56.247*** (16.795)	28.961*** (7.008)	4.13	2.285*** (0.675)	0.740*** (0.151)	4.91	-9.115 (9.561)	-7.905 (7.847)	-1.010
Quality uncertainty	6.942 (16.392)	4.054 (9.594)	0.42	-0.133 (0.438)	-0.046 (0.153)	-0.30	13.428* (7.267)	11.833* (6.385)	1.850
sigma	50.157 (6.623)						16.280 (2.234)		
Number of observations	91			91			38		
Log likelihood	-231.544			-26.85			-154.881		
F-stat.	5.62***								
Prob. F-test	$p<0.01$								
Pseudo R^2	0.130			0.573					
Wald χ^2 (11df)				47.09***			25.06***		
Prob. χ^2 for Wald test				$p<0.01$			$p<0.01$		
Correct classification				84.6%					
LR test for Tobit vs Cragg's model (λ)							99.63***		
Prob. χ^2 for LR test							$p<0.01$		

Notes: *, **, *** represent 10%, 5% and 1% levels of significance, respectively. Figures in brackets are robust standard errors.
Source: Survey data (2011/12)

One of the unique attributes of oyster mushrooms is that although the harvested quantities decline over time, from the first flush they can be harvested continuously for a period of about three to four months, subject to prevailing conditions (Gwanama *et al.*, 2011). Therefore, the advantage of owning a refrigerator is that a producer may harvest for a couple of days, store and thereafter make a single trip to the market. As indicated earlier, the mushroom enterprise is labour-demanding in almost all pre-production, production, harvesting, and post-harvest handling procedures. It is not surprising, therefore, that a high labour endowment enables the household to produce and market relatively larger quantities, which they are able to transport to the retail market.

The results in Table 5.3 also indicate that producers who are unaware of prevailing prices in alternative markets and have difficulty in accessing price information are more likely to sell their mushrooms at the farm gate. The negative, significant coefficient for bargaining power confirms Woldie and Nuppenau's (2011) persuasion that the paucity of market information denies producers the leverage to bargain for exchange prices; hence, prices and exchange terms are dictated by the buyers. As a result, producers who cannot bargain at the retail market are more inclined to sell their mushrooms at the farm gate. Despite being price takers and often required to travel, farmers who sell their produce to retail outlets are presumably attracted by market reliability and a comparatively high producer price. Another important observation from the results is that producers who are affiliated to mushroom producing groups are more likely to sell to the retail market. While these producers do not sell collectively, it could be inferred that performing certain tasks as a group builds some social cohesion, which enables them to share information beyond the joint activities. In any group setting characterized by mutual trust between members, there are possibilities for sharing skills and information as some members could be more experienced and knowledgeable than others.

Only two factors were found to significantly influence the quantity of mushrooms sold. The first relates to the difficulty encountered in organising transport, which significantly influences farmers to sell their mushrooms at the farm gate. As noted earlier, producers who supply the retail market are required to travel, whereas a majority of those who sell at the farm gate rarely transport their mushrooms as buyers generally consist of locally-based community members. Accessing the retail market comes with an opportunity cost of time spent in organising transport and time spent during transportation. Given that most

producers rely on public transport to convey their mushrooms to the market, it is evident that they have no control on regulating transportation periods. The second factor relates to producers' quality uncertainty. Contrary to previous findings (e.g. Hobbs, 1997 and Gong *et al.,* 2007), the coefficient for quality uncertainty was positively related to the quantity of mushrooms sold through the retail market. Generally, it would be expected that the more producers become concerned about meeting buyers' quality requirements, the less of mushrooms they will supply to that particular channel. However, as observed by Staal *et al.* (1997), it could be inferred that while producers are often uncertain about whether their mushrooms will meet the buyers' expectations for quality, the market reliability and comparatively better exchange price offered by the retail market seem to outweigh the uncertainty about quality such that producers are willing to increase their supply in order to avoid the farm gate option, which relies mostly on unpredictable consumer turnout.

5.4   Summary

This chapter studied the effects of transaction costs on the choice of marketing channels and quantity of mushrooms sold by producers in Swaziland. Transaction costs were categorised into (i) information and search costs, (ii) negotiation, bargaining and transfer costs, and (iii) monitoring and enforcement costs. Among the four marketing channels, the retail market and farm gate were identified as the most preferred. Hence, the analysis was based on producers' choices between the two. Buyers at the farm gate generally comprise locally-based community members, whereas in the retail market they include the urban working class, tourists and customers with special diet preferences. Cragg's regression model results indicate that producers who are likely to supply the retail market are those who manage a relatively large number of spawn impregnated bags, have a relatively high labour endowment, own cold storage facilities, and are affiliated to mushroom producing groups. However, the difficulty in accessing market information and lack of bargaining power significantly constrains producers' plans to supply the retail market; hence, they end up selling at the farmgate. These results highlight the importance of a Market Information System (MIS), which Swaziland is yet to establish despite numerous discussions that have taken several decades to conclude. Besides improving market transparency, full and easy access to reliable and up-to-date market information would strengthen producers' bargaining position and competitiveness as they would be able to make timely and better informed production and marketing decisions.

Producers' decisions on the quantity of mushrooms supplied through the retail market were found to be negatively affected by the difficulty in accessing transport and positively affected by producers' uncertainty about the quality of the mushrooms. Even though the latter finding was against *a priori* expectations, this could be an indication that regardless of the producers' uncertainty of whether their mushrooms will meet the buyers' expectations for quality, the market reliability and comparatively better exchange price offered by the retail market are more important. As such, producers are willing to increase their supply to the retail market in order to avoid the farm gate option, which relies mostly on unpredictable consumer turnout.

In attempting to improve the marketing conditions for local producers, it is recommended that the government, in collaboration with the private sector and other development agencies, should establish the much needed MIS. The establishment of refrigerated collection centres in strategic locations countrywide would help reduce the marketing and transaction costs currently incurred by remotely located and poorly-resourced producers. Such facilities would also help to preserve the quality and freshness of the mushrooms, particularly when considering that current producers have not yet ventured into mushroom processing. The next chapter examines the effects of organisational form on mushroom producers' participation in collective responsibilities.

CHAPTER 6

DOES ORGANISATIONAL FORM OF FARMER GROUPS AFFECT PRODUCERS' PARTICIPATION IN COLLECTIVE RESPONSIBILITIES? EVIDENCE FROM SMALLHOLDER MUSHROOM PRODUCERS IN SWAZILAND[9]

6.1   Introduction

This chapter presents the empirical methods, results and discussion of the effects of organisational form on collective action. As indicated in chapter one, mushroom producing groups are constituted in predominantly two organisational forms, depicted as model A and B, respectively. In model A, besides establishing their own by-laws, members produce mushrooms in one production house where they share all pre-production, production, and marketing activities. In model B, members also establish their own by-laws and share all pre-production activities. However, instead of producing under one roof, each member manages his/her own production house and members are at liberty to make their own marketing arrangements independently. This chapter, therefore, answers the question of whether the two predominant forms in which mushroom producing groups are organised (Model A and B) induce any effects on the producers' participation in collective responsibilities. The rest of the chapter is organized as follows: Section 6.2 outlines the methodology, followed by a presentation of the empirical results in section 6.3. Section 6.4 concludes the chapter with a summary of the findings.

6.2   Methodology

6.2.1   Analytical procedure

a)   Identifying collective action indicators

The first task was to identify the key indicators of collective action as perceived by the members themselves. Collective action is a dynamic process that relates to social relationships; hence, it is inherently difficult to measure directly. As a result, most

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[9] This chapter gave rise to the following article: Mabuza, M.L., Ortmann, G.F. and Wale, E. Does organisational form of farmer groups affect producers' participation in collective responsibilities? Evidence from smallholder mushroom producers in Swaziland. Currently under review with the *International Journal of Rural Management.*

researchers (e.g. Fujiie *et al.*, 2005; Araral, 2009) have resorted to use proxy indicators for its analysis, which, nonetheless, cannot be replicated across different locations and study periods as the signs of collective action can vary over time and across communities (Meinzen-Dick *et al.*, 2004). As suggested by various scholars (e.g. Collier, 2003; Ostrom and Ahn, 2009), the sustainability of collective action is premised on the strength of social capital. This is an attribute that promotes and facilitates interaction among individuals, and as a result the trust generated through interaction reduces opportunistic behaviour, thereby developing a foundation for collective action. Therefore, collective action indicators were extracted from cognitive and structural social capital-related variables (see Table 6.1), which were selected based on field observations and the related literature (e.g. Krishna and Uphoff, 2003; Mitchell and Bossert, 2007).

Table 6.1: Variables used to develop collective action indicators for mushroom producing groups in Swaziland, 2011

Label	Variables	Scale
I have a strong personal confidence in each group member[d]	Confid	$1 - 5^a$
All group members are trustworthy[d]	Trustworth	$1 - 5^a$
Level of member cooperation in executing joint manual activities[e]	Man_act	$1 - 5^b$
Level of member cooperation in joint planning and decision making[e]	Decmk	$1 - 5^b$
There are no demonstrated conflicts within the group[e]	Unity	$1 - 5^a$
I am willing to contribute towards group investments in future[e]	Inv_fut	$1 - 5^a$
There is extensive communication in the group[e]	Comm	$1 - 5^a$
Information is shared in a language and form understood by all members[e]	Info	$1 - 5^a$
Level of satisfaction with group performance towards achieving its objectives[e]	Satisf	$1 - 5^c$

Notes: [a] 1-strongly disagree, 2-disagree, 3-neutral, 4-agree, 5-strongly agree
       [b] 1-very low, 2-low, 3-moderate, 4-high, 5-very high
       [c] 1-very dissatisfied, 2-dissatisfied, 3-neutral, 4-satisfied, 5-very satisfied
       [d] cognitive social capital-related variable
       [e] structural social capital-related variable

The variables were measured from members' perceptions, which as indicated in Table 6.1, were captured using a Likert-type scale. Prominent dimensions were then extracted from the nine variables using Principal Component Analysis (PCA), a technique that reduces dimensionality by extracting the smallest number of principal components (PCs), which account for most of the variation in the original multivariate dataset and summarizes the data with little loss of information (Koutsoyiannis, 1992). The prominent PCs, which were

then used in the subsequent analysis as proxies for collective action, were identified by having eigenvalues greater than one (Kaiser, 1960).

b)   Analysing the effect of group form on collective action

Given that no baseline data were available on the variables of interest, in order to analyse the effect of group form on collective action, the study used the Propensity Score Matching (PSM) method, which can produce reliable results using cross-sectional data (Rosenbaum and Rubin, 1983). In line with the discussion made in chapter one (section 1.2), participation in a group that operates using model B was regarded as a treatment, and the estimation of its effect on collective action indicators, as an evaluation of the average effect of treatment on the treated (ATT). The outcome variables representing collective action that are considered in the PSM method are the dominant indicators generated using PCA. The main idea of PSM was to construct a suitable comparison group with other mushroom growers who produce collectively and also share some comparable observed attributes with those affiliated to groups that operate using model B (Caliendo and Kopeinig, 2008). Given that mushroom producing groups in Swaziland only use two models (A and B), as highlighted in chapter one, the only available producers likely to fulfil the above 'common support condition' were those affiliated to groups that operate using model A. The use of model A group members as a counterfactual was also in conformity with another essential pre-condition of the PSM method, which indicates that members from both groups should be facing the same economic incentives that drive their decision to participate in the mushroom industry and do so through collective action (Heckman *et al.*, 1997).

The PSM was implemented in two stages. In the first stage, propensity scores $p(X)$ were generated from the Logit model, which provided an indication of the probability of a farmer to be a member of a group that operates using either model A or B. The variables included in the Logit model are summarised in Table 6.4. A pre-condition of the Logit model used to generate propensity scores is that the covariates should be predetermined and unaffected by the outcome variables, in this case the proxy variables for collective action (Caliendo and Kopeinig, 2008). Producers affiliated to groups that operate using model B (treated) were then matched with their counterparts belonging to groups that use model A (untreated) according to their propensity scores. Members belonging to groups

that use model B, whose appropriate match could not be found, as well as members belonging to groups that use model A that were not used as matches, were dropped from further analysis. This is one way of fulfilling the common support condition (Heckman *et al.*, 1997). The PSM method can be implemented through various procedures, namely nearest neighbour matching, kernel matching, stratification, and radius matching (see Caliendo and Kopeining, 2008, for details). Worth noting is that all these methods have their advantages and respective drawbacks, and none is superior to the other (Becker and Ichino, 2002). However, asymptotically, all matching methods should yield similar results. The nearest neighbour and kernel matching methods were used in this study. After matching, the results were checked for consistency through an assessment of the matching quality and the attainment of the common support condition. The common support condition was assessed through a visual inspection of the density distribution of the propensity scores in the treated and control groups. However, for matching quality, a balancing test was used to ascertain whether the differences in the covariates of the two groups in the matched sample were eliminated. A preferred estimator produces statistically identical covariate means for both groups, provides a low pseudo R^2 value, and a statistically insignificant Likelihood Ratio (LR) test of all regressors after matching (Caliendo and Kopeinig, 2008).

In the second stage, the average effect of membership in groups that use model B (ATT) on the outcome variable Y (collective action) was estimated using matched observations of treated and untreated respondents. The ATT was estimated as (Caliendo and Kopeining, 2008):

$$
\begin{aligned}
ATT &= E\{Y_1 - Y_0|\, D = 1\} \\
&= E[E\{Y_1 - Y_0|\, D = 1, p(X)\}] \\
&= E[E\{Y_1|\, D = 1, p(X)\} - E\{Y_0|\, D = 0, p(X)\}|D=1]
\end{aligned}
\tag{6.1}
$$

where $E(.)$ represents the average or expected value, Y_1 and Y_0 are the outcomes for the treated with treatment (model B group membership) and control farmers without treatment, respectively. $D = 1$ indicates treated farmers, $D = 0$ indicates control farmers, p is the propensity score, and X is a vector of predetermined characteristics. All the estimations in this chapter were carried out using STATA 11 (StataCorp, 2009), and the results are presented in section 6.3. The next sub-section presents the data collection procedure.

6.2.2 Data collection

The analysis conducted in this chapter used part of the dataset that was used in chapter three. However, the dataset in this case excluded the non-mushroom producers, and individual producers who had no group affiliation. In addition, the producers who were purposively excluded in chapter three for being affiliated to relatively smaller groups, were included in this case. Therefore, the analysis in this chapter included all the 11 groups identified in November 2010, and the number of respondents per group were estimated based on the probability proportional to group size (please refer to chapter three, section 3.2.3, for details). As indicated in the introduction section, the mushroom producing groups operate in predominantly two models (A and B), and among the 11 groups shown in Table 6.2, only two (Mbangweni and Zombodze) were found to operate using model B.

Table 6.2: Mushroom producing groups in Swaziland, 2010/11

Area	Group size	Sample size
Ncandweni [f]	16	9
Sinceni [f]	16	9
Ngcina/Mpolonjeni [f]	35	21
Vuvulane [f]	10	6
Ka Shoba [f]	21	12
Mangweni [f]	81	48
Nkhaba [f]	4	2
Mbangweni [g]	38	22
Zombodze [g]	25	15
Dumako [f]	5	3
Matsanjeni [f]	4	2
Total interviewed respondents		149

Notes: [f] Group produces using model A
[g] Group produces using model B
Source: Mushroom Development Unit, Ministry of Agriculture (2010)

The next section presents the empirical results and discussions.

6.3 Empirical results and discussions

This section commences with a presentation of collective action indicators that were identified using PCA. Also discussed in this section are the variables used in the Logit model, followed by the empirical results of the Logit model and PSM, respectively.
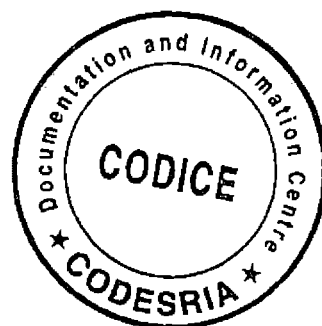
6.3.1 Indicators of collective action

The scores captured from the interviewees in response to the questions in Table 6.2 were first tested for reliability using Cronbach's alpha (Cronbach, 1951). The result was 0.61, suggesting that the responses were related enough to constitute a reliable composite measure. In order to avoid the problem of assigning a greater weight to variables with larger variances in Table 6.1, PCA was conducted using a correlation matrix (Krzanowski, 1987), and the results are presented in Table 6.3. The use of PCA was found appropriate to provide significant reductions in dimensionality as evidenced by the Kaiser-Meyer-Olkin and Bartlett's test of sphericity results (Tobias and Carlson, 1969). Using the Kaiser criterion of retaining PCs with eigenvalues greater than one (Kaiser, 1960), four PCs (see Table 6.3), which together account for 75 percent of total variation in the original variables were retained and later used in the PSM. Applying the rule of thumb proposed by Koutsoyiannis (1992) for observations above 50, PC loadings greater than |0.30| were considered to indicate a strong association between the original scores and the PCs. These loadings are highlighted in Table 6.3 in bold print.

Table 6.3: Indicators of collective action for mushroom producing groups in Swaziland, 2011

| Variables | Principal Components | | | |
	1 Trust	2 Communication	3 Cooperation	4 Commitment
Confid	**0.5813**	0.1186	0.1844	0.1181
Trustworth	**0.5985**	0.1353	0.1454	0.0864
Man_Act	-0.2352	0.2779	**0.5881**	0.1516
Decmk	-0.2814	**0.3004**	**0.5326**	0.1810
Unity	**0.3276**	-0.2862	**0.3456**	-0.2767
Inv_fut	0.0604	0.2938	**0.3858**	**0.6333**
Comm	0.1765	**0.5573**	-0.0895	-0.0173
Info	0.0795	**0.4175**	-0.0800	**-0.5102**
Satisf	0.1449	**-0.3835**	-0.0810	**0.4296**
Eigen value	2.374	1.852	1.500	1.007
Variance explained	26%	21%	17%	11%
Cumulative % of variance explained	26%	47%	64%	75%
Bartlett's test of sphericity χ^2 = 482.48***				
Kaiser-Meyer-Olkin measure of sampling adequacy = 0.60				

Note: Component loadings greater than | 0.30 | are highlighted in bold print
Source: Survey data (2011)

The first PC explains 26 percent of the variation in the original variables and represents the trusting attitudes that each member has towards others. Dominant indicators of trust are Confid, Trustworth, and Unity. Trust is defined by Hansen *et al.* (2002:42) as "the extent to which one believes others will not act to exploit one's vulnerabilities for their own gains". The results in this case suggest that trust is positively influenced by the level of confidence that members have in others' abilities, the reliability of members, and lack of frequent conflicts within the group. The second PC, which explains 21 percent of the total variance, represents communication within the group. Dominant indicators for communication are Decmk, Comm, Info and Satisf. The results suggest that participation in decision making and unrestricted exchange of information within the group in a language that appeals to all members are important in maintaining collective action. As a managerial tool, communication facilitates information sharing, coordination of activities, reduces unnecessary managerial burdens, and improves organisational performance. If group members are well informed and up-to-date through effective communication, their incentive to engage themselves in the group activities will increase as they will own the process and the outcome. However, if members are not satisfied with the group's overall performance, there is a high likelihood that the level of interaction will decline.

The third PC, which explains 17 percent of the variation in the original variables, represents cooperation. Toumela (1993) defines cooperation as the joint action performed by members who share a 'we attitude' for joint intentions. Cooperation is explained by four dominant indicators, namely, Man_act, Decmk, Unity, and Inv_fut. The results suggest that collective action is likely to be enhanced, or at least maintained, if group members participate in the decision making process and fully participate in performing joint activities. Collective action will also be enhanced if the group is characterised by high levels of cohesion and members are willing to associate themselves with the groups' long-term plans. The fourth PC, which explains 11 percent of the variation in the original variables, represents members' level of commitment in performing collective activities. Dominant indicators of commitment were Inv_fut, Info, and Satisf. The results indicate that if members are satisfied with the group's performance they are more likely to remain committed and contribute towards the group's future plans. However, this will be very unlikely if the environment is not conducive for unlimited exchange of information among the members.

The next sub-section discusses the variables used in the Logit model and PSM method. Apart from the indicators of collective action (PC1 - PC4), all the variables discussed in the next sub-section, and summarised in Table 6.4, were used in the Logit model to estimate propensity scores.

6.3.2 Descriptive statistics for variables used in the Logit model and Propensity Score Matching method

Table 6.4: Descriptive statistics for variables used to analyse the effects of group form on collective action

Categorical variables					
[A] Variable	[B] Unit	[C] % of Total sample (N=149)	[D] % of [C] from *Model A* (N=112)	[E] % of [C] from *Model B* (N=37)	[F] χ^2-value
Gender of producer (GENDER)	Male	24.2	83.3	16.7	1.70
	Female	75.8	72.6	27.4	
Is member affiliated to other community organisations? (ORGANS)	Yes	47.6	73.2	26.8	0.27
	No	52.4	76.9	23.1	
Was member trained to produce mushrooms? (TRAIN)	Yes	33.6	60	40	9.28***
	No	66.4	82.8	17.2	
WEALTH	Not poor	16.1	48.8	51.2	9.71***
	Poor	83.9	80	20	
Continuous variables					
Variable	Unit	Total sample mean (N=149)	Mean *Model A* (N=112)	Mean *Model B* (N=37)	*F*-value[a]
Age of producer (AGE)	Years	53	53	52	0.25
Household size (MAN_EQUIV)	Man-equiv.	4.6	4.4	5.2	3.38*
Trust	PC1	2.20e-09	0.09	-0.27	1.57
Communication	PC2	6.35e-09	-0.14	0.42	4.73**
Cooperation	PC3	2.64e-09	-0.32	0.98	40.02***
Commitment	PC4	-1.96e-09	-0.03	0.10	0.52
Ordered variables					
Variable	Unit	Total sample mode (N=149)	Mode *Model A* (N=112)	Mode *Model B* (N=37)	χ^2-value
Education level of H'hld head (EDUC)	Highest level of education attained[*]	3	3	3	1.986

Note: *,**,*** represent 10%, 5% and 1% levels of significance, respectively
[*]1= no education; 2 = adult education; 3= primary education; 4 = secondary education; 5 = high school; 6 = vocational/college; and 7 = university.
[a]Generated from one way ANOVA
Source: Survey data (2011)

Given the dearth of literature on the effects of organisational or group form on collective action, the selection of these variables was primarily based on the broader organisational theory and practice, and the literature related to households' participation in collective action (e.g. Olson, 1965; Napier and Gershenfeld, 1993; Wade, 1988; Cook *et al.*, 2005; Ostrom, 2010). Despite the absence of a clear theoretical background, members' demographic attributes are reported by Carpenter *et al.* (2004) and Cook *et al.* (2005) to have a significant influence on collective action. A review of related studies indicates that demographic characteristics may be used to describe different perceptions on collective action and members' subsequent actions in certain organisations. These attributes include, among others, gender (Pandolfelli *et al.*, 2008), age (Gachter *et al.*, 2004; Diwakara, 2006), and level of education (Helliwell and Putnam, 2007). The descriptive statistics presented in Table 6.4 indicate that the average age of mushroom producers was 53 years, and the majority (76 percent) were women of whom about 73 percent were affiliated to groups that produce using model A. Gender, age, and the highest level of education attained did not differ significantly by group form.

Labour endowment is an important requirement in mushroom production. It was gathered during interviews that members are free to delegate other family members to work on their behalf in the event they cannot avail themselves due to ill-health or engagement in other activities. Considering members who were identified to participate in household agricultural activities, labour endowment was measured following Langyintuo and Mungoma (2008) in man-equivalents as: members less than 9 years = 0; 9 – 15 = 0.7; 16 – 49 years = 1; and above 49 years = 0.7. The concept of man-equivalents was adopted to account for labour contribution differences among household members. School-attending children also participate in household agricultural activities, especially outside school-attending hours including weekends and holidays. The results in Table 6.4 indicate that members affiliated to groups that produce using model B had significantly higher man-equivalents than their counterparts, suggesting that they would probably be in a better position to cope with the labour requirements of the enterprise.

Over 47 percent of the respondents reported to be affiliated to other community organisations, besides being members of mushroom producing groups. Past studies (e.g. Haddad and Maluccio, 2003) found that members who are affiliated to more than one community group are likely to have relatively high levels of social capital. This implies

that interacting with people from different backgrounds shapes members' behaviour and generates the experience of working in group formations through trust. Therefore, multiple or diverse group affiliation enhances social interaction and improves trusting attitudes towards other people. Despite the expectation that producers with multiple group affiliation would perhaps opt to produce under groups that use Model A, the results in Table 6.4 suggest that the respondents did not differ significantly in this regard.

Being a non-conventional agricultural enterprise in Swaziland, farmers who have not received basic training in mushroom production will hardly participate in the mushroom industry. However, as indicated in Mabuza *et al.* (2012), despite not undergoing the required training, some farmers participate in the industry through group formations, an arrangement that enables them to learn from those who have been trained by the MDU. Given the different models used by various mushroom producing groups, it appears model A would be more conducive to those who have not been trained by the MDU. In conformity with these expectations, Table 6.4 indicates that about 34 percent of the producers received training from the MDU in basic oyster mushroom production, and over 80 percent of those who were not trained produce in groups that use model A.

In spite of the need to act collectively in the smallholder sub-sector, for reasons presented in chapter two, it has been found that collective action in most Sub-Saharan African (SSA) countries tends to exclude the poorest farmers in society mainly because they are unable to cope with the cash requirements of attaining full membership (see Chirwa *et al.*, 2005; Bernard and Spielman, 2009). This was confirmed by Fischer and Qaim (2012), who found that while some farmer groups were generally inclusive of the poor, wealthy households have a significantly higher probability of attaining full membership in banana producing groups in Kenya. Given that model B requires members to develop and manage their own structures, it would be expected that members who are not wealthy would opt to produce in groups that operate using model A. This prospect was confirmed by the results in Table 6.4, which indicate that members affiliated to groups that produce using model B had significantly higher levels of wealth. Following Fernando *et al.* (2003), wealth categories were identified based on household asset ownership using cluster analysis. Variables used to classify households were primary source of power for lighting, primary source of power

for cooking and primary source of domestic water[10]. Other variables included the number of usable valuable items owned such as cars, tractors, motorcycles, bicycles, television sets, radios and computers.

Regarding the proxy variables for collective action, Table 6.4 indicates that members from both groups did not differ in their perceptions of trust and commitment. However, groups that operate using model B communicate significantly better, and their members have significantly higher levels of participation in the groups' decision making process as well as in performing other collective responsibilities. The Logit results of factors that explain producers' participation in either model A or B-groups are presented in the next sub-section.

6.3.3 Factors that influence members' participation in different group forms

Table 6.5 presents the Logit regression results used to estimate the propensity scores on the basis of which the matching was conducted. Prior to estimating the Logit model, the variables were tested for multicollinearity using a pairwise correlation matrix, which indicated that the variables were reasonably independent of one another. The estimated model correctly predicted over 79 percent of the producers' preference of group form and the results showed a statistically significant ($p<0.01$) Wald χ^2 of 21.48, suggesting that the explanatory variables explained variation in the choice of group form by members reasonably well. The Logit regression results indicate that members who received training in mushroom production are more likely to participate in groups that allow them to individually manage their production houses and further make their own marketing arrangements (model B). Despite that group members have an opportunity to learn from their colleagues, the conditions may not be very conducive in model B groups, as members have less contact time than those affiliated to model A groups. The positive significant coefficients for EDUC and WEALTH suggest that the likelihood of producing under groups that operate using model B, as opposed to model A, increases with the members' education level and wealth status, respectively.

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[10] The categorical variables used to develop wealth clusters were classified as follows:
    a) Energy for lighting: 6= electricity, 5=solar, 4=generator, 3=handigas, 2=paraffin and 1=candles.
    b) Energy for cooking: 6= electricity, 5=solar, 4=generator, 3=handigas, 2=paraffin and 1=wood.
    c) Source of domestic water: 7=own borehole, 6=standpipe within household, 5=harvested water within household, 4=community standpipe/borehole, 3=well, 2=dam, 1=river.

Table 6.5: Logit estimates of factors that influence mushroom producers' choice of group form in Swaziland, 2011

Variables	Coeff.	Marginal values		
		$\partial y/\partial x$	Std. Error	z-value
GENDER	0.222	0.036	0.083	0.43
AGE	-0.005	-0.0009	0.003	-0.34
EDUC	0.384	0.064	0.032	2.02**
ORGANS	-0.527	-0.087	0.079	-1.09
TRAIN	1.372	0.255	0.094	2.73***
MANEQUIV	0.082	0.014	0.017	0.82
WEALTH	1.380	0.284	0.119	2.36**
Constant	-3.159			
Observations	149			
LR χ^2 (7df)	24.89***			
Wald χ^2(7df)	21.48***			
Pseudo R^2	0.1490			
Correct classification	79.8%			
Log pseudolikelihood	-71.068			

Note: ** and *** denote statistical significance at 5%, and 1% respectively
Source: Survey data (2011)

Despite the absence of theory linking education and organisational form, the results suggest that educated producers are better positioned to perform certain functions on their own. Drawing from Schultz (1975) and Pingali *et al.* (2005) who posit that education is linked to information acquisition, interpretation, and use, these findings indicate that better educated producers are more capable of searching for exchange partners and negotiating marketing deals, a function that would certainly be a challenge to perform by their relatively less educated counterparts. What may also be inferred from these results is that even though the oyster mushroom growing houses are generally categorised as low-cost structures, wealthy households are more likely to provide the materials required to establish and manage a fully-fledged mushroom growing enterprise. The effects of group form on collective action are presented in the next sub-section.

6.3.4 The effect of group form on collective action

From the descriptive statistics presented in sub-section 6.3.2, some significant differences were noted in the underlying characteristics between model B and model A members. However, it is impossible to make informed connotations from the observed differences based on a simple comparison of means. This section, therefore, presents the empirical

results of the estimated effects of group form on collective action, where the latter is proxied by the PCs representing trust, communication, cooperation, and commitment. The analysis commenced with an assessment of whether the common support condition was met after estimating the propensity scores for all the respondents. A visual inspection of Figure 6.1 indicates that there was substantial overlap in the distribution of the propensity scores for both groups; hence, the common support condition was satisfied. However, this was achieved after removing some observations from the treatment group with propensity scores lower than the minimum and higher than the maximum in the control group from the sample (see Table 6.6). The matching procedure was consequently performed in the region of common support using the nearest neighbour and kernel methods, respectively, following Leuven and Sianesi's (2003) procedure.
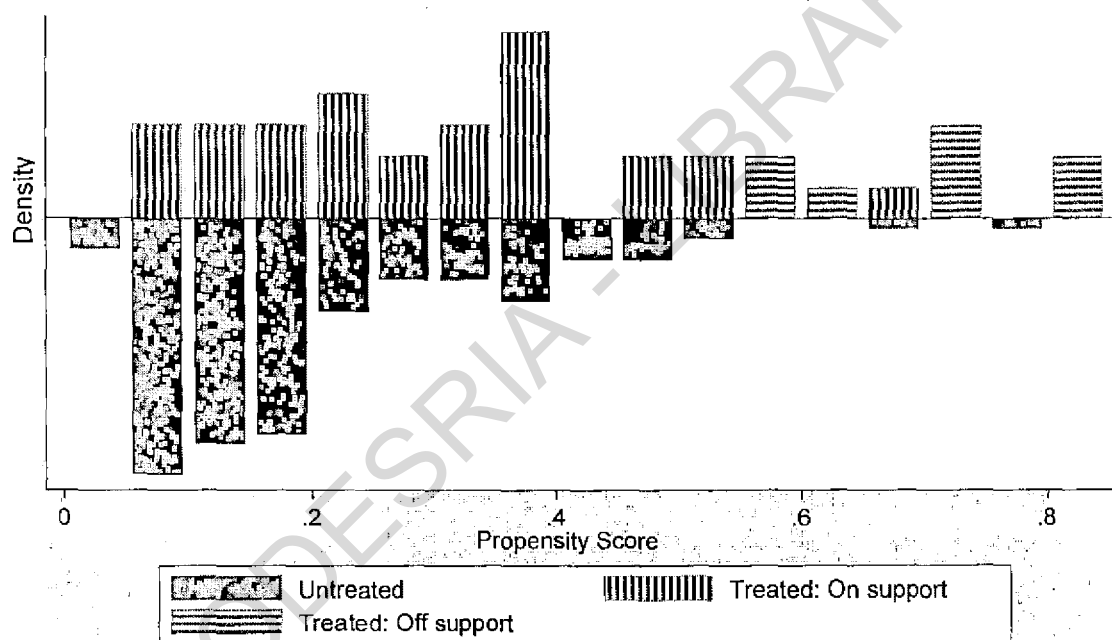
Figure 6.1: Distribution of the propensity scores for model A (treated) and model B (control) participants
Source: Survey data (2011)

After matching, a balancing test was conducted as discussed in the methodology section. The balancing test results shown in Table 6.6 indicate that the mean bias reduced from about 34 percent before matching to about 10 percent and three percent after matching using the nearest neighbour and kernel methods, respectively. The levels achieved after matching are way below the critical 20 percent suggested by Rosenbaum and Rubin (1985).

Table 6.6: Matching quality indicators before and after matching

	Pseudo R^2		LR χ^2		Mean bias (%)		Observations on common support		Observations off common support	
Matching method	Before matching	After matching	Before matching	After matching	Before matching	After matching	Untreated	Treated	Untreated	Treated
Nearest neighbour	0.149	0.014	24.88 (0.001)	1.16 (0.992)	33.8	10.3	112	29	0	8
Kernel	0.149	0.003	24.88 (0.001)	0.23 (1.000)	33.8	3.3	112	28	0	9

Note: Figures in parentheses are *p*-values
Source: Survey data (2011)

The pseudo R^2 reduced from 0.149 before matching to a minimum of 0.003 after matching. The Likelihood Ratio also reduced from a significant value of 24.88 ($p<0.01$) to non-significant values of 1.16 and 0.23 ($p>0.1$) for the nearest neighbour and kernel matching methods, respectively. In addition, Table 6.7 indicates that the covariate means were not significantly different for both groups after matching. These results jointly suggest that the specification of the propensity score was successful in balancing the distribution of covariates between the two groups.

Table 6.7: Balancing test results of matched samples

	Unmatched samples			Nearest-neighbour matching			Kernel-based matching		
	Mean			Mean			Mean		
Variables	Treated (Model B) $N=37$	Untreated (Model A) $N=112$	Diff *p-value*	Treated (Model B) $N=29$	Untreated (Model A) $N=112$	Diff *p-value*	Treated (Model B) $N=28$	Untreated (Model A) $N=112$	Diff *p-value*
GENDER	0.838	0.732	0.195	0.793	0.862	0.496	0.786	0.760	0.823
AGE	51.595	52.848	0.621	51.379	52.241	0.813	51.429	51.638	0.953
EDUC	3.378	2.848	0.012	3.207	3.035	0.598	3.143	3.077	0.833
ORGANS	0.514	0.464	0.606	0.517	0.586	0.605	0.536	0.535	0.997
TRAIN	0.541	0.268	0.002	0.483	0.483	1.000	0.5	0.492	0.952
MANEQUIV	5.249	4.430	0.068	4.762	4.693	0.914	4.643	4.675	0.960
WEALTH	0.324	0.107	0.002	0.172	0.241	0.525	0.143	0.169	0.787

Source: Survey data (2011)

Table 6.8 reports the estimated results of the impact of group form on members' perceptions of trust, communication, cooperation, and commitment levels in their respective groups. Although the ATT figures and *z*-values are not the same, the nearest neighbour and kernel matching methods showed consistent effects. The results indicate that groups that operate in model B induce a negative effect on trust and positive effect on communication, and commitment, respectively. However, all these effects are not statistically significant for both the nearest neighbour and kernel matching methods. Instead, Table 6.8 reveals that, after controlling for other factors, the two groups differ

significantly in the level of members' cooperation in making joint decisions and performing shared labour-intensive activities. What could be inferred from these results is that while both models promote the procurement of inputs in bulk and performing all pre-production activities as a group, thus enabling members to reduce average input costs (including labour), model B seems to have an added advantage. By allowing members to manage their individual houses and market their mushrooms independently, model B groups help to curb the inherent problem of internal free-riding.

Table 6.8: Effect of group form on trust, communication, cooperation and commitment for mushroom producing groups in Swaziland, 2011

| Outcome indicators | PSM methods | Mean Outcome indicators | | Difference (ATT) | Bootstrap Std. Errors (50 replications) | z-value |
		Treated	Untreated			
Trust	Nearest neighbour	-0.385	0.172	-0.558	0.430	-1.30
	Kernel	-0.339	0.236	-0.576	0.419	-1.37
Communication	Nearest neighbour	0.336	-0.057	0.393	0.435	0.90
	Kernel	0.324	0.041	0.283	0.370	0.76
Cooperation	Nearest neighbour	0.987	-0.144	1.131	0.326	3.47[***]
	Kernel	1.014	-0.181	1.195	0.287	4.17[***]
Commitment	Nearest neighbour	0.059	0.056	0.003	0.259	0.01
	Kernel	0.015	-0.034	0.049	0.207	0.24

Note: [***] denotes statistical significance at 1% level of probability
Source: Survey data (2011)

As noted by Olson (1965), in any collective initiative, rational members will always have an incentive to free-ride if the opportunity arises. Therefore, groups that operate using model B reduce the likelihood of defecting as each member realises that whatever results they are likely to attain as individuals at the end, will depend largely on what they would have invested in the preliminary stages of the enterprise. It appears as well that this is one method which can possibly help improve individual members' knowledge of the enterprise and management capacity. However, as indicated earlier, producers' participation in model B groups is related to, among other factors, access to basic training in mushroom production. Therefore, creating an environment that would be conducive for farmers to

participate in model B groups would require the government to intensify the farmer training programme such that more aspiring producers obtain the required skills.

6.4   Summary

This chapter sought to study the effect of organisational form on producers' participation in collective responsibilities. Based on a conceptual framework that uses dimensions of social capital to study collective action, trust, communication, cooperation, and commitment were identified through Principal Component Analysis (PCA) as the key elements responsible for maintaining close relationships between members of mushroom producing groups. Further analysis conducted using the Propensity Score Matching (PSM) method indicates that the use of model B introduces a significant effect on members' cooperation in making joint decisions and performing shared manual activities. These results are important for policy, given that if members do not participate in their own groups' decision making process and the labour-intensive pre-production activities, the collective mushroom enterprise would simply be an unviable proposition. Producers who are likely to participate in model B groups are those who have been trained in mushroom production, are better educated, and relatively wealthy.

In view of these results, it is recommended that groups engaged in mushroom production should consider using model B for the production phase of the enterprise, with some modifications when it comes to marketing. Some of the major benefits of adopting model B include buying inputs in bulk, preparing the substrate material and spawning substrate bags (planting) as a group, enabling members to reduce their average input costs. In addition, allowing members to manage their individual houses is more likely to improve their knowledge of the enterprise and management capacity, while at the same time it reduces the likelihood of internal free-riding. However, instead of marketing independently (which is what model B currently promotes), it is recommended that producers should consider the option of collective marketing, which could be coordinated similarly to their procurement of inputs and performance of pre-production activities. Marketing as a unit could be easily coordinated given that all members commence the production cycle at the same time.

Having accounted for the four specific objectives of the study, the next chapter summarises all the empirical findings and highlights key policy recommendations. Areas for further research are also indicated in the next chapter.

CHAPTER 7

CONCLUSIONS, RECOMMENDATIONS AND OUTLOOK

7.1   Re-capping the purpose of the study

Mushroom cultivation was introduced in Swaziland through a United Nations Development Programme-funded initiative in 2001 as a strategic economic activity that aims to generate nutritious food and quick financial returns for rural-based households. Swaziland has 75 percent of its one million population residing in the rural areas, of whom 63 percent live below the US$2/day poverty line. Currently, the emphasis is on the oyster mushroom for the reason that it is comparatively the easiest and least expensive type of mushroom to grow. There is also a wide choice of oyster mushroom species available for cultivation under different climatic conditions using a range of substrate materials. In attempting to give the mushroom industry a prominent position, the government currently offers free training in basic mushroom production, extension services, high quality spawn (mushroom seed) at a very nominal fee, and free substrate bags. Swaziland is also one of the six countries supported by the New Partnership for Africa's Development (NEPAD) to promote mushroom production in Southern Africa as an intervention that seeks to reduce rural poverty and improve the production of medicinal products through mushroom processing. The NEPAD iniative commenced in 2009 and Swaziland participates as a host for a regional mushroom gene bank. Considering the geographical suitability and the magnitude of public and private investment made towards the mushroom development programme, there is a need to understand why not many farmers participate in the mushroom industry, and why Swaziland still imports more than 95 percent of locally consumed cultivated mushrooms. There has also been no research so far on the challenges and opportunities in producing, value adding, and marketing of mushrooms in Swaziland. This study was, therefore, an attempt to address these knowledge gaps. It also provided an opportunity to draw relevant policy and management implications to inform future strategies in the industry.

The specific objectives were to: (i) identify and examine the factors that influence households' decisions to participate in mushroom production; (ii) study the underlying mushroom production and market access constraints; (iii) examine the effects of

transaction cost factors that influence mushroom producers' market channel choice decisions and the quantity of mushrooms sold in selected channels; and (iv) study the effects of organisational form on producers' participation in collective responsibilities. These objectives were addressed by employing various conceptual and empirical models.

Firstly, the Two-Stage Conditional Maximum Likelihood and Two-Stage Probit Least Squares approaches were applied in chapter three to analyse the factors that influence households' decisions to participate in mushroom production. These two models were adopted after detecting some endogeneity between the decision to produce (a dichotomous dependent variable) and producers' perceptions towards mushrooms (a continous explanatory variable generated using Principal Component Analysis). Secondly, a value chain approach was used in chapter four to study the underlying mushroom production and market access constraints. The value chain approach was found appropriate as it was able to reflect on the various activities from production to the delivery of mushrooms to final consumers. It also enabled the study to better identify unexploited opportunities and in response prioritise interventions that could improve operations at various stages of the entire chain. Thirdly, Cragg's regression model was applied in chapter five to examine the effects of transaction cost factors that influence mushroom producers' market channel choice decisions and the quantity of mushrooms sold in selected channels. This model was adopted after performing a Likelihood Ratio test whose results indicated that marketing decisions are made sequentially. These results suggested that producers pay attention to market conditions, and with the information gathered, they first decide whether or not to participate in a particular channel prior to making the decision on the quantity of mushrooms to sell through the selected channel. Finally, the Propensity Score Matching method was used in chapter six to study the effects of organisational form on producers' participation in collective responsibilities. The findings in chapter six are very important for policy given that over 90 percent of mushroom producers in Swaziland currently participate in the mushroom industry through farmer groups that operate in predominantly two different organisational forms.

The aim of this concluding chapter is to present the main findings of the study, policy implications, and areas for further research. Therefore, the remainder of this chapter is organised as follows: Section 7.2 provides a summary of conclusions drawn from the study's key findings, whereas Section 7.3 presents the study's key policy

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recommendations, whose implementation could promote the mushroom industry's contribution towards advancing Swaziland's priorities of rural poverty reduction and improving household food security. Section 7.4 describes the limitations of the study and Section 7.5 concludes the chapter with suggestions for further research.

7.2   Conclusions

7.2.1   Determinants of farmers' participation in oyster mushroom production

Using cross-sectional data generated from producers and non-producers, the empirical findings in chapter three indicate that farmers' decisions of whether (or not) to produce mushrooms are influenced mainly by institutional factors. Such factors include access to information on mushrooms' nutritional and therapeutical attributes, access to training in basic mushroom production methods, proximity to input sources and market outlets, and farmers' perceptions towards cultivated mushrooms. It was found that farmers who receive information about mushrooms from government extension officers and NGOs have a significantly higher likelihood of participating in the mushroom industry. The key message drawn from the results is that while other information sources are being utilised by farmers, they are not perhaps competent enough to relate the technical aspects of how to effectively manage a mushroom enterprise.

By virtue of mushroom cultivation being a non-conventional agricultural enterprise in Swaziland, farmers are bound to have mixed perceptions regarding its potential contribution towards improving their livelihoods. In this regard, it was found that those who have positive perceptions towards mushrooms are more likely to take up the enterprise. Chapter three also found that with appropriate training and mentoring, farmers are likely to develop positive perceptions if they fully understand the circumstances associated with the production of oyster mushrooms. As a result, farmers will be able to compare the 'new alternative' with conventional agricultural enterprises as they become aware of niche opportunities in the mushroom industry. Additional results indicated that farmers who are located further from markets are less likely to produce mushrooms given that it would be difficult to procure inputs and access the retail market after harvesting. By virtue of being a perishable commodity, if mushrooms are transported over long distances without proper storage, producers could be compelled to either sell at a reduced price (due

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to shrinkage) or not sell at all due to advanced spoilage. Apart from the above institutional factors, it was also found that farmers engaged in diversified agricultural enterprises have a higher likelihood of participating in mushroom production. However, this is likely to happen if the mushroom enterprise complements existing agricultural enterprises and enhances the prospects of reducing household income variability.

7.2.2 Factors constraining mushroom producers' participation in mainstream markets

The second specific objective was to identify the potential and underlying factors constraining mushroom production and producers' participation in mainstream markets. This objective, as presented in chapter four, was addressed using the value chain approach. The major findings indicate that producers' plans to expand production capacities are hampered by the difficulty to access key inputs and services such as spawn, substrate preparation technology, and incubation services. Since the inception of the mushroom programme in 2001, the provision of these inputs and services has been centralised and fully controlled by the government through the Mushroom Development Unit (MDU). In addition, local farmers were also found to produce below capacity in relatively small low-cost structures, which are also not well equipped. As a result, they apply relatively primitive management methods that eventually affect their productivity. These constraints are partly responsible for the extremely low locally produced volumes and inconsistent market supply, prompting major mushroom traders (e.g. supermarkets) to rely on imports. Other constraints relate to the lack of diversification as farmers currently produce only the oyster mushroom, yet consumers are mostly interested in the button mushroom, which is favoured for its appearance and taste.

Although not directly involved in the production and distribution of products and services in the industry, some organisations are likely to influence the institutional environment and, consequently, the performance of certain activities by other value chain actors. Such organisations were identified in the study as the MDU, Food Science and Technology Unit (FSTU), and the National Agricultural Marketing Board (NAMBoard). These organisations are, respectively, responsible for offering farmer training in mushroom production, training in mushroom processing and value addition, and the coordination of agricultural marketing and trade. The findings in chapter four indicated that while the

MDU continues to provide farmer training in mushroom production, because of their low staff complement they have not been able to intensify their training programme, and have failed to convene a stakeholders' consultative forum since 2001. Such forums could enable value chain actors to establish networks and allow the MDU to receive feedback on areas that require improvement. The FSTU also lacks the capacity to impart the skills required by producers to venture into mushroom processing and value-addition. As such, not a single local farmer has received training in this field since 2001. Processing and value addition in the mushroom industry is further contrained by Swaziland's unfavourable regulatory framework. For instance, Swaziland's Canning Control Act of 1961, which still subsists, gives the power for controlling the development of food processing to the Minister of Agriculture through issuing of licences. Mushrooms are also listed under NAMBoard's scheduled products, implying that for every import of mushrooms, NAMBoard receives an import levy equivalent to 7.5 percent of the total value. Government's regulations further dictate that NAMBoard should use the generated revenue to develop local capacity to produce the same commodity. However, despite Swaziland importing over 240 tons of locally consumed cultivated mushrooms valued at about E2.4 million annually, no tangible investment has been made by NAMBoard in the mushroom industry thus far.

7.2.3 Effects of transaction costs on mushroom producers' choice of marketing channels

In contrast to other countries, where similar mushroom programmes are implemented with a marketing component, producers in Swaziland do not have this privilege as they have to make their own marketing arrangements. Currently, no cultivated mushrooms are exported from Swaziland and producers have not yet engaged in any form of mushroom processing. Instead, from what they harvest, it was found that about six to 10 percent is consumed at household level and the remainder is sold through four channels identified as: (i) the farm gate; (ii) retail market (supermarkets); (iii) middlemen; and (iv) food services industry (restaurants/hotels).

Although some producers reported to have sold mushrooms through different channels, indicating that the options are not mutually exclusive, two marketing channels were found to be prominent, and these were retail markets (supermarkets), which were used by 53

percent of the respondents, and the farm gate, which was used by 47 percent. Mushrooms are highly perishable agricultural commodities, and as such their marketing is invariably associated with high transaction costs. Using cross-sectional data obtained from mushroom producers, further analysis, as discussed in chapter five, was conducted to study the effects of transaction costs on producers' choice of marketing channels and the quantity of mushrooms supplied. Cragg's regression results revealed that producers' decisions of selling their mushrooms through the retail channel are positively and significantly affected by household labour endowment, production capacity, access to cooling facilities, and membership in mushroom producing groups. The results also indicated that producers who are unaware of prevailing prices in alternative markets and have difficulty in accessing price information, are more likely to sell their mushrooms at the farm gate. The negative, significant coefficient for bargaining power suggested that the paucity of market information denies producers the leverage to bargain for exchange prices in the retail market; hence, prices and exchange terms are dictated by the buyers. As a result, producers who cannot bargain at the retail market are more inclined to sell their mushrooms at the farm gate.

Regarding the quantity of mushrooms sold, it was found that producers who normally encounter difficulties in organising transport end up selling a relatively large quantiy of their mushrooms at the farm gate. Accessing the retail market comes with an opportunity cost of time spent in organising transport and time spent during transportation. Given that most producers rely on public transport to convey their mushrooms to the market, it is evident that they have no control over regulating transportation periods. Contrary to *a priori* expectations, the coefficient for quality uncertainty was positively related to the quantity of mushrooms sold through the retail market. Generally, it would be expected that the more producers become concerned about meeting buyers' quality requirements, the less mushrooms they will supply to that particular channel. However, what could be inferred from the results is that while producers are often uncertain about whether their mushrooms will meet the buyers' expectations for quality, the market reliability and comparatively better exchange price offered by the retail market seem to outweigh the uncertainty about quality. As such, producers are willing to increase their supply to the retail market in attempting to avoid the farm gate option, which relies mostly on unpredictable consumer turnout.

7.2.4 Effects of organisational form on collective action

Over 90 percent of mushroom producers in Swaziland participate in the industry through producer groups. These groups operate in predominantly two forms, depicted as model A and model B. In model A, besides establishing their own by-laws, members produce mushrooms in one production house where they share all pre-production, production and marketing activities. In model B, members also establish their own by-laws and share all pre-production activities. However, instead of producing under one roof, each member manages his/her own production house and members are at liberty to make their own marketing arrangements independently. The question that chapter six sought to address is whether organisational form, as depicted by the difference between the two forms of mushroom producing groups, induces any influence on members' participation in collective responsibilities.

Based on a conceptual framework that uses dimensions of social capital to study collective action, trust, communication, cooperation, and commitment were identified through Principal Component Analysis as the key determinants of collective action. Hence, they are responsible for maintaining close relationships between members of mushroom producing groups. Further analysis conducted using the Propensity Score Matching method indicated that the use of model B introduces a significant effect on members' cooperation in making joint decisions and performing shared manual activities. Producers who are likely to participate in model B groups are those who have been trained in mushroom production, are better educated, and relatively wealthy. The positive significance of the variable on wealth suggests that wealthy households are perhaps in a better position to access the materials required to establish and manage a fully-fledged mushroom growing enterprise. Being educated gives such producers an edge as they are able to search for exchange partners and negotiate marketing deals, something that would certainly be a challenge to non-educated producers.

Based on the empirical findings in chapters three to six, it is evident that the mushroom industry in Swaziland is confronted with several challenges, as well as unexploited opportunities. Given the potential of the mushroom enterprise as an alternative for providing rural employment, reducing poverty, and improving household food security, efforts should be made towards assisting current and prospective producers to participate

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more competitively in the industry. The specific forms of recommended interventions are discussed in the next section.

7.3 Policy recommendations

7.3.1 Intensification of farmer training and extension services

The empirical findings made in chapter three suggest that in order to improve the uptake of the mushroom enterprise among local farmers, concerted efforts should be made to intensify training in mushroom production and provision of extension services. Currently, the MDU is the only organisation with the capacity to provide training expertise. Considering their location and low staff complement, it would take a while to impart the required skills to a substantial number of aspiring producers. In addition, with the value chain results in chapter four indicating a market demand for other types of mushrooms (especially the button), it is recommended that the training should be diversified to include other types of mushrooms apart from the oyster. In responding to this challenge, government should consider increasing its staff complement and facilities or alternatively establish strong alliances with NGOs to complement its training and extension programmes. Another option would be to train and identify lead farmers in strategic locations and thereafter facilitate farmer-farmer interactions to impart similar skills to other aspiring producers. Opportunities should also be explored for engaging the private sector in this regard, with the MDU assuming a monitoring role to ensure that farmers are offered quality training and are not charged exorbitant fees.

These same options can be explored in attempting to improve producers' training in mushroom processing and value addition, given that the FSTU has failed to achieve its mandate in this regard. Even though fresh mushrooms fetch a comparatively higher retail price than when in processed form, in view of their high perishability, preserving and processing could be an ideal option for farmers who do not have access to cooling facilities. This option would play a significant role in minimising post-harvest losses at farm level and also create an opportunity to establish rural-based cottage industries; hence, improving employment opportunities.

7.3.2 Improving producers' access to key production inputs and services

An increase in production capacity by local producers and possible diversification into other types of mushrooms (e.g. the button) will likely create a demand for more production inputs. Considering that most production inputs and services (spawn, substrate preparation technology, and incubation services) are currently centralised and only offered by the MDU, it is recommended that the government should privatise these services. Besides improving producers' access to these inputs, this move would open opportunities for local entrepreneurs to participate in the value chain and contribute towards employment creation in other economic sectors. Producers will also find it relatively feasible to expand production capacities and with staggered production schedules, they could reduce fluctuations in quantities supplied to the market.

7.3.3 Coordination of mushroom production and marketing

Given that producers are sparsely distributed and independently supply different volumes of mushrooms to the retail market, there is a need to introduce some form of vertical coordination in the value chain. External support in the form of a facilitator who would, among other expectations, provide information and technical assistance, is also required considering that most of the mushroom producers are less educated and lack agri-business exposure. NAMBoard would be better suited for this role as it is within its mandate to safeguard the interests of producers, market intermediaries and consumers. In view of the possible increase in the number of producers in future, it is further recommended that NAMBoard should revive the marketing support of 2001, which as provided for in the government's regulations, could be funded from the levies collected from mushroom imports. The levies could also be used to establish collection points (fitted with cooling facilities) in strategic areas. Such facilities, as indicated in chapters four and five, can serve to reduce the marketing and transaction costs currently encountered by producers as well as preserve the quality of the mushrooms. As conditions improve and producers graduate to a position where they can manage to operate on their own, NAMBoard may then consider withdrawing its support gradually. As a complementary investment that responds to the empirical findings in chapter five, it is recommended that the government, in liaison with the private sector and other development partners, should establish an agricultural Market Information System (MIS) to aid in the provision of timely and reliable

information on prices, potential buyers, and exchange conditions. This investment will empower the producers with knowledge and enable them to assume a better negotiating position against exchange partners. Once operational, the MIS will not only serve the mushroom industry, but will improve information access for the entire agricultural sector.

The involvement of NAMBoard or any other development partner would be more feasible if producers work collectively; hence, reducing operational costs and facilitating the exchange of pertinent information. Having found significant differences between the group forms in relation to producers' cooperation in chapter six, it is recommended that mushroom producers should organise themselves into groups that operate using principles of model B. Besides that model B enables members to reduce their average input costs, it also provides an enabling environment that improves members' knowledge of the enterprise and management capacity, while reducing the likelihood of internal free-riding. However, instead of marketing independently (which is what model B currently promotes), it is recommended that producers should consider the option of collective marketing, which could be coordinated similarly to the procurement of inputs and performance of pre-production activities. Marketing as a unit could be easily coordinated given that members commence the production cycle at the same time. Although being tied to collective marketing could reduce the individual producer's leverage to make unilateral marketing decisions, the benefits due to individual members at the end will not be negatively impacted as the proceeds will be proportional to what each member trades through the organisation. As such, producers can still improve their rewards by improving their productivity. In the broader context, collective marketing will enhance farmers' chances of achieving economies of scale, increase their bargaining power in the value chain, and possibly open up new remunerative markets. This arrangement will also benefit major buyers as they will be able to reduce the number of small-scale transactions they currently engage in with individual farmers, allowing the same volume of business to be concentrated in a smaller number of relatively larger and more secure transactions.

7.3.4 Public-private partnerships in the mushroom industry

Given the absence of a coordination mechanism in the mushroom industry's 12 years of existence, it is imperative that the government, through the MDU, should take the initiative to bring all stakeholders on board in an attempt to advance the mushroom development

programme. This can be done through consultative forums proposed in chapter four, which are capable of establishing comprehensive networks among the value chain actors. Such forums could bring together prospective investors and enable them to identify unexploited opportunities within the value chain. The same forums could be used to influence the abstraction of counterproductive legislation (e.g. Swaziland's Canning Control Act of 1961), and further establish organs to oversee the implementation, monitoring and evaluation of future strategic interventions introduced to instil growth and efficiency within the mushroom industry. This would also provide an ideal platform to engage the public and private sectors to establish harmonised measurable quality standards and mushroom food safety regulations whose promulgation could preclude possible trade in non-edible species. As indicated in chapter four, these standards should be in line with existing international ones in order to facilitate mushroom trade with other countries. Such interventions will not only work towards guaranteeing the protection of consumers' lives, but also improve their attitudes towards the mushroom industry.

7.4   Limitations of the study

One major drawback of the study relates to the use of cross-sectional data, which provided limited information on the dynamics of the respondents' behaviour. For instance, the analysis conducted in chapter three made a comparison between mushroom producers and non-producers, but did not have much information on the respondents before and after the introduction of the mushroom enterprise. As a result, the data set could not be used to study the impact of the mushroom enterprise on producers' welfare, a fundamental area of interest for policy makers and development partners.

Secondly, given that mushroom production is a relatively new and non-conventional agricultural enterprise in Swaziland, very few farmers currently participate in the industry. As such, despite that the conclusions drawn from this study emanate from empirical estimations, it is important to acknowledge that the analyses were conducted using data gathered from a relatively small number of respondents.

7.5   Recommendations for further research

The results in chapter three indicate that farmers who participate in the mushroom industry are also engaged in other agricultural enterprises in different degrees. Therefore, in attempting to promote diversification towards the mushroom enterprise as an option to reduce farm income variability, it would be useful to conduct further research on possible enterprise combinations that can generate substantial income at lower risk taking into account the various constraints faced by rural-based small-scale farmers. The mushroom enterprise, as pointed out in chapter one, introduces a different dimension to the farm compared to most of the conventional agricultural enterprises found on customary Swazi Nation Land. Among the important attributes is that mushrooms can be produced year-round and have a relatively short gestation period. The waste materials generated from other agricultural enterprises can also be used as substrates to grow mushrooms.

Secondly, with the use of panel data, it would be beneficial in future to study the poverty and food security impacts of the commercial mushroom enterprise in Swaziland. Thirdly, as an enterprise primarily targeted to improve rural livelihoods, it would also be worthy to study the role of the mushroom enterprise towards advancing the empowerment of women. The general literature argues that regardless of their potential, women continue to face persistent obstacles and socio-economic constraints that preclude their full involvement in agriculture in most developing countries. Therefore, this particular dimension of the proposed research could provide evidence on how the mushroom enterprise enhances women's economic contributions both within the household and outside. Given Swaziland's very low Gender Empowerment Index (see for instance, Peter *et al.*, 2008), and the available opportunity for local producers to diversify into other types of mushrooms, the findings from the proposed studies will be very important in informing the direction of future national policies and investment decisions.

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APPENDIX A: List of interviewed mushroom value chain actors, Swaziland, 2011/12

Activity	Value chain actor	Location(s) in Swaziland
1. Production inputs	Arrow Feeds	Matsapha
	Mabhuda farm	Siteki
2. Substrate and spawning	Mushroom Development Unit (MDU)	Malkerns
3. Growing and management	Producers	91 producers located countrywide
4. Marketing inputs	Matata	Bigbend
	Newden	Matsapha
	Foodlines	Matsapha
	Cold room	Mbabane
	Hyper packaging	Mbabane
	Builders Hardware	Nhlangano
5. Product marketing outlets	Spar supermarket	Moneni, Nhlangano, Matata (Big Bend)
	Shoprite supermarket	Mbabane, Manzini, Siteki
	Pick'n Pay supermarket	Mbabane, Manzini, Ezulwini, Matsapha
	Wozani supermarket	Nhlangano
	Tum's George Hotel	Manzini
	Calabash restaurant	Ezulwini
	Lituba Lodge	Ngcina
	Siteki Hotel	Siteki
	Café Lingo restaurant	Mbabane
	Mountain Inn	Mbabane
	Happy Valley Hotel	Ezulwini
	Debonairs Pizza	Manzini
6. Fruit and Vegetable traders	Tetsembiso Investment	Malkerns
	Vegworth	Manzini
7. Training	MDU	Malkerns
	Food Science and Technology Unit (FSTU)	Malkerns
8. Coordination	National Agricultural Marketing Board (NAMBoard)	Manzini/Nokwane
	MDU	Malkerns
	FSTU	Malkerns

Questionnaire Number:

**UNIVERSITY OF
KWAZULU-NATAL**

**INYUVESI
YAKWAZULU-NATALI**

Section 1- 6: Household demographic characteristics - Crop production - Livestock production – Household asset ownership - Livelihoods - Farmers' attitudes towards mushroom production

Note to interviewers: *This questionnaire is targeted at all sampled households: Mushroom producers and non-producers*

Note to respondents: The information captured in this questionnaire is strictly confidential and will be used for research purposes at the University of KwaZulu-Natal to inform stakeholders how the production and marketing of mushrooms can be improved in Swaziland. Participation in the survey is voluntary and respondents are free to withdraw from the study at any time if they so wish.

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Interviewer's name   :_____   Date of interview   :_____

Administrative region: 1 = Hhohho   2 = Manzini   3 = Lubombo 4 = Shiselweni

Name of area:_____Government Enumeration Area. No:_____Homestead No.:_____

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SECTION 1: HOUSEHOLD DEMOGRAPHIC CHARACTERISTICS (start with household head)

1.1 Total number of household members:_____

Household Member	Name of household member	Gender 1=Male 2=Female	Relationship to household head 1= Husband/Wife 2= Daughter/Son 3= Brother/Sister 4= Niece/Nephew 5= Grand child 6 = Cousin 7 = Father/Mother 8 = Grand parent 9 = One of in-laws 10= Labourer 11= Orphan & Vulnerable Child	Age	Education level 1= Illiterate 2= Adult education 3= Primary 4= Secondary 5= High school 6= College/Vocational 7= University	Occupation 1= Wage employed 2= Farmer 3= Self employed[11] [state] _____ 4= Contract labourer 5= Pensioner 6= Disabled & unemployable 7= Unemployed 8= Scholar/student 9 = Infant (5 years and below)	Contributes to household agricultural labour? 1=Yes 2=No	Contributes to household income? 1=Yes 2=No
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

[11] Self employed refers to any other own business initiative apart from farming

SECTION 2:   CROP PRODUCTION

2.1 How much total arable land does the household manage _____Ha?

2.2 How much of the total land was.....

Allocated by the Chief to household? [Ha]	left fallow in 2010? [Ha]	leased in 2010? [Ha]	leased out in 2010? [Ha]

2.3 What major crops did the household produce in 2010? Provide answers in the table below.

Crops grown	Season planted 1 = Summer 2 = Winter 3 = Both	Irrigated 1 = Yes 2 = No	Area planted to each crop In Ha	Labour used 1 = Family only 2 = Hired (paid) only 3 = Family + paid labour	Quantity harvested (in Kg)	Quantity sold If none, write *Not applicable*	Income generated 1 = less than E100 2 = E100 – E200 3 = E201 – E400 4 = E401 – E600 5 = E601 – E800 6 = E801 – E1000 7 = E1001 – E1500 8 = E1501 – E2000 9 = Above E2000
Maize							
Beans							
Cotton							
Sorghum							
Sweet Potato							
Potatoes							
Other							
Other							

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SECTION 3: LIVESTOCK OWNERSHIP and PRODUCTION

3.1 What animals did the household raise in 2010? Provide answers in the table below.

Livestock	Cattle	Goats	Sheep	Indigenous pigs	Commercial pigs	Indigenous chickens	Broilers	Layers
Number currently owned								
If you were to sell all the animals currently owned (according to type), what price would you charge?								
Number of animals and products sold in 2010								*(Eggs)*
Total income from animal and products sales in 2010 1 = less than E100; 2 = E100 – E200 3 = E201 – E400; 4 = E401 – E600 5 = E601 – E800; 6 = E801 – E1000 7 = E1001 – E1500; 8 = E1501 – E2000 9 = Above E2000								*(Eggs)*
Number of animals slaughtered for food in 2010								

SECTION 4:   HOUSEHOLD ASSET OWNERSHIP

4.1 Which of the following assets does the household own?			
Asset	Quantity	State 1= usable 2= not usable	If you were to sell your assets, what price would you charge? [E]
Car – van			
Car – sedan			
Tractor			
Plough – tractor drawn			
Plough – ox drawn			
Planter – tractor drawn			
Planter – ox drawn			
Cultivator – tractor drawn			
Cultivator – ox drawn			
Scotch cart			
Trailer			
Truck			
Motorbike			
Bicycle			
Wheel barrow			
Television			
Radio			
Telephone – landline			
Cellphone			
Computer			
DVD/VCR (video player)			
Hammer mill			
Borehole			
Other			
Other			

4.2 What is the major source of energy used by the household?	
Energy for cooking 1 = Wood 2 = Paraffin 3 = Electricity 4 = Handigas 5 = Solar 6 = Generator 7 = Other	**Energy for lighting** 1 = Paraffin 2 = Electricity 3 = Handigas 4 = Solar 5 = Candles 6 = Generator 7 = Other

4.3 Main source of drinking water
       1=River
       2=Well
       3=Community stand pipe
       4=Stand pipe within household
       5=Own borehole
       6=Community dam

4.4 Sanitary facility
       1=Flush toilet
       2=Pit latrine
       3=None available

SECTION 5: LIVELIHOODS

5.1 What were the main sources of food for the household in 2010?
[Please rank the items, with 1 being the most important source. Items that are not applicable to the household should be left blank]

Source of food	Rank
Purchased food	
Own crop production	
Own livestock production	
Own produced mushrooms	
Food aid [source]	
School feeding	
Labour exchange	
Others [state]	

5.2 What were the main sources of income for the household in 2010?
[Please rank the items, with 1 being the most important source of income. Items that are not applicable to the household should be left blank]

Source of income	Rank
Wages earned by people living in homestead	
Money sent by people living away from homestead	
Crop sales [state]	
Livestock sales [state]	
Mushroom sales	
Tractor hire service	
Oxen hire service	
Transport operator [circle] bus, kombi, taxi, for hire	
Traditional healing	
Brewing	
Hawking	
Block making	
Repairs and maintenance [circle] cars, appliances, others [state]	
Retail shop	
Handcraft	
Social Grant	
Pension	
Others [state]	

5.3 In which activity do you devote most of your time as a source of employment?
[Please rank the items, with 1 being the most important source of employment. Items that are not applicable to the household should be left blank]

Source of employment	Rank	No. of weeks in a year	No. of days in a week	No. of hrs in a day
Permanent employment [state]				
Casual/Temporary employment [state]				
Own Crop production[state]				
Own Livestock production [state]				
Own Mushroom production				
Others [state]				
Others [state]				

5.4 What were the main expenditure items for the household in 2010?
[Please rank the items, with 1 being the most important expenditure item. Items that are not applicable to the household should be left blank]

Expenditure item	Rank
Staple food *(maize)*	
Non-staple food *(other food items apart from maize)*	
Crop production inputs	
Livestock production inputs	
Mushroom production inputs	
Clothes	
Transport	
Beverages and tobacco	
Medical expenses	
Burial expenses	
School fees	
Others [state]	

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SECTION 6: FARMERS' ATTITUDES TOWARDS MUSHROOM PRODUCTION

6.1 Please indicate whether you agree or disagree with the following statements.

Statement	Strongly agree (5)	Agree (4)	Not sure (3)	Disagree (2)	Strongly disagree (1)
1. Mushrooms have a potential to improve household income					
2. Mushroom production can reduce the problem of rural unemployment					
3. Starting a mushroom enterprise is relatively cheap compared to other agricultural enterprises					
4. Mushrooms have relatively higher financial returns compared to other agricultural enterprises					
5. Mushrooms can be produced year-round and do not rely on rainfall					
6. With mushrooms, more returns can be realised from a small portion of land					

Statement	Strongly agree (1)	Agree (2)	Not sure (3)	Disagree (4)	Strongly disagree (5)
7. There is nothing unique about mushrooms compared to other agricultural enterprises					
8. Mushrooms are known to grow in the wild and cannot be cultivated					
9. People that do not consume mushrooms will have difficulty to cultivate them					
10. Cultivating mushrooms demands a lot of time and labour					
11. Mushrooms can only be produced by people that have undergone some training					
12. Production and marketing of mushrooms has more risks compared to other enterprises					
13. Mushrooms are exotic products and cannot be grown under local conditions					

Statement	Strongly agree (1)	Agree (2)	Not sure (3)	Disagree (4)	Strongly disagree (5)
14. A mushroom is a fungus and one's exposure to mushrooms can increase chances of disease infestations					
15. Mushroom production inputs are scarce and expensive for smallholder producers					
16. There is less market potential for mushrooms in Swaziland					
17. Mushroom production is an enterprise for poor households in society					
18. Mushroom production is an enterprise for women					
19. Mushrooms are poisonous and their consumption will expose consumers to death					
20. Mushrooms grow from waste materials, therefore they are not good for the body					
21. People that eat mushrooms are those that cannot afford to buy meat from the shop					

Statement	Strongly agree (5)	Agree (4)	Not sure (3)	Disagree (2)	Strongly disagree (1)
22. Mushrooms are very tasty and enjoyable					
23. Mushrooms provide a good source of nutrients for the body					
24. Mushrooms are consumed by people that are health conscious					

6.2 Apart from the above statements, what other information would you like to share regarding production, marketing and consumption of mushrooms?

Production

(i)_____

(ii)_____

(iii)_____

Marketing

(i)_____

(ii)_____

(iii)_____

Consumption

(i)_____

(ii)_____

(iii)_____

6.3 Do you produce mushrooms?   1 = Yes 2 = No 3 = Once produced, but stopped

6.4 If Yes, when did you start growing mushrooms (Month/Year)? _____

6.5 Under what formation do you produce? 1= Sole proprietor   2= Partnership   3= Association   4= Cooperative   5= Company

6.6 If 2, 3, 4 or 5, name of entity (or Trade Name)_____

6.7 If producing under partnership, association, cooperative or company, how do you conduct your production activities?

      1= Production houses are jointly managed by members   2= Production houses are managed separately by individual members

6.8 If you are currently producing mushrooms, do you intend to stop any time soon? 1=Yes; 2=No. If yes, explain why?

6.9 If not currently producing, do you intend to produce mushrooms in future? 1=Yes; 2=No. If Yes, why are you not currently producing?

6.10 If you once produced mushrooms and stopped at some point, what were the reasons?

THANK YOU FOR PARTICIPATING IN THIS SURVEY!

Section 7-8: Institutional support & Collective action

<u>Note to interviewers:</u> *This questionnaire is targeted at mushroom producers only.*

Section 7 (Institutional support) will be answered by individual producers and members of mushroom producing groups.
Section 8 (Social capital-related attributes) will be answered by members of mushroom producing groups *only*.

<u>Note to respondents:</u> The information captured in this questionnaire is strictly confidential and will be used for research purposes at the University of KwaZulu-Natal to inform stakeholders how the production and marketing of mushrooms can be improved in Swaziland. Participation in the survey is voluntary and respondents are free to withdraw from the study at any time if they so wish.

For further information, please contact: Prof. G.F. Ortmann (Research Supervisor), University of KwaZulu-Natal, School of Agricultural, Earth and Environmental Sciences, P/BagX01, Scottsville 3209, Pietermaritzburg, South Africa. E-mail: <u>Ortmann@ukzn.ac.za</u>, Tel: (+27) 33 260 5492.

Interviewer's name   :_____   Date of interview:_____

Administrative region: 1 = Hhohho   2 = Manzini   3 = Lubombo 4 = Shiselweni

Name of area:_____Government Enumeration Area. No:_____Homestead No.:_____

Name of Producer/Group:_____

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SECTION 7: INSTITUTIONAL SUPPORT

These questions will be answered by mushroom producers (Individual producers and members of mushroom producing groups)

7.1 From which source(s) would you say you received information that influenced your decision to venture into mushroom production, and what type of information was this? *Tick in the relevant box(es).*

Information source	Production (How mushrooms are produced)	Financial (The costs and returns of mushroom production)	Marketing (Available markets, prices and profitable marketing channels)
1. Government extension agent			
2. Mushroom Production specialist (Mushroom Development Unit)			
3. NGO			
4. University specialist			
5. Radio			
6. Television			
7. Internet			
8. Community meeting			
9. Magazine			
10. Newspaper			
11. Pamphlet			
12. Mushroom producer			
13. Relative			
14. Neighbour			
15. Friend			
16. Private consultant			
17. Other (specify)			

7.2 How important is the following information for you in mushroom production? *Tick in the relevant box*

Information	Very important	Important	Not important
Production			
Financial			
Marketing			

7.3 From which source(s) would you prefer to receive the following types of information related to mushroom production? *Tick in the relevant box(es) and rank the top three sources.*

Information source	Production (How mushrooms are produced)	1st choice	2nd choice	3rd choice	Financial (The costs and returns of mushroom production)	1st choice	2nd choice	3rd choice	Marketing (Available markets, prices and profitable marketing channels)	1st choice	2nd choice	3rd choice
1. Government extension agent												
2. Mushroom Production specialist (Mushroom Development Unit)												
3. NGO												
4. University specialist												
5. Radio												
6. Television												
7. Internet												
8. Community meeting												
9. Magazine												
10. Newspaper												
11. Pamphlet												
12. Mushroom producer												
13. Other farmers												
14. Relative												
15. Neighbour												
16. Friend												
17. Private consultant												
18. Other (specify)												

7.4 Is the following information available to you as a mushroom producer?

Type of information	1= yes 2= no	If Yes, 1=readily available 2=need to search for it	Name the information source(s) using numbers in 7.3
Availability of spawn			
Price(s) of spawn			
Availability of substrate			
Price(s) of substrate			
Availability of substrate supplement			
Price(s) of substrate supplement			
Availability of product market			
Producer price(s)			

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7.5 Have you ever received any training in mushroom production?

    1= Yes   2= No

7.6 Have you ever received any training in preparing mushroom dishes/recipes?

    1= Yes   2= No

7.7. Do you have any knowledge of mushroom's nutritional and therapeutical attributes?

    1= Yes   2= No

7.8 Did you receive any extension service on mushroom production in 2010?

    1= Yes   2= No

7.9 If yes, approximately, what was the frequency of visits by Extension officers in 2010?

    1 = once a week   2 = once in two weeks   3 = once a month 4 = as and when requested   5 = Other (specify)_____

7.10 Did you find the extension service useful?

    1 = Yes   2 = No

7.11 Have you ever attended any field days or demonstrations on mushroom production?

    1 = Yes   2 = No

7.12 How far is your area of production from the following places?

Location	Name of area	Kilometres 0=no need to travel; 1=less than 1km; 2=1-2km; 3=2.1-3km; 4=3.1-4; 5=4.1-5; 6=5.1-10km; 7=above 10km
Nearest town/city		
Source of spawn		
Source of substrate		
Source of substrate supplement		
Mushroom Development Unit		
Major product market		

7.13 What is the distance between the production house and your homestead? *[State in Km]*_____

7.14 What is the distance between the production house and the nearest reliable water source? *[State in Km]*_____

SECTION 8: COLLECTIVE ACTION

These questions relate only to members of *mushroom producing* groups. To be answered by individual members.

8.1 Are you a founding member of the group?
    1=Yes   2=No

8.2 Who originally founded the group?
    1=Central Government   2=Regional Development Office   3=Community Leadership   4=Group members

8.3 Are you a member of any other organisation besides this group?
    1=Yes   2=No

8.4 If yes, what organisation(s) are these? *[Name(s)]*_____

8.5 Which religion do you follow?
    1= Christian [state denomination]_____   2= Muslim   3= Hindu   4 = Other [state]_____

8.6 What was the main reason behind joining this group? *Can have multiple answers*
    1=Voluntary (after learning of the benefits of mushroom production)
    2=Was encouraged by other members
    3=After seeing some of my friends (or neighbours) join, I decided not to be left behind
    4=Wanted to gain experience from the group with the hope that I will start my own enterprise later on
    5= Producing mushrooms individually is more expensive
    6=Other (specify)_____

8.7 Did you have enough information about the group when you joined as a member?
    1=Yes   2=No

8.8 Since joining this group, has membership in the group declined, remained the same or increased?
    1=Declined   2=Remained the same   3=Increased

8.9 If 1 or 3, Group size effects. *Tick the appropriate block*

Statement	No change	Getting better	Getting worse
If number increased - Since becoming a member of the group what has been the impact *of increasing* group size on cooperation of group members			
If number decreased - Since becoming a member of the group what has been the impact *of decreasing* group size on cooperation of group members			

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8.10 Have you been able to participate fully in all activities of the group during the past year?

    1=Yes   2=No

8.11 If No, which activities have you not fully participated in and why? *In the second column, tick the appropriate block and in the third column, enter the appropriate number*

Activity	[Tick]	Reasons for not participating 1=Was not informed that I was expected to participate in this activity 2=I am tired of working for other members that do not participate in group activities 3= (specify)_____
Group meetings		
Substrate gathering		
Substrate preparation		
Substrate mixing		
Substrate bagging		
Spawning and incubation		
Management of growing house		
Harvesting		
Packaging of products		
Marketing activities		

8.12 As a member, what costs does the group impose on you? Indicate the magnitude of these costs. *Tick the appropriate block*

Cost	Major	Moderate	Little	None
Joining fee				
Annual subscription				
Development fund contribution				
Time of attending meetings				
Labour for enterprise activities				
Opportunity costs - Returns at the end of the day are less compared to what I would be getting if I was involved in other activities				

8.13 Do you serve in the Group Committee?

    1=Yes   2=No

8.14 If Yes, in what capacity?_____

8.15 Do you feel that you are now putting less effort into the group than was the case when you joined?

    1=Yes   2=No

8.16 Do you feel every member is putting maximum contribution in the group?

    1=Yes   2=No

8.17 If No, what do you think has caused this anomaly? *Can have multiple answers*

    1=Other members not working hard enough
    2=Membership costs are too high
    3=There are very little individual benefits after all
    4=The group is too large
    5=There is often breakdown of communication
    6= Other (specify)_____

8.18 From your experience, which activities are difficult to get all members to participate in? *Tick the appropriate block(s)*

Activity	[Tick]
Group meetings	
Substrate gathering	
Substrate preparation	
Substrate mixing	
Substrate bagging	
Spawning and incubation	
Management of growing house	
Harvesting	
Packaging products	
Marketing activities	

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8.19 What happens to members that do not participate in group activities when required to do so and how effective are the penalties (if any)?

Statement	Effectiveness of penalty		
	Very effective	Moderately effective	Not effective
There are no penalties			
Verbal warning			
Written warning			
Fine			
Suspension			
Reduced rewards			
Expulsion			
Social exclusion			

8.20 What are the benefits of being a group member, and how would you rank them? *Tick the appropriate block*

Benefits of being a group member	Major	Moderate	Little	None
Better access to mushroom production advice from experts				
Access to reliable markets				
Better prices for products				
Better access to inputs				
Sharing of ideas with members				
Learning and gaining from the strengths of other members				
Other [specify]				
Other [specify]				

8.21 Please tick the most appropriate response to the following questions.

Statement	Always	Frequently	Sometimes	Not at all
How often do you disagree with decisions made by the group?				
Do group members get along with each other?				

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8.22 To what extent do you agree or disagree with the following statements regarding your working relationship with other group members?
Tick the appropriate block.

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I have a strong personal confidence in each group member					
All fellow group members are trustworthy					
I can always rely on any group member when it counts the most					
The confidence I have in group members will continue in the future					
I am willing to contribute towards group investments in the future					
There is extensive communication in the group					
Information is shared in a languate and form understood by all members					
There are no demonstrated conflicts within the group					

8.23 Rank the group's effectiveness in the following areas: *Tick the appropriate block*

Statement	Excellent	Very good	Good	Poor	Very Poor
Group's effectiveness in reaching decisions on issues affecting the group					
Group's effectiveness in implementing decisions taken at meetings					
Group's effectiveness in following the constitution (or by-laws) to the letter					

8.24 What is your assessment of the following: *Tick the appropriate block*

Statement	Very low	Low	Moderate	High	Very Higy
Level of member cooperation in executing joint manual activities					
Level of member cooperation in joint planning and decision making					

8.25 Your level of satisfaction with group performance towards achieving its objectives

1= Very dissatisfied   2= Dissatisfied   3= Neutral   4= Satisfied   5= Very satisfied

8.26 Group-Institutional Factors

Statement	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
The nomination and voting for committee members is well known and transparent					
I can vote and express myself freely during elections of committee members					
I can vote and express myself freely during group meetings					
I fully understand the constitution (or by-laws) of the group					
The committee shares with us everything about its operations					
Decisions in the group are taken by a few influential committee members					
The leadership structure needs to be improved					
Scheduling of group tasks needs to be revised					
All group members are involved in performing tasks as assigned					

8.27 Which of the following statements best describe the condition of your farmer organisation? *Tick the appropriate number under each category.*

General meetings

1	No general meetings called by committee
2	General meetings held on insistence by members
3	General meetings held without following constitution
4	General meetings held according to constitution
Comment	

Agenda for Group meetings

1	No agenda is set for committee meetings
2	Agenda set informally by some committee members and not circulated
3	Agenda set in the meeting
4	Agenda set and circulated in advance but not adhered to during meetings
5	Agenda set in consultation with members, circulated in advance and is adhered to during meetings
Comment	

Minutes of meetings

1	No minutes are recorded during meetings
2	Minutes are recorded, but not referred to in following meetings
3	Minutes are recorded, but not circulated to members
4	Minutes are recorded and circulated in the next meeting
5	Minutes are recorded and circulated to members way before the next meeting
Comment	

Financial records

1	No financial records are kept by the group (cash book, income & expenditure, balance sheet, payment vouchers, invoices, receipts)
2	Income and expenses are haphazardly recorded
3	Group keeps all financial records and they are up-to-date
Comment	

Auditing

1	Accounts are not audited
2	Accounts are only audited due to external pressure
3	Accounts are audited annually in accordance with the group constitution and are accessible to all members
Comment	

Financial reporting

1	Group members are not updated on financial matters
2	Group presents fragmented financial reports
3	Group presents fragmented financial reports in response to external pressure
4	Group presents delayed but comprehensive financial reports
5	Group members are informed of all financial matters in every general meeting as per constitutional requirements
Comment	

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Budgeting procedures

1	Group does not produce budgets
2	Budgets are done by committee members only, excluding general membership
3	Budgets are produced in consultation with entire membership
4	Budgets are produced in consultation with entire membership but partially adhered to
5	Budgets are produced in consultation with entire membership and group fully adheres to it
Comment	

Decision making

1	Committee makes all the decisions (dictates)
2	Committee makes all decisions as a result of non-participation of members in meetings
3	Committee makes all decisions as they are entrusted by group members
4	Consensus on major decisions made at general meetings with the participation of members
Comment	

Member monitoring system

1	No member monitoring system in place
2	Member monitoring system at developmental stage
3	Member monitoring system in place but not functional
4	Member monitoring system functional, but results not used
5	Member monitoring system functional and results inform decision-making
Comment	

Effectiveness of disciplinary measures for non-cooperative members

1	General members disregard laid-down disciplinary measures
2	Disciplinary measures in place but not enforced
3	Disciplinary measures partially enforced
4	Disciplinary measures well known and enforced
Comment	

THANK YOU FOR PARTICIPATING IN THIS SURVEY!

UNIVERSITY OF
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YAKWAZULU-NATALI

Questionnaire Number:

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Name of area:_____

Name of producer:_____ Contact details (Cell No.):_____

Date started producing mushrooms: Month_____Year_____

If member of a mushroom producing group, Name of group:_____

SECTION 1: HOUSEHOLD DEMOGRAPHIC CHARACTERISTICS (start with owner of enterprise)

1.2 Total number of household members:_____

Household Member	Name of household member *start with owner of enterprise	Gender 1=Male 2=Female	Relationship to household head 1= Husband/Wife 2= Daughter/Son 3= Brother/Sister 4= Niece/Nephew 5= Grand child 6 = Cousin 7 = Father/Mother 8 = Grand parent 9 = One of in-laws 10= Labourer 11= Adopted	Age	Education level 1= Illiterate 2= Adult education 3= Primary 4= Secondary 5= High school 6= College/Vocational 7= University	Occupation 1= Wage employed 2= Farmer 3= Self employed[12] [state] _____ 4= Contract labourer 5= Pensioner 6= Disabled & unemployable 7= Unemployed 8= Scholar/student 9 = Infant (5 years and below)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						

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[12] Self employed refers to any other own business initiative apart from farming

SECTION 2: HOUSEHOLD ASSET OWNERSHIP

2.1 Which of the following assets does the household own?			
Asset	Quantity	State 1= usable 2= not usable	If you were to sell your assets, what price would you charge? [E]
Car – van			
Car – sedan			
Tractor			
Plough – tractor drawn			
Plough – ox drawn			
Planter – tractor drawn			
Planter – ox drawn			
Cultivator – tractor drawn			
Cultivator – ox drawn			
Scotch cart			
Trailer			
Truck			
Motorbike			
Bicycle			
Wheel barrow			
Television			
Radio			
Telephone – landline			
Cellphone			
Computer			
DVD/VCR (video player)			
Hammer mill			
Borehole			

2.2 What is the major source of energy used by the household?	
Energy for cooking 1 = Wood 2 = Paraffin 3 = Generator 4 = Handigas 5 = Solar 6 = Electricity	**Energy for lighting** 1 = Candles 2 = Paraffin 3 = Generator 4 = Handigas 5 = Solar 6 = Electricity

2.3 Main source of drinking water
   1=River
   2=Community dam
   3=Well
   4=Community stand pipe
   5=Harvested rain
   6=Stand pipe within household
   7=Own borehole

2.4 Sanitary facility
   1=None
   2=Pit latrine
   3=Flush toilet

2.5 Describe the nature of your growing house(s)

Dimensions of growing house (length x width x height in metres)	Number of spawn-impregnated bags

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SECTION 3:   TRANSACTION COSTS

Where do you normally sell your mushrooms? 1= Farm gate; 2 = retail/supermarket; 3 = restaurant/hotel; 4 = middlemen *[State in columns 3 – 5]*

Explanatory variables	Description	Buyer 1	Buyer 2	Buyer 3
3.1 Buyer identification	How did you identify buyer(s)?	1=through Ext.officer; 2=conducted own marketing study; 3=through other producers; 4=went into production without identifying buyer(s); 5= other means (indicate)		
3.2 Price uncertainty	Was the price in alternative markets known before selling your mushrooms?	1= yes; 0 = no		
3.3 Difficulty in getting price information	How difficult is it to get price information?	1=not an issue of concern; 2=very easy; 3=easy; 4=difficulty; 5=very difficult		
3.4 Source of price information	Indicate the source of price information for the channel?	1= Ext.officer; 2= other producers; 3=newspaper; 4=radio; 5=buyer; 6=trader; 7= indicate		
3.5 Search for trading partner	How difficult is it to locate exchange partners/buyers?	1=not an issue of concern; 2=very easy; 3=easy; 4=difficulty; 5=very difficult		
3.6 Transfer costs	How long do you travel to sell your mushrooms?	0=no need to travel; 1=less than 1km; 2=1-2km 3=2.1-3km; 4=3.1-4 5=4.1-5 6=5.1-10km; 7=above 10km		
3.7 Transportation	How difficult is it to transport your products to the market?	1=not an issue of concern; 2=very easy; 3=easy; 4=difficulty; 5=very difficult		
3.8 Transport organiser	Who organises transport for your mushrooms?	1=buyer; 2=producer		
3.9 Type of transport	If producer is responsible for transport, indicate mode.	1=own vehicle; 2=hired vehicle; 3=public transport 4=by foot		
3.10 Road condition	What is the condition of the road?	1=all tar; 2=more tar than gravel; 3= more gravel than tar; 4= all gravel		
3.11 Cost/trip	How much does a return trip to the market cost you?	E/trip		
3.12 Period of supply	Does buyer decide when you should deliver product?	1= yes; 0 = no		
3.13 Sorting/grading	Do you grade your mushrooms?	1= yes; 0 = no		
3.14 Weighing	Do you weigh the mushrooms?	1= yes; 0 = no		
3.15 Packaging	Do you package your mushrooms before taking to market?	1= yes; 0 = no		
3.16 Processing	Any processing of mushrooms to a different form(s)?	1= yes; 0 = no. If (1), list the products.		
3.17 Time to complete sale	No. of days it normally takes to sell all mushrooms after harvest?	Average No. of days_____		

Explanatory variables	Description	Buyer 1	Buyer 2	Buyer 3
3.18 Storage	Do you store your mushrooms before selling?	1= yes; 0 = no		
3.19 Storage facility	Who owns the storage facility (fridge)?	1= producer; 2= neighbour; 3=association		
3.20 Shrinkage loss	Do you experience problems of weight loss during transportation of mushrooms?	0=no; 1= sometimes; 2=often; 3=always		
3.21 Uncertainty of none sale	Is there uncertainty that you will not find buyers for your mushrooms?	0=no; 1= sometimes; 2=often; 3=always		
3.22 Grade uncertainty	Is there uncertainty that your mushrooms will not meet the expected grade/quality of buyers?	0=no; 1= sometimes; 2=often; 3=always		
3.23 Quantity harvested	From your last harvest, how many bags/trays did you come up with?	No. of bags/trays_____ Each bag/tray weighing_____ grams		
3.24 Consumption	How much mushrooms did you consume?	No. of bags/trays		
3.25 Quantity sold	How much did you sell through this channel?	No. of bags/trays_____		
3.26 Producer price	At what price did you sell your mushrooms?	E/bag or tray_____		
3.27 Bargaining power	Who sets the marketing price?	1=producer; 2=buyer; 3=both		
3.28 Price uncertainty	How difficult is it to agree with trading partner on exchange price?	1=not an issue of concern; 2=very easy; 3=easy; 4=difficulty; 5=very difficult		
3.29 Initial producer price	When you started the production cycle, what producer price did you use for budgeting purposes?	E/bag or tray_____		
3.30 Quantity rejected	In your last harvest, how much was rejected?	No. of bags/trays_____		
3.31 Frequency of sale	From your last 4 harvests, how many times did you sell through this channel?	Number of times_____		
3.32 Contract/agreement	What form of contract do you have with your buyers?	0 = no; 1=marketing; 2=resource providing; 3= other (specify) If 1, 2 or 3, is contract *verbal* or *written* (underline)		
3.33 Quantity requirement	Does the buyer require you to produce a certain quantity?	0=never 1= sometimes; 2=often; 3=always		

Explanatory variables	Description	Buyer 1	Buyer 2	Buyer 3
3.34 Meet requirements	Are you able to satisfy the quantity requirements?	0=never 1= sometimes; 2=often; 3=always		
3.35 Payment arrangement	How are you paid for your supplies?	1= cash on delivery; 2= on a later date		
3.36 Payment delay	Do you experience any payment delays from your trading partner(s)?	0=no 1= sometimes; 2=often; 3=always		
3.37 Length of payment delay	If 1, 2 or 3, on average, how many days does it take to receive your payment after delivery?	No of days:_____		
3.38 Follow up on unpaid balance	Do you make reminders/follow up calls for unpaid bills?	0=never 1= sometimes; 2=often; 3=always		
3.39 Legal intervention	In connection to 3.38, have you used the legal route at some point?	1=yes; 0=no		
3.40 Major risks and challenges	Which of the following do you consider as the major risks and challenges associated with your marketing channel(s)?	Please rank *the major five(5)* ☐Lack of **price information** ☐Low **sale volume** ☐High **labour** requirements ☐Inability to provide consistent **quantity** ☐Inability to provide consistent **quality** ☐**Competition** from other producers ☐Unpredictable **customer turnout** ☐**Low prices** and profit ☐Price **uncertainty** ☐Delayed **payments** (buyer unreliability) ☐Lack of **transport** ☐Lack of **cooling facility** ☐Other state)_____	Please rank *top five(5)* ☐Lack of **price information** ☐Low **sale volume** ☐High **labour** requirements ☐Inability to provide consistent **quantity** ☐Inability to provide consistent **quality** ☐**Competition** from other producers ☐Unpredictable **customer turnout** ☐**Low prices** and profit ☐Price **uncertainty** ☐Delayed **payments** (buyer unreliability) ☐Lack of **transport** ☐Lack of **cooling facility** ☐Other state)_____	Please rank *top five(5)* ☐Lack of **price information** ☐Low **sale volume** ☐High **labour** requirements ☐Inability to provide consistent **quantity** ☐Inability to provide consistent **quality** ☐**Competition** from other producers ☐Unpredictable **customer turnout** ☐**Low prices** and profit ☐Price **uncertainty** ☐Delayed **payments** (buyer unreliability) ☐Lack of **transport** ☐Lack of **cooling facility** ☐Other state)_____

THANK YOU FOR PARTICIPATING IN THIS SURVEY!
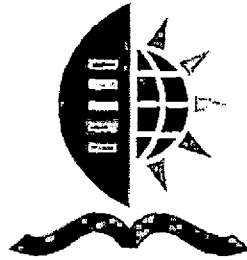
UNIVERSITY OF KWAZULU-NATAL

INYUVESI YAKWAZULU-NATALI

1. *Questionnaire-Mushroom buyers (Supermarkets and Middlemen)*

Note to respondents: The information captured in this questionnaire is strictly confidential and will be used for research purposes at the University of KwaZulu-Natal to inform stakeholders how the production and marketing of mushrooms can be improved in Swaziland. Participation in the survey is voluntary and respondents are free to withdraw from the study at any time if they so wish.

For further information, please contact: Prof. G.F. Ortmann (Research Supervisor), University of KwaZulu-Natal, School of Agricultural, Earth and Environmental Sciences, P/BagX01, Scottsville 3209, Pietermaritzburg, South Africa. E-mail: Ortmann@ukzn.ac.za, Tel: (+27) 33 260 5492.

Name of respondent:_____ Organisation:_____

Designation:_____

1.1.   What type(s) of mushrooms do you buy and sell in your outlet?

Type of mushroom	Origin 1=cultivated 2=from forest	Form 1=fresh 2=dried 3=canned	Source of supply (Name and location) 1=local 2=import	Buying Price [E/kg]	Processing activities done in your outlet (List, if any)	Selling Price [E/kg]	How would you rate the demand? 1=Very high; 2=High; 3=Moderate; 4=Low; 5=Very low	Required quantity of supply per week [kg]	How would you rate the supply? 1= Very good; 2=Good; 3=Moderate 4=Erratic; 5=Very erratic	Quantity supplied per week [kg]*
Oyster										
Button										
Shiitake										
Enoki										
Shimeji										

*In brackets, quantity from local suppliers

1.2. If any processing, what input(s) do you use?

Input	Source of input	Cost/unit [E/unit]

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1.3. If mushrooms are cooked

Type of mushroom					Type of mushroom				
Ingredients	Amount used [kg]	Source of input	Cost/unit [E/unit]	Time for preparing [hrs]	Ingredients	Amount used [kg]	Source of input	Cost/unit [E/unit]	Time for preparing [hrs]

1.4. If packaged?

Packaging material	Source of input	Cost/unit [E/unit]

1.5. What is your source of market and price information for mushrooms?_____

1.6. What are the problems with market and price information for mushrooms?

1.7. Did you receive any training related to the mushroom enterprise? If yes, which field and who provided the training?

1.8. How would you describe the mode of delivery of mushrooms?

Type of mushroom	Mode of delivery 1=Own collection 2=Delivery by seller 3=Use contractor	If own collection, what is the average distance travelled 1=less than 10km; 2=11 – 20km 3=21 – 50km; 4=51-100km; 4=above 100km
Oyster		
Button		
Shiitake		
Enoki		
Shimeji		

The following questions are specific to oyster mushrooms

1.9. What requirements do you have for local oyster mushroom suppliers?

Requirement	Comment
Amount of supply	
Frequency of supply	
Grade/quality of mushrooms	
Location of producer	
Packaging	
Labeling of products	
Standards accreditation	

1.10. Who sets the buying price for oyster mushrooms? a) buyer, b) producer or c) both

1.11. Are you happy with the current marketing arrangement for local oyster mushrooms? If not, which areas would you want to see improved, and what proposals would you make?

Area of concern	Proposal	Who has to act on these proposals?	Have you made these proposals before?	Any improvement thus far?
Low sale volume				
Inability to provide consistent quantity				
Inability to provide consistent quality				

1.12. Have you at any point rejected some oyster mushrooms supplied by local producers? If yes, what were the reasons for rejection?

1.13. What happens with the rejected produce?

1.14. Do you have any idea who your buyers are and if they add any value to your product?

Category of buyer	Form of value addition (if known)	Any knowledge of who else they sell to? (Indicate)

1.15. Have you received any requests/proposals from your customers in relation to oyster mushrooms? If yes, what were the major requests?

Area of concern	Proposal	Who has to act on these proposals?	Any improvement thus far?
Lack of form variety			
Inability to provide consistent quantity			
Inability to provide consistent quality			
Comparatively expensive			
Poor taste compared to other types			
Other _____			
Other _____			

1.16. What other opportunities do you feel have not been exploited by local mushroom producers?

1.17. Which national and/or international regulations (laws or policies) affect your trade in mushrooms?

Regulation	How regulation affects you?	Any proposal	Who has to act on proposal?

THANK YOU FOR PARTICIPATING IN THE SURVEY!

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INYUVESI YAKWAZULU-NATALI

2. *Questionnaire-Mushroom buyers (Hotels and Restaurants)*

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Name of respondent:_____ Organisation:_____

Designation:_____

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2.1.   What type(s) of mushrooms do you buy and sell in your outlet?

Type of mushroom	1=cultivated 2=from forest	Form 1=fresh 2=dried 3=canned	Source of supply (Name and location) 1=local 2=import	Buying Price [E/kg]	Processing activities done in your outlet (List them if any)	Selling Price [E/kg]	How would you rate the demand? 1=Very high; 2=High; 3=Moderate; 4=Low; 5=Very low	Required quantity of supply per week [kg]	How would you rate the supply? 1= Very good; 2=Good; 3=Moderate 4=Erratic; 5=Very erratic	Quantity supplied per week [kg]*
Oyster										
Button										
Shiitake										
Enoki										
Shimeji										

*In brackets, quantity from local suppliers

2.2. What is your source of market and price information for mushrooms?_____

2.3. What are the problems with market and price information for mushrooms?

2.4. Did you receive any training related to the mushroom enterprise? If yes, which field and who provided the training?

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2.5. How would you describe the mode of delivery of mushrooms?

Type of mushroom	Mode of delivery	If own collection, what is the average distance travelled
	1=Own collection 2=Delivery by seller 3=Use contractor	1=less than 10km 2=11 – 20km 3=21 – 50km 4=51-100km 4=above 100km
Oyster		
Button		
Shiitake		
Enoki		
Shimeji		

2.6. Method of food preparation

Type of mushroom					Type of mushroom				
Ingredients	Amount used [kg]	Source of input	Cost/unit [E/unit]	Time for preparing [hrs]	Ingredients	Amount used [kg]	Source of input	Cost/unit [E/unit]	Time for preparing [hrs]

2.7. If packaging…..

Packaging material	Source of input	Cost/unit [E/unit]

The following questions are specific to oyster mushrooms

2.8. What requirements do you have for local oyster mushroom suppliers?

Requirement	Comment
Amount of supply	
Frequency of supply	
Grade/quality of mushrooms	
Location of producer	
Packaging	
Labeling of products	

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2.9. Who sets the buying price for oyster mushrooms? a) buyer, b) producer or c) both

2.10. Are you happy with the current marketing arrangement for local oyster mushrooms? If not, which areas would you want to see improved, and what proposals would you make?

Area of concern	Proposal	Who has to act on these proposals?	Have you made these proposals before?	Any improvement thus far?
Low sale volume				
Inability to provide consistent quantity				
Inability to provide consistent quality				

2.11. Have you at any point rejected some oyster mushrooms supplied by local producers? If yes, what were the reasons for rejection?

2.12. What happens with the rejected produce?

2.13. Do you have any idea who your buyers are and if they add any value to your product?

Category of buyer	Form of value they add (if known)	Any knowledge of who else they sell to? (indicate)

2.14. Have you received any requests/proposals from your customers related to oyster mushrooms? If yes, what were the major requests?

Area of concern	Proposal	Who has to act on these proposals?	Any improvement thus far?
Lack of form variety			
Inability to provide consistent quantity			
Inability to provide consistent quality			
Comparatively expensive			
Poor taste compared to other types			

2.15. What other opportunities do you feel have not been exploited by local mushroom producers?

2.16. Which national and/or international regulations (laws or policies) affect your trade in mushrooms?

Regulation	How regulation affects you?	Any proposal	Who has to act on proposal?

THANK YOU FOR PARTICIPATING IN THE SURVEY!

3. *Questionnaire-Mushroom Development Unit*

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Name of respondent:_____ Organisation:_____

Designation:_____

3.1. What is your current staff compliment?

3.2. Is your unit adequately staffed to fulfill its overall mandate? If not, what other positions are required?

3.3. Did you receive any training related to the mushroom enterprise? If yes, which field and who provided the training?

3.4. Which areas do you still require training in? Any justification?

3.5. What steps does a farmer have to take if he/she wants to start producing mushrooms? What are the biggest obstacles?

3.6. Do you have any idea who your buyers are and if they add any value to your product?

Category of buyer	Form of value they add (if known)	Any knowledge of who else they sell to? (indicate)

3.7. Indicate the type, cost and source(s) of items used to produce spawn

Item	Source	Cost	Mode of delivery	If own collection, what is the average distance traveled	Total cost	Selling price of spawn
		[E/ unit]	1=Own collection 2=Delivery by seller 3=Use contractor	1=less than 10km 2=11 – 20km 3=21 – 50km 4=51-100km 4=above 100km	[E]	[E/unit]

3.8. Have you received any requests/proposals from your customers related to the supply of spawn? If yes, what were the major requests?

Area of concern	Proposal	Who has to act on these proposals?	Any improvement thus far?
Source is too centralised			
Inconsistent supply			
Low quality			
Not adaptable to certain areas			
Lack of species variety			

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3.9. Does the MDU have plans of privatising spawn production? If yes, when and how? If no, why?

3.10. What is the capacity of your incubation room?_____

3.11. Have you received any requests/proposals from your customers related to the availability and use of your incubation room? If yes, what were the major requests?

Area of concern	Proposal	Who has to act on these proposals?	Any improvement thus far?
Facility is too centralised			
Has low capacity			
High level of contamination			.
Theft of bags			.

3.12. Does the unit have a contingency plan ready in case the donation of substrate bags is terminated? If yes, what is the plan?

3.13. Have you received any requests/proposals from your customers related to the availability and use of chopping, mixing, boiling and sterilizing equipment? If yes, what were the major requests?

Area of concern	Proposal	Who has to act on these proposals?	Any improvement thus far?
Location is too centralised			

3.14. How many people have you trained in mushroom production in the past 3 years?

Year	Constituency	No. of trainees
2010		
2011		
2012		

3.15. Are you satisfied with the way training in mushroom production is being coordinated? If not, which areas do you feel should be improved?

Area of concern	Proposal	Who has to act on these proposals?	Any improvement thus far?

3.16. Are you satisfied with the way extension services for mushrooms are being coordinated? If not, which areas do you feel should be improved?

Area of concern	Proposal	Who has to act on these proposals?	Any improvement thus far?

3.17. Have you received any requests/proposals from stakeholders related to mushroom production in general in Swaziland? If yes, what proposals were made?

Area of concern	Proposal	Who has to act on these proposals?	Any improvement thus far?

3.18. Have you received any requests/proposals from stakeholders related to mushroom marketing in Swaziland? If yes, what proposals were made?

Area of concern	Proposal	Who has to act on these proposals?	Any improvement thus far?
No coordination			
Too fragmented			
Lack of market information			
Poor marketing skills			
Lack of processing/value addition			
Lack of consumer awareness about mushrooms as a source of nutrients			

3.19. How many stakeholder meetings have you convened since the programme was incepted? What were the areas of discussion and key outputs?

3.20. Do you have a committee of stakeholders in place? If yes, what is its mandate? Are they benefiting the industry?

3.21. Which organization(s) do you collaborate with in fulfilling your mandate?

Organisation	Area of collaboration

3.22. Which other organization(s) would you like to collaborate with in future?

Organisation	Area of collaboration

3.23. What other opportunities do you feel have not been exploited by actors within the mushroom value chain?

Actor	Opportunity

3.24. Which national and/or international regulations (laws or policies) affect the mushroom production and marketing in Swaziland?

Regulation	How regulation affects you	Any proposal	Who has to act on proposal?

THANK YOU FOR PARTICIPATING IN THE SURVEY!
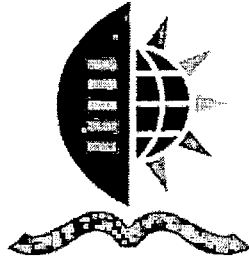
4. *Questionnaire- Food Science and Technology Unit*

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Name of respondent:_____ Organisation:_____

Designation:_____

4.1. What is your current staff compliment?

4.2. Is your unit adequately staffed to fulfill its overall mandate? If not, what other positions are required?

4.3. Did you receive any training related to the mushroom enterprise? If yes, which field and who provided the training?

4.4. Which other areas do you still require training in? Any justification?

4.5. How many people have you trained in mushroom processing in the past 3 years?

Year	Constituency	No. of trainees
2010		
2011		
2012		

4.6. Which organization(s) do you collaborate with in fulfilling your mandate?

Organisation	Area of collaboration

4.7. Which other organization(s) would you like to collaborate with in future?

Organisation	Area of collaboration

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4.8. Are you satisfied with the way training in mushroom processing is being coordinated? If not, which areas do you feel should be improved?

Area of concern	Proposal	Who has to act on these proposals?	Any improvement thus far?

4.9. What is your impression of mushroom processing in Swaziland? What do you think should be done to improve the situation?

Area of concern	Proposal	Who has to act on these proposals?	Any improvement thus far?

4.10. What possible forms can locally produced oyster mushrooms be processed to?

Form	Average shelf life	Required inputs	Where can these inputs be found?	Possible input costs [E]	Current average price of commodity form [E/kg]

4.11. Does your unit have the capacity to equip farmers with the skills required to produce the above product forms? If not, what would you suggest?

4.12. Do you conduct regular quality diagnosis on locally produced mushrooms? If so, what is your general impression so far?

4.13. What other opportunities do you feel have not been exploited by local mushroom producers?

4.14. Which national and/or international regulations (laws or policies) affect the processing of locally produced mushrooms?

Regulation	How regulation affects processing	Any proposal?	Who has to act on proposal?

THANK YOU FOR PARTICIPATING IN THE SURVEY!

5. *Questionnaire – Input suppliers*

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Name of respondent:_____ Organisation:_____

Designation:_____

5.1. Indicate the nature of your business
a) Manufacturer   b) trader/agent c) wholesaler   d)retailer

5.2. How many branches/outlets do you have of your business, and where are they located?

5.3. What is your source of market and price information for your supplies?_____

5.4. What are the problems with market and price information for your supplies?

5.5. Do you require any regulatory permits/licenses to sell your products?
1 = Very easy   2 = Easy   3 = Difficult   4 = Very difficult

5.6. If yes, is it difficult to obtain such permits/licenses?
1 = yes 2 = no

5.7. Please specify any other regulatory requirements?

5.8. Indicate the type, cost and source(s) of items used to produce your supplies

Item	Source of input material Indicate whether 1=local or 2=import	Mode of delivery 1=Own collection 2=Delivery by seller 3=Use contractor	If own collection, what is the average distance traveled 1=less than 10km 2=11 – 20km; 3=21 – 50km 4=51-100km; 4=above 100km	Cost [E/ unit]	Total cost [E]	Selling price of input [E/unit]

5.9. If you deliver, who pays for the cost of delivery

a) separate payment by buyer (price/km)___   b) included in original price   c) free delivery within certain radius

5.10. Which organization(s) do you collaborate with in fulfilling your mandate?

| Organisation	Area of collaboration

5.11. Which other organization(s) would you like to collaborate with in future?

Organisation	Area of collaboration

5.12. Which national and/or international regulations (laws or policies) affect your business in input trade?

Regulation	How regulation affects processing	Any proposal?	Who has to act on proposal?

THANK YOU FOR PARTICIPATING IN THE SURVEY!

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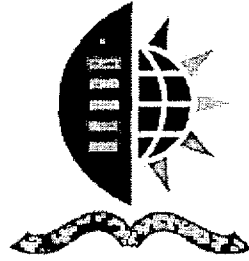
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**INYUVESI
YAKWAZULU-NATALI**

6. *Questionnaire – NAMBOARD*

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Name of respondent:_____ Organisation:_____

Designation:_____

6.1. Does NAMBOARD provide market and price information in connection with the marketing of mushrooms?
1=Yes 2=No

6.2. If yes, which channels do you use for information dissemination?

6.3. If no, what future plans does the organization have in relation to this matter?

6.4. Are you happy with the current marketing arrangement for local oyster mushrooms? If not, which areas would you want to see improved, and what proposals would you make?

Area of concern	Proposal	Who has to act on these proposals?	Have you made these proposals before?	Any improvement thus far?
Low sale volume				
Inability to provide consistent quantity				
Inability to provide consistent quality				

6.5. What kind of taxes, quotas and fees are there for mushroom traders in Swaziland? Who are the custodians of these instruments?

6.6. Have you received any requests/proposals from stakeholders related to mushroom marketing in Swaziland? If yes, what proposals were made?

Area of concern	Proposal	Who has to act on these proposals?	Any improvement thus far?
No coordination			
Too fragmented			
Lack of market information			
Poor marketing skills			
Lack of processing/value addition			
Lack of consumer awareness about mushrooms as a source of nutrients			

6.7. Does NAMBOARD provide training to smallholder producers on agricultural marketing and value addition?

6.8. Has NAMBOARD provided such training to local oyster mushroom producers?

6.9. Which other Organisation(s) do you know of that can assist in providing such training to local mushroom producers?

6.10. Some producers have reported that despite producing quality oyster mushrooms they cannot access local lucrative retail markets, either because they are located in remote areas or they are unable to negotiate with buyers. What role can NAMBOARD play in an attempt to assist these producers?

6.11. What opportunities do you feel have not been exploited by stakeholders in the mushroom industry, and what proposals would you make that may lead to the industry being competitive in future?

Opportunity	Proposal	Who has to act on these proposals?
Value addition (processing)		

THANK YOU FOR PARTICIPATING IN THE SURVEY!