Analysing brand awareness pertaining to seed adoption by small-scale farmers

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November 2016

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Author: November 2016

ABSTRACT

Small scale farmers play a significant role in food and nutrition security issues worldwide. For profit and non-profit making organizations aim to improve agricultural technology adoption. The main objective of the study was to assess brand awareness impact on adoption of hybrid seed maize technology by small scale farmers.

This was a cross sectional study design with systematic sampling on small scale maize farmers (target population). A total of 370 interviews were done from 13th to 27th September 2016 using a self-administered structured questionnaire. The dimensions measured were customer expectations, product quality, also quality of service, perceived value, satisfaction, complaints recovery, loyalty, and awareness and adoption behaviour. All of the dimensions were measured with at least three items. The items were measured on a 5 point Likert scale, ranging from Bad (1) - Good (5). Statistical analysis encompassed factor analysis and structural modelling. Although not all, most proposed networks of relationships as hypothesized was supported with data; overall, there was a statistically significant ($p<0.001$) relationship between brand awareness and maize seed hybrid technology adoption.

Southern African countries have the potential to benefit from hybrid maize seed adoption by developing strategies that prioritize improving the quality of seed. Quality of seed was the major alarming negative and positive predictor of seed technology adoption among small scale maize farmers. On the contrary, among Mozambicans, recovery of lost value through supplier on any reported issues stands out as a negative predictor of low adoption. Several mediating factors differ in significance of their effects by country. For Zimbabwe Perception, satisfaction levels had significant effect on hybrid maize seed technology adoption whilst the same were not significant in Mozambique. Thus different countries behave differently in terms of adoption behaviour. Therefore, technology adoption strategies have got to be country specific.

Key words: Brand awareness, brand perceived value, brand influences, hybrid seed technology and adoption influences.

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CHAPTER 1: INTRODUCTION

1.1 NATURE AND SCOPE OF THE STUDY

Research evidence has shown that most companies use their brands as competitive advantage tools in order to create repeat sales to have product identification and to promote new products (Oliver, 2009:33; Keller *et al*., 2011:25). A brand is more than a name for a given product. According to Kotler and Armstrong (2009:599) a brand is a name, word, picture, term, symbol, sign, device, design or a combination of these to create a unique identity for particular products. A brand creates identification between a product and the seller and enables differentiation from the competitor's products. Chevalier and Mazzalovo (2009:288) concluded that a consumer chooses a brand due to specific qualities it offers and that the differentiation created by the brand is part of the contract between two parties. The essential values of the company, its identity and the perceptions that the customers have of the company and its image are presented by the name and the logo of the product (Chevalier & Mazzalovo, 2009:288).

Branding is the marketing of the corporate identity and the creative part of the specific product image. Wood (2009: 662) established that a brand can perform several different functions. Hultén (2009:24) cited that several companies strive to create in the mind of the customer an imprint of their brand and try to link their brand with a certain value as perceived by the customers. Varey (2009:389) indicated that once the value has been created whether by trust or perception customers get committed to that particular brand. Flamand (2010:1) purported that when a customer develops a certain positive perception about a particular brand, especially in the seed industry, the customer is likely to try it out for one or two seasons. Chaudhuri and Holbrook (2009:81) highlighted that once customers have seen that the brand is working consistently they then develop trust in the brand and its products. The resulting effect is that they become committed to the brand for the long term. This study will assess if brand awareness is a driver of hybrid seed maize technology adoption by small scale farmers in two countries that have different levels of adoption, represented by two districts, one in Manica in Mozambique and the other Harare in Zimbabwe. The two districts happen to be the most productive in both countries in terms pf Hybrid maize. Cromwell *et al*. (2009:92) highlighted three categories of small scale farmers as described below:

- *Small-scale commercial farmers* aim to maximise marketable surpluses but due to the smaller scale of production, a more labour-intensive mode of production is

usually practiced and individual seed requirements are smaller. These farmers are also a relatively attractive market for commercial seed organisations, although a more highly developed distribution system is usually required in order to reach them.

- *Small-scale semi-commercial farmers* operate in a pattern of production geared primarily to satisfy domestic consumption needs for food and other natural resource products, and are strongly influenced by social relations of production but including some commercially-oriented activities. Many semi-commercial small farmers have very limited cash resources and are located in areas of unlimited agricultural potential remote from market infrastructure. Increased use of improved seed may have significant potential for increasing productivity for this group but their ability to make use of formal sector seed organisations, both public sector and commercial, is constrained by the difficult physical and economic environment in which they operate.

- *Subsistence farmers*: In most developing countries few purely subsistence farmers remain because the level of market penetration means most farmers are now integrated into the commercial economy for at least some consumption goods and, therefore, for a proportion of production activities. Most save their own seed on-farm or rely on the informal sector for their seed needs and there are particular difficulties associated with producing and distributing seeds for this group using formal sector organisations. Until their wider resource constraints are more directly addressed and they are able to participate more fully in conventional markets, supplying subsistence farmers through public or commercial seed organisations is unlikely to be feasible, although there may be an important role for community-oriented organisations that can work to alleviate these constraints at the same time as making improved seed available.

The United Nations Economic and Social Council (2012: 1-23) report indicates that food security in Africa remains a challenge. The report shows that the causes of food insecurity in Africa are not well addressed. Among the root causes are low production, a result of low productivity and the inadequate access to food due to poverty. About 239 million (30 % of Africa's population) out of the 1 billion estimated African population are undernourished. The United Nations Economic and Social Council (2012:1-23) report highlights that African countries need to shape their policy on increased agricultural productivity and production, markets development and resilience of vulnerable

populations. Food Agriculture Organisation (F.A.O, 2009:36) indicated that there are nearly 33 million small farms of less than two hectares, representing 80 % of all farms in the African continent.

Sub-Saharan Africa and other parts of the developing world are generally experiencing low yields in maize; as a result standard of living in the rural areas is generally low. The main reason being the use of traditional maize varieties that have not been improved (Fischer & Kandiwa, 2013:101). Little work has been done in the area of the influences of adoption of new hybrid seed maize technologies by small scale farmers. An understanding of the underlying influences of adoption of these technologies could lead to significant improvements in providing solutions, access to these technologies and could also significantly improve yields and subsequent livelihoods of small scale farmers. Rogers (2009:290) defined adoption as "a decision to make full use of an innovation at the best course of action available". Alternatively, Morris *et al*. (2009:4) described adoption as when a farmer changes from planting traditional varieties to planting modern varieties; either improved-open pollinated varieties (OPVs) or hybrids. The gap in adoption of modern maize seed improved hybrid varieties is unknown but detrimental to the development of rural communities and this imposes real costs in terms of untapped potential in agricultural output, food security and economic growth in the entire sub-continent (Ragasa *et al*., 2013:19). An assessment of small scale buying behaviour, and brand influence on adoption of hybrid seed maize technology has not been done in the Zimbabwe and Mozambique seed industries.

1.2 PROBLEM STATEMENT

In Southern Africa, about 29 million are currently food insecure due to the past poor harvest season and other factors (Food Security and Nutrition Working Group Report, . 2015:1). Food Agriculture Organisation (F.A.O report, 2009:36) showed that small scale farms constitute 80% of the African continent.. An analysis of predicting factors on the use of hybrid seed maize technology by small scale farmers particularly, comparing Zimbabwe and Mozambique, has never been done. Neither is there any data on current prevalence of brand switching as a behaviour marker of seed technology adoption. The assessment done in this study is necessary to ascertain competition levels as indicated by competitors or suppliers of brand description as hinted by customer survey ratings. This will be used to strategize the company's penetration strategy in areas serviced by competing brands.

The essence of this study was to generate new knowledge on what factors can influence adoption of new technologies by small scale farmers. This knowledge will help seed companies to service the customers better and hopefully increase market share and generate more profit. The knowledge will add new information to policy makers who are struggling to find ways of increasing productivity per household. Answers to issues of adoption could solve food security problems facing Sub-Saharan Africa. If farmers adopt high yielding hybrid seed maize they increase food output per capita, leading to more food available for subsistence and eventually commercial use. Failure to address the challenges described above may result in poor health, social, economic outcomes. There may be uninformed decision making and low progression in terms of evidence based stratergic formulations among seed companies.

1.3 OBJECTIVES OF THE STUDY

1.3.1 Primary objective

The main objective of the study was to assess brand awareness impact on adoption of hybrid seed maize technology by small scale farmers.

1.3.2 Secondary objectives

1.3.2.1 *to determine the structural links between seed maize technology adoption and seed maize brand awareness*

1.3.2.2 *to determine the reasons and extent of brand switching between small scale farmers in Zimbabwe and Mozambique*

1.3.2.3 *to determine the reasons for seed maize brand preference among small scale farmers*

1.4 RESEARCH METHODOLOGY

The research method used in this study is as outlined below:

1.4.1. Empirical investigation

1.4.1.1 Questionnaire

The data collection was done by means of personal, face-to-face interviews through questionnaires using trained Klein Karoo personnel enumerators. The data collection process was done over a one month period (September) in year 2016. A sample size of total of 370 households of small scale famers (185 in Manica and 185 in Harare districts) was required to draw conclusion based on empirical evidence. A copy of the questionnaire is attached in Appendix 1.

This study focused on small scale farmer adoption behavior on use of hybrid seed technology, which was measured scientifically through semi-structured questionnaire (with structured and open ended questions). The target population were small scale farmers in two districts; Manica in Mozambique and Harare in Zimbabwe. The questionnaires were distributed amongst the randomly selected farmers to find out if use of hybrids maize seeds was correlated with the supplier brand description. The questionnaires consists of different sections assessing the impact of different seed suppliers brand description on use of hybrid seed maize technology by small scale farmers. There are some variables which intervene in the relationship between brand value and adoption of hybrid seed maize technology. These variables include price, quality, perception, expectation, satisfaction, loyalty and recovery (Mogajane 2015:50 and Arndt *et al*., 2010a:87).

1.4.1.2 Target Population

The target samples were drawn from two populations, one in Manica district in Mozambique and the other in Harare district in Zimbabwe. The former is an area of low adoption and the latter is an area of high adoption so the two will be compared on the influence of brand description and maize hybrid seed adoption. The target population were farming households in these districts represented by either the head of the family irrespective of gender. The targeted sample size was 185 households in each of the 2 districts. The researcher used systematic sampling

1.4.1.3 Measuring instrument

The measuring scale used was the uni-dimensional brand sensitivity scale with a five point Likert scale ranging from bad to Good. Constructs were built and tested for

confirmation of theory and hypothesis using data through factor analysis for correlated Items and using Stata 12 software and cronbachn's alpha, composite reliability, factor variance extracted and construct correlations wasused as a measuring tool for validity and reliability of the data.

1.4.1.4 Research procedure

A questionnaire was prepared to capture data on hypothesized constructs items. Data was from small scale farmers collected over a period of one month. Data entry was then done in CSPro 6.2 entryware by 2 trained data clerks using a userfriendly interface developed by a statistician (confirmation in appendix). The data was then exported to Stata 12 software for analysis as described in the next section 1.4.1.5.

1.4.1.5 Statistical analysis

Previous sections described the process of data collection and entry. After exporting data from CSPro 6.2 entryware to Stata 12, the data was cleaned for outliers and errors acquired during field work and data entry process. Latent (unobservable) variables were brand awareness and adoption; the mediating variables or constructs were price, quality, perception, satisfaction, expectation and recovery as illustrated in Figure 1.1.

1.5 SCOPE OF THE STUDY

The study is in the field of agriculture seed industry and in particular it will provide seed companies with information on whether their brand awareness efforts are being effective in the new areas of introduction. This study will generate information on factors influencing the purchasing behaviour of small scale farmers therefore closing the existing information gap between seed supplires and small scale farmers.

1.6 LIMITATIONS OF THE STUDY

This was a cross sectional design, which takes a snap short which is associated with possible confounding factors. The geographical coverage is limited to the sampled areas, thus the results must be generalised with caution.

1.7 CONTRIBUTION OF THE STUDY

The study will contribute to academic knowledge, literature on the behaviour influences of technology adoption by small scale farmers, this information is for improving marketing strategies in reaching small scale farmers, a generally neglected group in the seed value chain. Furthermore, the information generated will assist brand managers to understand how a brand interacts with the target market and even monitoring good conduct with customers in order to win them over for business growth.

1.8 ETHICAL CONSIDERATIONS

Study participant information was considered to be private by way of unique identifiers instead of names and by not sharing information provided in confidence, i.e. income levels and areas planted. Study participation was willingly and not imposed, participants gave verbal consent before the interview. This is in order to adhere with international ethics standards (Terpstra *et al.,* 2012:118).

1.9 CHAPTER DIVISION

Chapter 1 – Introduction

The chapter will set the context of the study and will narrate the meaning of brand awareness, brand perceived value, brand presence and hybrid seed maize technology. It will outline the research problem research question and research objectives then it will state the benefits of the research subject.

Chapter 2 – Literature review

This chapter will review literature on the subjects brand awareness, brand presence, brand perceived value, Hybrid seed maize technology in general and as it pertains to small scale farmers. This is the chapter of the full empirical literature review and related conceptual framework. It will touch appropriateness of the study supported by substantive arguments.

Chapter 3 – Empirical investigation

In this chapter the research design, data collection, data analysis discussion of the results were attended to.

Chapter 4- Statistical analysis

The research results are analysed and the conclusions are drawn from it. If further research is needed recommendations are made in this chapter.

Chapter 5 Conclusion and recommendations

A conclusion to the study is made based on the results and recommendations in chapter 4. Here a conclusion of the study is made and any further investigation is made.

1.10 SUMMARY

In this chapter introduction and the background to the study was provided. The chapter then presented the problem statement, goals and objectives, importance of the study, and limitations of the study. This was followed by a discussion on the research design, research method and chapter division. The next chapter focuses on literature review.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

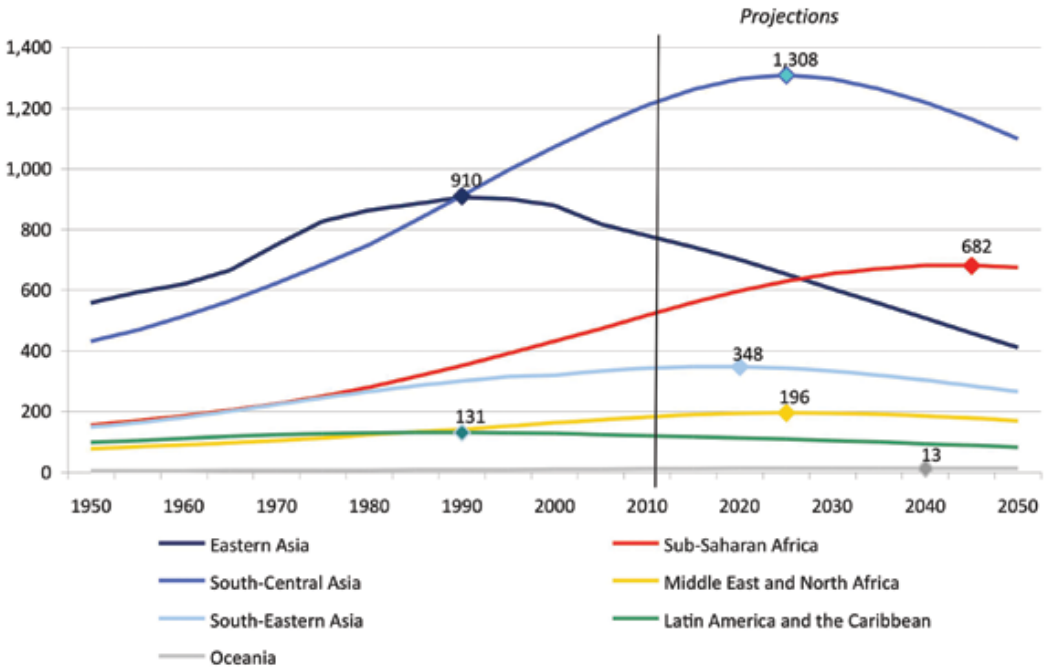
This chapter presents literature review on brand awareness as a driver for hybrid seed maize technology adoption by small scale farmers. Literature provides an awareness of relevant concepts and contributions from other researchers on the scope of the study. As reiterated by Taylor and Procter (2009:1), literature review should focus on relevant writings which ought to be analysed critically so as to find room for development through identifying areas for further investigation and comparing facts. This chapter provides literature on brand awareness in relation to seed technology adoption and relevant predictors. A conceptual frame work is provided below to highlight the relationship of the independent variable (brand awareness) and dependent variable (hybrid seed technology adoption). Section 2.2 below provides conceptual context of small scale farmers in Mozambique and Zimbabwe.

2.2 FOOD SECURITY OVERVIEW

2.2.1 Global and Sub-Saharan Africa

The demand for food is estimated to increase by 70 per cent by 2050 (FAO, 2009:36). This increase is due to the combined effects of world population growth (from around 6.9 billion to an estimated 9.3 billion), economic development and shifting consumer preferences. By 2050 an estimated seven out of ten people worldwide will live in low-income food-deficit countries (Oxfam, 2011:72), creating new challenges and opportunities. Figure 2.1 below projects the rural population growth by regions.

Figure 2.1: *Rural population trends and projections to 2050 in key regions (millions)*

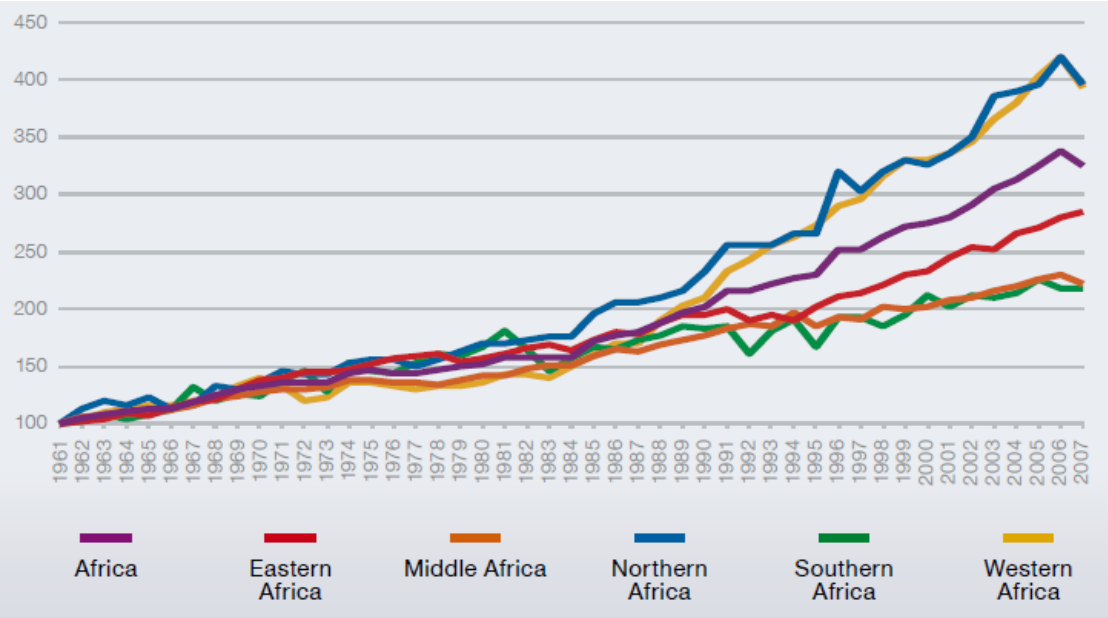


Source: *Proctor and Lucchesi (2012:11). Based on United Nations, World Urbanization Prospects, the 2009 Revision*

Figure 2.1 shows that food security demand is escalating over time.Sub-saharan Africa rural population constitutes most small scale farmers. This concur with Food Agiculture Organisation (F.A.O) report (2009:36), which indicated that approximately 33 million small farms of less than two hectares, represent 80 % of all farms in the African continent

Whilst the demand for food in Figure 2.1 escalated overtime, Figure 2.2 also shows a elatively escalating agriculture food production supply over time. However, the supply does not meet the demand as discussed in Chapter 1 and in Figure 2.3.

Figure 2. 2: *Index of Agricultural Production (1960=100)*



Source: F.A.O (2009:36)

2.2.2 Trends in small-scale farming and in agrifood markets

The structure of farming and the role of small-scale agriculture have a bearing on the opportunities for livelihood enhancement and employment. Approximately, 500 million small-scale farmers worldwide support some two billion people, i.e. a third of humanity; these farmers account for large shares of global agricultural food security of many millions. Small-scale farmer description is relative to function, scale and characteristics. Nagayets (2009:23) describes small scale farms as ”operated units in which most labour and enterprise come from the farm family, which puts much of its working time into the farm”. In agreement, Lipton (2009:12) defines smallholders as those ”with a low asset base, operating less than two hectares of cropland”. In the same context the World Bank (2009:18) defined a smallholder as “a farmer (crop or livestock) practising a mix of commercial and subsistence production or either, where the family provides the majority of labour and the farm provides the principal source of income” (Narayanan & Gulati, 2009:16). Thus, while there is general agreement that small-scale farms are family operated and use limited non-family hired labour, there is less agreement on other factors, in particular those impacting on small-scale farm viability including land productivity, access and availability of public goods, agro-ecological conditions, etc. This lack of general agreement results in the development debate falling back to the size of the landholding (or numbers of livestock) owned or managed by a household or

enterprise as being the key criterion. The ratio of agricultural area to agriculture population or rural population is commonly used as a proxy.

Getting to grips with numbers based on data from 14 countries, including China and India, some 348 million households farm less than two hectares of land. Such data as are available exclude most of Sub-Saharan Africa and many of the more populous countries of Asia such as Bangladesh, probably making the commonly quoted figure of some 500 million small scale farmers in the developing and emerging economy worlds an underestimation. Whatever the reality of the numbers, there are tens of millions of small-scale farmers predominantly concentrated in Asia and Africa. As some of the most populous countries in the world have a proportion of such small-scale farmers to all farmers of well over 80 per cent, it is assumed that global and national food security is strongly dependent on the performance of the small-scale agriculture sector. In Africa and Asia mean farm sizes seem to have shown an overall decline over the 20th century, whereas in South America there appears to be no clear overall long term trend (Eastwood *et al*., 2010:26).

Jayne *et al*. (2010:34) used small-scale farm survey data from five countries of eastern and southern Africa to highlight the following four under-appreciated issues in the context of small-scale farming::

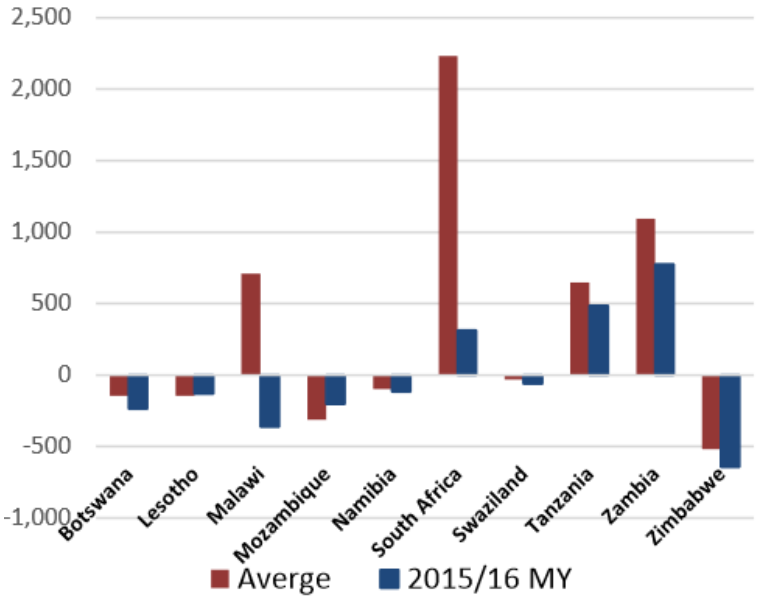
1. Land distribution patterns constrain the potential of crop technology and input intensification to enable many small farms to escape from poverty.
2. Most smallholders are unable to produce more than a marginal surplus and thus are limited in their capacity to participate meaningfully in commodity markets.
3. Most farmers are hurt directly by higher grain prices as consumers.
4. The marketed agricultural surplus of small-scale agriculture is heavily concentrated among a small group of relatively large smallholders.

A significant proportion of small-scale food crop producers do not engage in food crop markets at all. Chamberlain (2014:57) reported that small scale farmers are less likely to participate in food markets and high-value crop markets. Chamberlain (2004:51) also noted that the smallest and poorest farms are particularly vulnerable to the constraints imposed by remoteness, missing or under-developed credit and input markets, and the risks associated with high variability in climate and/or commodity prices.

For those small-scale farms that are not viable but for which agriculture and livestock remain critical for household food security, special social protection measures must be

put in place to ensure their livelihood during the processes of rural transformation. New business models support both farming as a decent but also new formal and informal employment opportunities along the value chain. Among the strategies for increasing benefits to small-scale producers in agricultural value chains are: investing in upgrading at farm level to meet production and processing requirements; adapting trading relationships and supply chain structure for better smallholder sourcing; adapting the product proposition and buying practices of the lead firm; and investing in broader sustainable livelihood strategies (Seville *et al*., 2011:19). Chilonda *et al.* (2010:35) emphasised the necessity and importance of business interventions along the value chain that seek to support small-scale producers access to markets and improved nutrition for low-income consumers. Small-scale producers' inclusion in modern retail markets provide opportunities for small-scale producers (Figuié and Moustier, 2009:211)..

Figure 2.3: *Maize balance estimates by country (000s MT)*



Source: *FEWSNET calculations with data from SADC, WRSI, and government ministries.*

Mozambique's estimates are based on the Water Requirements Satisfaction Index (WRSI) due to the absence of official estimates. Zimbabwe recorded the greatest deficit in the region of 645,000 MT, followed by Malawi and Mozambique with deficits of 360,000 MT and 200,000 MT, respectively (Figure 2.2.2).

2.3 CONCEPTUAL DEFINITIONS

2.3.1 Small-scale commercial and communal farming

Literature reveals that in the context of Southern African countries, authors define the small-scale farmer as one who participates in the day to day activities by providing labour and management of the farm (Babu & Sanyal, 2010:4). Small-scale farmers in Zimbabwe and Mozambique can be devided into two categories, namely small-scale commercial and communal farmers. The latter, in particular, occupy a large proportion of the area of both countries with low agricultural potential.

2.3.2 Small-scale commercial farmers

These are producers on land in the former African Purchase Areas who have full and sole rights to the arable and grazing land within a defined area (Babu &Sanyal, 2010:4).

2.3.3 Small-scale communal farmers

These are farmers in the former Tribal Trust Lands who have individually-allocated arable plots but whose grazing is used by the whole community (Babu and Sanyal, 2010:4). During the colonial Southern Rhodesia era, now Zimbabwe, Tribal Trust Lands were areas reserved solely for black African ownership and use.

2.4 THE SCIENCE OF SEED TECHNOLOGY

The science of seed technology plays an important role for both commercial and communal production which contribute to global food and nutrition security (Xu *et al.,* 2016:33). There are many research-driven improvements in seed genetics and technology that culminated into dramatic increases in crop productivity worldwide (Wang *et al.,* 2016:25). Increasing seed demand for biofuel, stockfeed and global population food supply makes seed science and technology an essential discipline for the world economies (Dawson *et al.,* 2016:18). Research shows that cereal production alone needs to increase by approximatimately a billion metric tons in the following 30 years to meet world demand (Amanor & Chichava, 2016:97). The global needs for food, fiber and energy places additional research advancements in seed genetics and technology (Badu-Apraku *et al.,* 2015:67). Sharing expertise on seed production technologies and research findings through simplified information dissermination to small scale farmers is inevitable for meeting the global demand for quality seed (Chamberlin *et al.,* 2014:94).

The following section contains a detailed situational analysis on the progression of the science of seed technology .

2.4.1 Status of global seed technology

Seeds are the starting point for the crop production and important for global food and nutrition security. Research on seed technology studies in Asia and Europe indicated that hybrids exploit heterosis and achieve higher yields than open pollinated varieties (OPVs) according to (Chamberlin *et al.*2014:40). Badigannavar *et al.* (2015:34) cited that the Indian hybrid research and seed production is increasingly dominated by private companies, which direct their research mainly at commercial growers in well-developed regions with irrigation facilities or reliable rainfalls. Such a scenario creates and widens low rates of hybrid seed technology adoption among smallscale farmers. Since Indian private companies targeted commercial farmers, seed prices charged by the private sector are claimed to deter small-scale farmers from buying hybrid seeds. Given decreasing public support to agricultural research, policies should be targeted at reducing private sector constraints to ensure that smallscale farmers are not bypassed by private sector innovations. In addition, a study in Zambia by Langyintuo and Mungoma (2009:550) demonstrated that the adoption decisions of improved, high yielding maize (IHYM) varieties in selected districts in Zambia differ between well- and poorly-endowed households. The use of improved, high yielding crop varieties by rural households can improve livelihoods compared to staying trapped in poverty and hunger. Although there is a proliferation of improved crop varieties on the market in Zambia, small scale farmers continue to use traditional, low yielding varieties. This highlights the need to explore the predictors and reasons why farmers are not successfully adopting hybrid seed technology.

Baiphethi and Jacobs (2009:460) cited that access to hybrid seed is crucial for determining food and income security of farmers and countries in Africa. The African seed industry is diverse, both in the capacity of seed companies and the seed consumers and seed purchase rates. Furthermore, the adoption rates of hybrid seed is diverse with Zimbabwe on the lead amongst other including Mozambique (Table 2.1). There is an increase in the number of seed companies marketing various types of improved maize seed in Africa (Langyintuo *et al*., 2009:23).

Although the seed business in Africa is recording markable growth as described above, more than half of the maize area (or 6.7 million ha) is still planted with traditional,

unimproved low-yielding varieties (MacRobert, 2009:2). Most of the seed companies are small, producing less than 500 tonnes of seed annually and they sell to local farmers. Langyintuo *et al*., (2009:23) showed that more than 70% of the maize area planted by farmers in South Africa, Kenya, Zimbabwe and Zambia purchased certified seed of improved varieties, while in most other countries, including Mozambique, less than 30% of the maize area was sown with certified seed .

MacRobert, (2009:2) cited that farmers in developing countries, including Zimbabwe and Mozambique, indicate that lack of cash or credit, long distances to retailers, unexpected and unattractive grain prices and lack of information on variety performance and seed availability are the main disincentives to use improved seed. Reviewed literature shows that the main challenge is lack of certified seed of improved, adapted and appropriate varieties available in the market place. If this seed was accessible close to farm homesteads and at reasonable prices relative to the grain price, it is expected that smallholder farmers would purchase and benefit. This has been amply demonstrated in countries such as Zimbabwe, Kenya and Zambia, where maize hybrid seed purchase rates by smallholder farmers have been consistently high in the past two decades.Therefore, it is generally accepted that a more diverse, geographically dispersed and competent seed sector is crucial for achieving the goal of increasing farmer adoption of improved seed across Africa.

Table 2.1: Adoption rates of maize seed technology in Africa

Country	No. of seed companies interview	Seed sales (X 1000t)		Maize	Seed demand	Adoption Rate
		OPV	Hybrids	(X 106 ha)	(X 103t)	%
Ethiopia	13	2	6.2	1.7	42.4	19
Kenya	13	1.7	26.3	1.6	38.9	72
Tanzania	15	3.9	7.3	2.6	64	18
Uganda	8	3.5	2.2	0.7	16.5	35
Angola	5	0.8	0.2	0.8	19.3	5
Malawi	10	5.4	2.5	1.4	35.3	22
Mozambique	16	3.1	0.2	1.2	30.3	11
Zambia	11	0.5	9.7	0.6	14.1	73
Zimbabwe	16	2.2	25.9	1.4	34.4	80
Total	107	23.1	80.5	12	295.1	35

Source: Langyintuo et al. (2009:19).

2.4.2 Historic overview of hybrid seed technology adoption in Zimbabwe

Leiman and Behar (2011: 449) postulate that after World War II, Zimbabwe, then Rhodesia, put in place a number of interventions, including agricultural marketing boards, interest-free loans and a free technical support programme. The Seed Maize Association was set up which consisted of interested farmers who worked with agronomists to produce and provide high quality seed. This produced initially improved OPVs such as Salisbury White and the first generation of maize hybrids. These seeds successful brought higher yields in both normal and drought years (Bourdillon *et al.,* 2009:2). Leiman and Behar (2011: 449) cited that since the 1960s both large-scale and small-scale Zimbabwean maize farmers have been replacing open pollinated varieties (OPVs) with locally developed hybrids.

Leiman and Behar (2011: 449) stated that, Seed Co, now a public company, was formed in 1983 after the Seed Maize Association and Crop Seeds Association merged into one entity. Seed Co in 1990s focused on improving the disease resistance of hybrids. It is these improved seeds that small-scale farmers have been slower to adopt. The reduced use of improved seed has had both demand and supply dimensions, with Seed Co and other local firms unable to meet demand, some seed was imported and some provided as aid.

The Agricultural, Technical and Extension Services (AGRITEX) was formed after independence and provides advisory services to commercial farmers as well as small scale farmers (Hanyani-Mlambo, 2009:3 ; Pazvakavambwa & Hakutangwi, 2009:218).

In the early 1990s, most farmers were buying hybrid seed, though the rate of adoption was gradual. When the Zimbabwean economy collapsed, many small farmers retuned to planting OPVs and saving seed, because hybrid seed was scarce; it was also done also as a response to economic risks. Initially these risks were associated with Zimbabwe's economic structural adjustment programme, which affected extension services, short-term credit and maize prices. Since 2001 risks increased as land invasions affected seed producing farms resulting in the importation of new seed brands with which small-scale farmers were unfamiliar; this happened while inflation continuously escalated.

Maize farming depends on the viability of the seed producers, maize marketers, fertilizer producers, extension services and credit provider institutions. Credit provider institutions are important as they provide a conducive resource foundation on which viable agriculture thrive. The following section describe the historical seed technology overview in Mozambique.

2.4.3 Overview of hybrid seed technology adoption in Mozambique

While a number of technologies are already available in principle in Mozambique, farmers' contact with new technology is distinctly limited in practice.This could be because agriculture in Mozambique is mostly practiced by smallscale farmers, who account for 99 % of the total number of farming units while farming 96 % of the 5.6 million ha of cultivated land (CAP, 2011:12). The large majority of these farmers practice rain-fed subsistence production on small areas (cultivated land measures on average

1.35 ha) (TIA, 2012:15) with limited integration into markets and with low use of external inputs, animal traction and mechanical implements (Table 2.2).

Table 2.2: Rural household technology characteristics (in % unless noted)

Technology (%)	**Cropping season**	
	2001/02	2004/05
Fertilizer use	3.7	3.5
Pesticides use	6.7	5.1
Animal traction use	11.2	8.6
Hired permanent labor	2.2	1.6
Hired seasonal labor	15.5	18.0
Grow cotton	7.2	5.6
Grow tobbaco	3.8	2.6
Access to extension	13.7	15.7
Membership in Ag, Association	3.9	6.8
Distance0 (<)	40	40
Distance1 (11-20km)	16	16
Distance2 (21-40km)	18	18
Distance3 (>40km)	21	21
Farmsize (<0.75ha)	21	20
Farmsize (0.75-1.75ha)	37	35
Farmsize (1.75-5.0ha)	33	36
Farmsize (>5.0ha)	9	9
Easy access to land in in village (yes)	75	73
Household head male	77	73

Household head age (years)	44	46
Household head education (years of schooling)	2.8	2.0

***Source**. Uaiene, Arndt and Masters (2009:8), based on theTIA 2005*

These include improved maize open pollinated varieties (OPV), hybrid seeds and chemical packages, improved farm storage techniques, methods of small scale irrigation such as treadle pumps and others. This translates to low rates of technology adoption shown in Table 2.3.

Table 2.3: Percentage use of improved seeds in 2004/05 by small scale farmers.

Province	**Maize**	**Rice**	**Peanut Small**	**Peanut Large**	**Beans**	**Cowpeas**
Niassa	6	3	2	0	2	3
Cabo Delgado	2	0	1	2	0	0
Nampula	6	4	2	3	11	4
Zambezia	5	4	3	8	7	3
Tete	11	8	6	3	4	3
Manica	15	0	6	8	15	5
Sofala	5	2	3	4	9	3
Inhambani	5	9	12	7	30	7
Gaza	4	6	10	5	7	4
Maputo	13	7	50	12	26	10
Total	7	3	4	6	8	5

***Source**. Uaiene, Arndt and Masters (2009:8), based on theTIA 2005*

Furthermore, Table 2.4 shows adoption trends of improved agriculture technology including use improved maize seed.

Among other potential reasons of low adoption trends and main constraints in small-holders' productivity in Mozambique are low coverage of extension services, lack of storage infrastructure, high post-harvest losses, poor transport facilities, high transaction costs and difficult access to financial services (IFAD, 2011:11).

Table 2.4: Use of improved agricultural technologies by small scale farmers (2002–12).

Technology (%)	**2002**	**2003**	**2005**	**2006**	**2007**	**2008**	**2012**
Improvement maize seed	-	-	5.6	9.3	10.0	9.9	8.7
Chemical fertilisers	3.8	2.6	3.9	4.7	4.1	4.1	2.8
Pesticides	6.8	5.3	5.6	5.5	4.2	3.8	6.3
Animal traction	11.4	11.3	9.5	12.8	12.0	111.3	7.7
Irrigation	10.9	6.1	6.0	8.4	9.9	8.8	8.1

***Source**: TIA (2012:23)*

As seen in Table 2.4, only about 15% of rural households benefit from contact with a public extension agent and this could explain low technology adoption levels as observed in Table 2.4 culminating in a general constant trend of low adoption from 2002 to 2012. In Mozambique from 2004 the number of public extension agents has declined, meaning only one-third of rural districts are served by the public extension services (Gemo *et al*., 2009:78). Supplementary public extension services are given by NGOs. While Mozambique made efforts to encourage technology adoption it has not achieved the targeted national impact (Arndt *et al*., 2010b:87).

Reviewed literature has shown different factors that influence maize seed technology adoption from a broader global context to a focus on Mozambique and Zimbabwe context. The researcher measures adoption as the impact of brand awareness linking the following mediating construct variables: price, quality, customer perceptions, satisfaction, expectation and recovery as illustrated in figure 1.1.

2.4.4 Customer retention

Malhotra and Malhotra (2013:1) defined customer retention (CR) as one of the main relationship marketing (RM) concepts concerned with developing and maintaining a long-term customer-firm relationship. Peng *et al*., (2013:5) stated that customer retention is the number of customers conducting business with a firm at the end of a trading year expressed as a percentage of those customers that were active at the start of the year. The definitions of customer retention above have one common theme which is about creating and maintaining a long-term bond with a customer to spawn a re-buy behaviour. Martin and Catalán (2013:156) postulates that customer value is enhanced by having a long-term association with the customer, deepening the relationship with the customer and availing a platform which enables an engagement to better understand customer requirements. As such customer retention is premised on customer's contribution versus investment in the customer (Malhotra & Malhotra, 2013:7).

Simon and Yaya (2012:14) cited that the importance of customer retention has increased since a majority of firms started to suffer a noticeable loss of customers, along with the complexity and high costs of acquiring new customers. Thus, the model of competition has shifted from just acquiring new customers to retaining existing customers and then luring customers away from rival companies. Stewart *et al.* (2009:55) argued that the key motivation for investment in retention of profitable customers is due to the high cost of new customer acquisition as compared with the cost of retaining existing customers. Customers basically have a choice of service providers available, so they can easily change or switch from one supplier brand to another. Glady *et al*. (2009:24) felt that the actual differentiation in the product market will not be based on the technology or the services or the prices, but it will be centred on the ability to deliver quality service and prompt responding to customers' request or inquiries, keeping customers informed as order processing is in progress, cost reduction and not price reduction.The following variables in section 2.5.1 below interfere with measurement of customer decision and buying behaviour.

2.4.5 Mediating variables of customer decision and buying behaviour

2.4.5.1 Price

When considering customer perceived value, price is fundamentally important (Buttler, 2009:2). Mogajane (2015:51) argues that customers value low price. A number of researchers agree that price is perceived by customers to be a trade-off between the price paid and the quality experienced in consumption of the product or service. Herrmann *et al.* (2009:49) defines customer value as the reduction in costs and a corresponding increase in the benefits that accrue to the customer. From the above argument, price becomes a key factor in customer's evaluation of value. Mogajane (2015:60) also defines price worthiness as the overall assessment of the utility of a product based on a perception of what is received and has been paid. Price therefore becomes an important factor in the price worthness equation: price worth value = Benefits/sacrifices. Price is the denominator which if reduced will lead to more value. Herrmann *et al.* (2009:49); Adeleke and Aminu (2012:209) argue that good seed quality is the only predictor of hybrid seed adoption. The researchers pose that price is a crucial factor and in most markets ; price has been used to attract new seed customers and retain the seed customers. Of course, this works perfectly if the seed delivery seem to be homogenous and not differentiated, hence price becomes a factor to induce customer switching either temporarily or permanently.

2.4.5.2 Quality

Vargo and Lusch (2011:181) suggest that the perceived quality of a service is a result of an evaluation process in which customers compare their perceptions of service delivery and its outcome against what their prior expectations projected. In discussing quality of products and services, Gera (2011:12) cited that customers want products that work as expected, are reliable, durable, serviceable and conform to their specifications. The researcher added that customers are willing to spend a little more on distinctive offerings and enhancing features. This is probably the reason why companies have come out in full force offering more or less the same products but with different enhancements. Some of the products differ in price and others on product or service packaging. Some customers are also concerned with intangibles such as reputation, image and impression. Customers purchase offerings that lack the attributes of quality only in the

absence of ”the real thing”, and in many instances, repeating business becomes difficult to generate from disgruntled customers.

2.4.5.3 Customer satisfaction

Satisfaction is defined as customer’s post purchase evaluation and affective response to the overall service or product experience (Peng *et al*., 2013:2). The satisfaction level is considered to be a strong predictor of customer behaviour such as repurchases intention, positive word-of-mouth recommendations, or loyalty (Martin & Catalán, 2013:156). Customer satisfaction is deemed to mediate customer learning due to prior experience and to explain key post purchase behaviours, such as word-of-mouth, complaining, product usage and repurchase intention (Adeleke & Aminu, 2012: 209). Cameran (2010:423) suggests that an unsatisfied customer is more likely to hunt for information on alternative products or services and much more likely yield to competitor overtures than a satisfied customer. Past research has shows that satisfaction is a reliable forecaster of re-purchase intentions (Hu *et al.*, 2009:111).

2.4.5.4 Customer loyalty

Alwi (2009:1) cited that customer loyalty is shown when a customer repeats purchase intention on certain products or services in the future. Customer loyalty makes customers feel committed. When the benefits are meaningful and significant, customers will stay on (Hu *et al*., 2009:111). Customer loyalty is one of the key factors that can help a company achieve long-term success. Gebauer *et al*. (2011:1273) state that the cost of delivering service to a loyal customer is at least five times less than that of serving a new customer. Therefore it is better to look after existing customers before attempting to acquire new customers.

2.4.5.5 Customer expectation in relation to satisfaction

Expectations is defined as beliefs about what is likely to happen in future as compared or contrasted to what is eventually or actually experienced (Edwardson *et al*., 2009:917). Existing and potential customers have certain minimum expectations about the service they are going to receive from a service provider (Cameran, 2010:421). Gebauer *et al*. (2011:1273) cited that these beliefs determine the level of satisfaction that the customer gets at the service delivery counter which can be a virtual counter. If the customer’s

expectations and the actual service delivered or experienced match, then the level of satisfaction the customer expriences is likely to be great (Martin &Catalán, 2013:156).

2.4.5.6 Customer recovery

The relationship between seed customers and seed companies, the prospective increased customer retention in the seed industry is widely recognized in the literature as depended on a company's responsiveness to customer complains and problems. To be responsive, service providers must appreciate and offer immediate solutions to their customers' encountered problems. Customer responsiveness is often considered as one of the sources of customer satisfaction or dissatisfaction. Generally companies should continually enhance their mechanism competencies in the areas of speed, quality, communication contact in order to meet up with their customers' responsiveness targets (Malhotra & Malhotra, 2013:8).

2.4.5.7 Perceived value

According to Malik (2012:68), perceived value is derived mainly from price/quality by convincing customers that they are receiving quality in exchange for what they give by means of recharging. Malik (2012:68) suggests that poor service cause customers to take their business elsewhere.The above mediating variables are linked with brand awareness, the dependent variable described below.

2.4.5.8 Awareness

Adeleke and Aminu, (2012:26) cited that brand awareness measures the accessibility of the brand in memory of a customer. Brand awareness can be measured through brand recall or brand recognition. Furthermore, Alwi (2009:56) highlighted that brand recall reflects the ability of consumers to retrieve the brand from memory when given the product category, the needs fulfilled by the category, or some other type of probe as a cue. Adoption of maize seed technology impacts on the traditional way of living which small scale farmers were used to; this may trigger resistance to or accepatance of new seed technology, of which the details are given in section 3.2.1 and section 3.3.

2.4.5.9 The change theory, acceptance and resistance

Atkinson and Barry (2010:29) highlighted that customer behaviour change interventions should address both internal and external customer environment. Ensuring

communication in proper channels may achieve positive change outcomes. Valbuena *et al.* (2010:186) highlighted that farmers behaviour is impacted by interaction between external and internal environment or factors. Among the external factors affecting the buying behaviour of small scale farmers are policies and subsidies, demand and advice. The external environment may be in the form of institutions or self-networks. Internal environment consists of willingness and abiity..

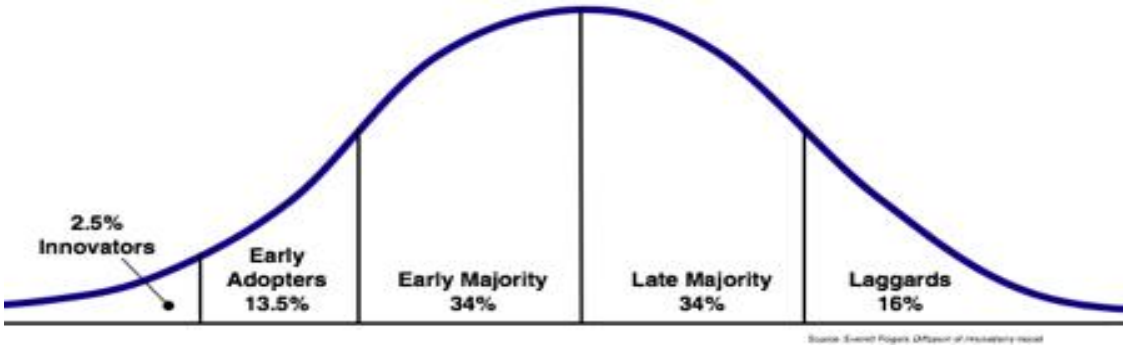
2.4.6 Change theories

Baden-Fuller and Stopford (2009:43) and Balogun (2009:76) indicate that managing customer change starts with understanding how to manage change with a single person.

2.4.7 AIETA Model

The AIETA model which stands for Awareness-Interest-Evaluation-Trial-Adoption unlike other models, lays emphasis on the consumer. This model shows that consumers respond to new products and services in a systematic order of importance. Awareness, consciousness and attention is induced in the consumers. They tend to pay attention to the new products or services. The evaluation stage highlights the impact of the information that consumers listen to and their subsequent action. Consumers evaluate and compare the services with others and make decisions regarding their expectations. At the trial stage, the consumer test the advertised services; the adoption stage is when the consumer buy to use the advertised products.

Figure 2.4: The diffusion curve, indicating the adopter categories



Source : Rogers, E.M. (1976:291)

The innovators are privy to new product information. Whilst early adopters are consumers who obtain new products from their favourite brands. They prefer to use new ideas. The early majority are also called opinion leaders.The average members of the society are also called late majority, their decisions come after the early majority. The last adopters are are called the laggards, so called a result of their uncertainty about new products.

2.4.8 The ADKAR model

Among the tools available to drive customer change is the ADKAR model. The ADKAR is an acronym for Awareness, Desire, Knowledge, Ability and Reinforcement (Atkinson & Barry, 2010:81).

Fink (2009:23) highlighted that to make a change successfully an individual needs awareness of the need for change, desire to participate and support the change, knowledge on how to change, ability to implement required skills and behaviors and reinforcement to sustain the change ADKAR describes. Elfring and Volberda (2009:34,; Fairholm (2009:26) and Fairholm and Fairholm (2009:34) indicate that ADKAR is an effective tool for planning customer change management, diagnosing gaps and developing corrective action..

The researchers further referred the theory of change as the building blocks required to achieve long-term goals. There are many theories on how to conduct change in line with customer technology adoption. A focus on the behaviour change application to the research context is detailed in section 2.7 below.

2.5 SEED HYBRID MAIZE TECHNOLOGY ADOPTION

Kaffle, (2010:1-7) describes adoption a decision to make full use of an innovation at the best course of action available. In context of using modern varieties (MVs) of maize seed, *adoption is* when a farmer is changing from planting traditional varieties to planting modern varieties (Cavatassi *et al*., 2010:280). The term "*modern varieties"* includes both improved-open pollinated varieties (OPVs) and hybrids (Cavatassi *et al*., 2010:283). The term *traditional varieties* refers to *local*, which have never been subject to a formal plant breeding program (Bocci, 2009:40)..

2.5.1 Measuring adoption

2.5.1.1 Unified theory of acceptance and use of technology (UTAUT)

A diversy of research studies used the Unified Theory of Acceptance and Use of Technology (UTAUT) to measure technology adoption (Venkatesh et al., 2009:34).The UTAUT model integrates earlier models of user acceptance; like the Davis' technology acceptance model (Chuttur, 2009:9-37) and Rogers' innovation diffusion theory (May *et al.* 2009:1) are social and psychology models of individual behaviour change. The UTAUT model consist of constructs, including performance expectancy, effort expectancy, social influence and facilitating conditions as determinants of technology adoption. The model can explain up to 70% of the variation in adoption of technology among users (Venkatesh *et al*., 2009:83). Demographic information such as gender, age, experience and voluntariness potentially explain levels of adoption depending on the technology context under study. The UTAUT model is the most widely cited model in studies of user adoption. The model has been tested and extended through the inclusion of additional determinants of use (Peek *et al*., 2014:85). These extensions have highlighted the importance of additional variables such as price value perceptions in contexts where users need to absorb the cost of implementation and use (Peek *et al*., 2014:87). The UTAUT model has also gained support within health informatics studies. Lee and Song (2013:19) ; Li *et al*. (2013:29) were among the other researchers who suggested that UTAUT could be applied to the study of health and agriculture technology adoption .

2.5.2 Construct data collection

A cross-sectional survey methodology was often used in similar studies and a structured questionnaires (Li *et al*. 2013:99). Study sample sizes ranged from 379 to 639 respondents (Peek *et al*., 2014:55). In other studies the item variables were captured using multi-item likert 5-point Likert-type scales (Holden and Karsh, 2010:39). The items were meant to measure specific constructs like performance and effort expectancy, items adapted from Holden and Karsh (2010:39) and Venkatesh *et al.* (2009:69). Effort expectancy was measured such that high values represented low perceptions of effort and thus positive correlations with other constructs are expected. Social Influence was measured with three items from Li *et al*., (2013:98). Trust was measured with four items and price value was measured with three items (Venkatesh *et al*., 2012:16); technology adoption was measured using Venkatesh *et al.'s* three item scale (Venkatesh *et al*., 2009:67) .

2.6 DATA ANALYSIS

Rosseel (2012:1-36) before testing a measurement model, initial exploratory factor analyses were carried out to confirm unidimensionality of the reflective constructs. Results of this study supported the theoretically defined constructs. The structural equation modeling was employed using the STATA software version 12 and the analysis is presented in two phases. Firstly, it allowed for a confirmatory factor analysis to be carried out in order to ensure adequate convergent and discriminant validity of the measurement model. Secondly, it provided for an analysis of the hypothesised structural model. Convergent validity was established by examining the average variance extracted (AVE) scores. These were all well above the recommended 0.60, confirming that constructs explained above 50% of the variance in their underlying items. Discriminant validity was confirmed by ensuring that constructs shared more variance with their own items than with other constructs. Cronbach's alpha and internal consistency scores confirmed the reliability of all scales (Hair *et al.* 2014:106).

2.7 STRUCTURAL EQUATION MODELLING

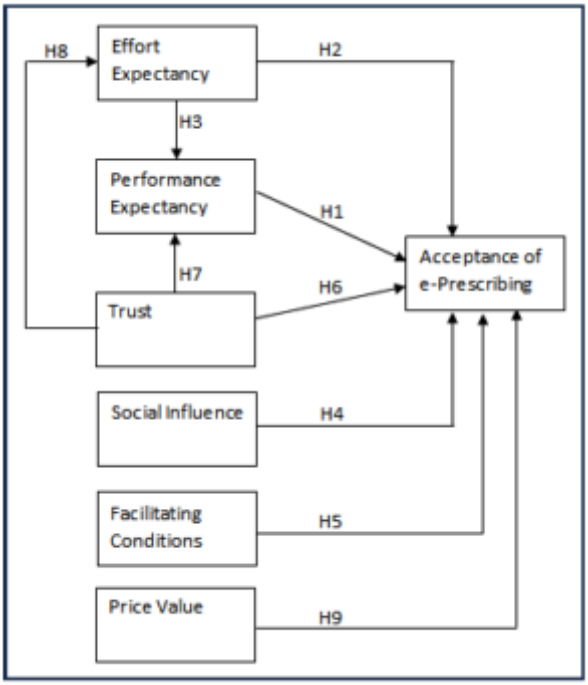
Reliability and validity of the measurement model was often used to test the hypothesised structural model .

2.8 CONCEPTUAL FRAMEWORK

2.8.1 Other researches

Venkatesh*et al.* (2012:65), Williams *et al*. (2012:34), Cody-Allen and Kishore (2009:23) and Lee and Song (2013:81) had generally similar adoption models in thei studies. Cohen *et al*. (2013) illustrated that performance expectancy (H1), effort expectancy (H2), social influence (H4) and facilitating conditions (H5) are direct determinants of acceptance or adoption. Trust (H6) and price value (H9) were identified as additional determinants of acceptance..

Figure 2.5: Conceptual framework

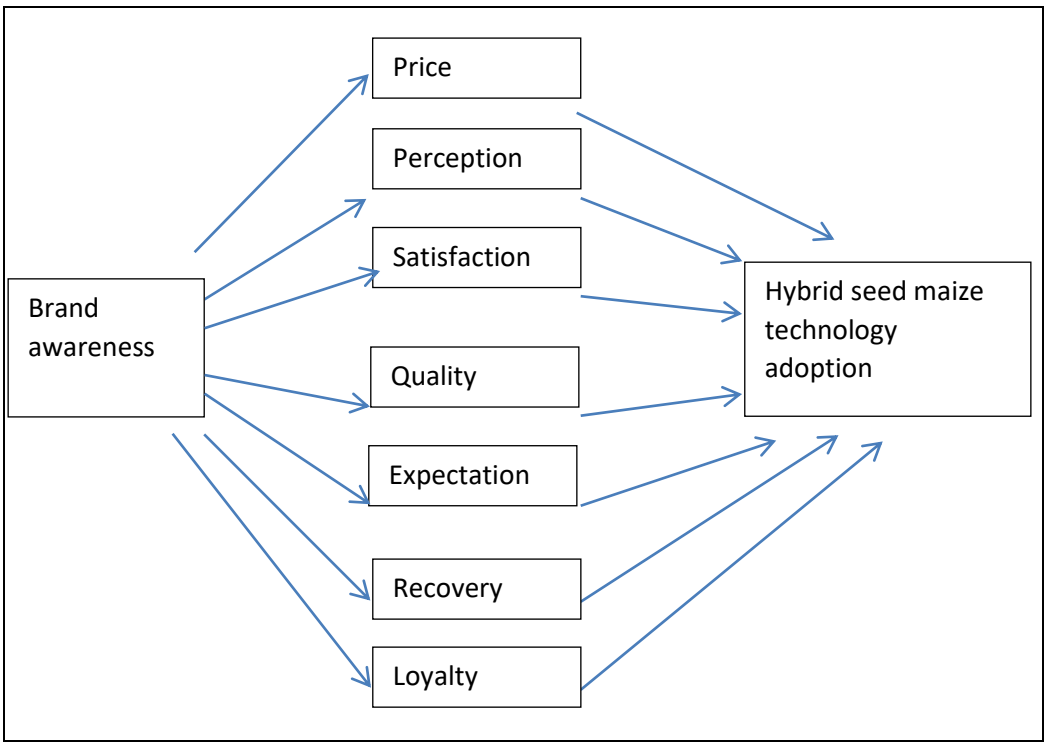


Source: Adapted from Cohen et al., 2013

2.8.2 The research model employed

The latent (unobserved) dependent variable is hybrid adoption and the latent independent variable is brand awareness; mediating variables are brand product price and quality, customer perceptions, satisfaction, expectation, and recovery as illustrated (Figure 2.4.1.1).

Figure 2.4.1.1: *Proposed model*



Source: Author

The study examined differences by participants' demographics including but not limited to gender, age, family size and the total area planted with maize that would possibly explain some research findings. Descriptive statistics such as graphs, including mean, mode, standard deviation and frequency distribution were used to describe the demographic details.

Structural equation modelling (SEM) and tests of mediation, both direct and indirect effects were in STATA 12 statistical package (SEM is available in STATA 12).

2.8.3 Formulation of hypothesis

H1: Brand awareness significantly influences adoption of hybrid seed maize technology.

H2: Intervening variables (see Figure 1.1) significantly influence adoption of hybrid seed maize technology.

H3: Intervening variables are significantly correlated with brand awareness.

Significance testing will be tested at 95% confidence interval. This will be used to measure the correlation between the variables. Reliability and consistence will be tested

using the cronbachn’s apha coefficient, composite reliability. Construct validity was measured using factor extracted variance.

2.9 CHAPTER SUMMARY

This chapter discussed literature on seed brand and its impact on hybrid seed technology adoption. The literature highlighted the processes of adoption of hybrid seed technology. Literature was reviewed on hybrid technology adoption and how small scale farmers attempt to adopt it. The impact of brand awareness in both commercial and small scale farming was also discussed in this chapter. An overview of agriculture technologies achieved by the Zimbabwe and Mozambique farming sectors were outlined. In the literature, although brand awareness was deemed to have a causal effect on hybrid seed adoption through the intervening variables, price, perceived quality, perceived value, customer expectations, customer satisfaction, customer loyalty and customer recovery indicated that there are other predictors (highlighted in the literature). A conceptual framework was formulated to show how the independent variable (brand awareness) influences the dependent variable (hybrid maize seed adoption) through some intervening variables. The following chapter provides the research methods applied in the research.

CHAPTER 3: EMPERICAL INVESTIGATION

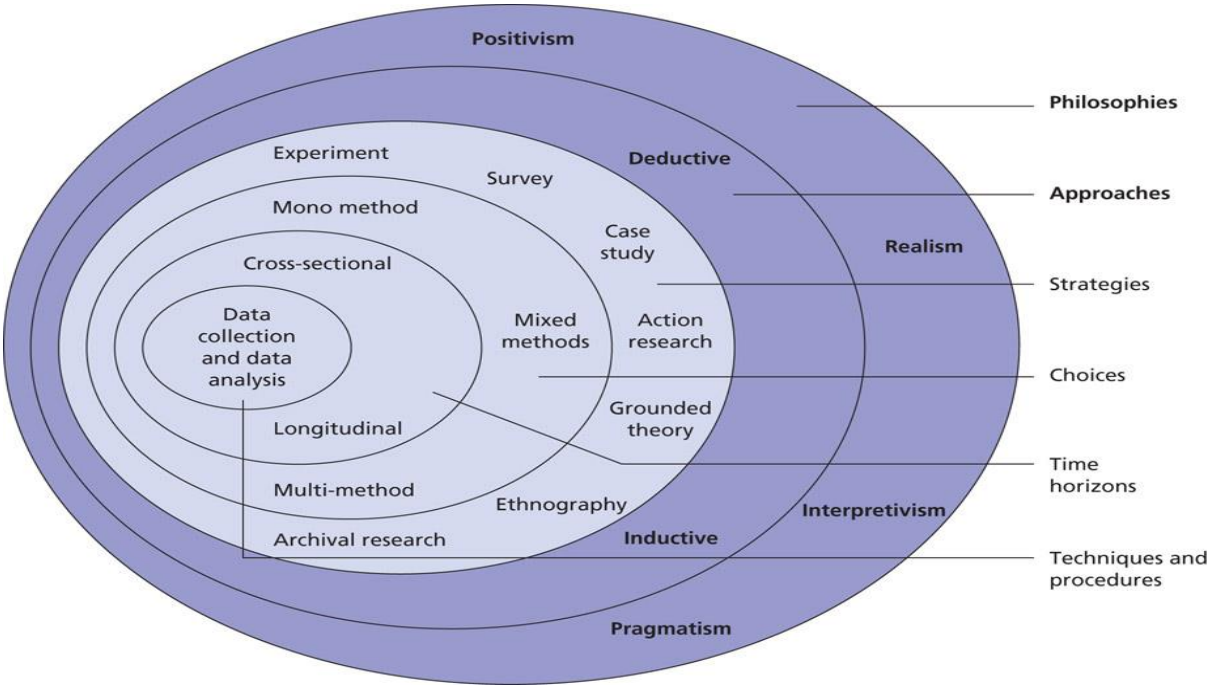
3.1 INTRODUCTION

This chapter describes how the the study was carried out. The research philosophy, the choice of data collecting methods, including the analysis and presentation of data which is quantitative in nature, will be provided. Furthermore, the chapter also provides a description of the population and sampling, validity and reliability and the ethical considerations. This study targets small scale farmers' (customers') relationships with hybrid maize seed suppliers in efforts to draw the link with the use of hybrid maize seed. The previous chapter gave a literature overview on brand awareness impact on hybrid technology adoption. Small scale farmers' buying behaviour may be influenced by the environment (both external and internal). The conceptual framework explains small scale farmers' choice drivers and their effect on adoption behaviour. In summary, this study focuses on confirming and testing hypothesized determinants of adoption of hybrid seed technology by small scale farmers theoretically by measuring them empirically. To achieve this aim, a rigorous and systematic methodology is needed to comprehend how to collect essential data from small scale farmers. This chapter provides an overview of the research methodology and data collection instruments to test the study propositions and solve the research problems empirically.

3.2 RESEARCH PHILOSOPHY

Saunders *et al.* (2009:56) describe the research process as an "onion" and proposes that by neatly peeling away the layers one gets to the central point.

Figure 3.1: Research Philosophy components



Source: Saunders et al. (2009:41)

According to Saunders *et al.* (2009:40), research philosophy is the establishment of how to go about studying the research phenomena. Generally there are two approaches, namely the positivist and the anti-positivist approach which can be triangulated to give the realist approach. With the anti-positivist approach data is usually collected in the form of descriptions. Qualitative researchers then use non-mathematical procedures when interpreting and explaining their research. This study is positivistic in nature and uses a quantitative approach as explained below.

3.2.1 Positivism

For the purpose of this study a positivist philosophy was used. According to Saunders *et al*. (2009:34), positivism is a statement about the power of science and of rational thought to comprehend and manipulate the world. Saunders *et al.* (2009:23) argue that positivism stems from a movement that rejected the metaphysical and subjective ideas and was interested only in the tangible. Positivism holds that an accurate and value-free knowledge of things is possible. But positivism's emphasis on the study of tangible human activity such as behaviours and speech, limits its application on the intangible or motivation of those externals.

White (2009:72) opines that quantitative research describes, explains and tests relationships. The positivist approach examines cause and effect relationships. The techniques used in this approach always generate numerical data which can be analysed using simple mathematical terms involving the production of tables, charts and diagrams (e.g. pie chart, bar chart, etc). This interpretation is referred to as descriptive statistics. With the quantitative approach the analysis can be complicated and involve complex mathematical procedures and statistical tests of significance. This is referred to as inferential statistics.

The positivist approach was followed through the application of likert scaled questionnaires administered to small scale farmers of maize crop in Manica district of Mozambique and Harare district of Zimbabwe, using a semi-structured questionnaire (See Annexture 1). The same questionnaire includes questions regarding general seed industry performance effect on adoption, which was then used as a support instrument to the brand specific effect on adoption. A positivistic approach was preferred because it uses an economical way of data collection, data can be easily compared and the researcher can control the research process. However, there are also shortfalls, as there is limited option for allowing respondents to expand their views.

3.2.2 Research strategy

According to Saunders *et al.* (2009:39), a research strategy is a general plan of how a researcher goes about answering research questions. Tarras, Rowney and Steel (2009:357) indicated that there are a couple of ways of undertaking research and this include surveys, case studies, experiments, histories and the evaluation of archival information. He further affirms that each of these approaches have distinct merits and demerits, based on the following three conditions :

1. focus on present as opposed to past phenomena;
2. the control that the researcher has over actual behavioural events; and
3. the type of research question.

A survey strategy was used for this study. The survey method is descriptive, objective, maintains structure and is relatively simple in presenting and analysing results. Saunders *et al.* (2009:46) argue that surveys have enabled the handling of substantial amounts of data by affording a standardised way of comparing statistics and giving more control of the research process. White (2016:78) argues that surveys are the most popular quantitative technique used in governance evaluations and can be a reliable

information gathering tool. In this research the survey data was administered through questionnaires which were self-administered by trained enumerators.

3.3 STUDY POPULATION

White (2009:78) explains that it is usually impossible because of time, cost, size, etc. to consult every emember of the population, which is termed the sampling frame, and a sample is therefore chosen for this very reason. White (2009:98) goes on to say that a sample must be typical of the population and unbiased. A population characterises a group for which a research expert wish to generalise the findings to. Research populations are sometimes defined in relation to geography, demography, occupation, time or some combination of the above. The population for this study comprises of small scale farmers in Mozambique and Zimbabwe particularly the Manica and Harare districts respectively.

3.4 SAMPLING AND SAMPLING STRATEGY

Sampling is the process or technique of selecting a suitable sample for the purpose of determining parameters or characteristics of the whole populationIn many of the surveys and research work, inferences about the population are usually made based on analysis of the sample drawn from the same population.

Probability sampling is a sampling technique that gives each element an equal chance of being selected (Saunders *et al*., 2009:23). According to White (2009:32), random sampling techniques include systematic sampling, simple random sampling and stratified sampling.

Saunders *et al*. (2009:23) posit that non-probability (non-random) sampling, on the other hand, is a sampling approach in whivh samples are selected based on the subjective judgement of the investigator and not based on random selection, i.e. the probability of each respondent being selected from the whole population is known beforehand and, therefore, cannot answer questions which may require statistical inference on the characteristics of the population.

This research applied a probability sampling technique in the form of systematic random sampling by randomly selecting 185 households selecting every 10^{th} household per district in a farming area .

3.5 SAMPLE SIZE

According to White (2009:74) a sample relates to elements within a certain population category, drawn to represent the totalityThe larger the sample size the smaller the error will be in estimating the characteristics of the whole population but the more it will cost to administer a survey and to analyze the data.

To determine the total effective sample size, calculations are based on requiring that:

- the sample size be based on a 95% level of confidence;
- an allowable margin of error be set at 0.05;
- P= 30% is the estimated adoption level;
- allowance for non-response rate to up to 4%; and
- the design effect of 1.1 is set (to counter bias from clustering by province and by type of the districts).

The required sample size was calculated using the Dobson's sample size formula (White *et al.,* 2016)

$$n = \frac{Z^2 P(1-P)}{(e)^2}$$

Where Z = value for the selected alpha level of 0.025 in each tail = 1.96. (alpha level of .05);

(P) = 0.30, (1-P) = 0.70; and P (1-P) estimate of variance = 0.21; e = acceptable margin of error for proportion being estimated = 0.05.

The sample size determined by the formula above was, therefore, 370 small scale maize farmers.

3.6 DATA COLLECTION PROCEDURES

A semi-structured questionnaire was used and it was personally administered. The interviews were conducted with respondents during the period 13 to 27 September 2016. The total sample for this study was 370 interviews.

Table 3.5: Number of selected small scale farmers

Country	Frequency	Percent	Cumulative Percent
Mozambique	185	50.0	50.0
Zimbabwe	185	50.0	100.0

Total	370	100.0	

Other characteristics of the sample and sampling procedure are as follows:

- the interviews were conducted in the two districts, i.e. one in Mozambique and one in Zimbabwe;
- the sample includes the same number of respondents from each of the two districts; ethnic group and gender are representative;
- respondents are interviewed at home; and respondents were required to be 18 years or older to be taken up in the sample.

3.6.1 Primary data

Primary data collection entails the researcher or his/her agents conducting the research to gather the data (White *et al.* 2016:76). The primary data collected may be or quantitative or qualitative. The common tools that are used in primary data collection include questionnaires, surveys, experiments, case studies, field studies, interviews and observation. Primary data for this research was gathered using questionnaires.

3.6.2 Research instruments

A research instrument is a testing device for measuring a given phenomenon such as a paper and pencil test, a research tool or a questionnaire, or a set of guidelines for observation (White, 2016:70). The quality of information gathered from a sample relies on the quality and reliability of the data collection instruments adopted (Cohens 2013:46). Reliability refers to accuracy and precision of a measurement instrument. The reseacher measured the reliability of the study tool using the Cronbach's alpha and Composite reliability (CR) scale. Hair *et al.,* (2014:119) recommended a minimum value of 0.6. . Construct validity was measured using factor extracted variance and the recommended cut-off is greater than or equal to 0.5 (Hair *et al.,* 2014:107)

A factor loading is the degree to which every variable correlates with a factor. Loading variables with poor factor loadings reduces reliability (measured by cronbach' alpha and CR). The items with poor factor loadings, below 0.3 are recommended to be deleted. When the factor loading is very high (above 0.6), then the relevant variable describes that factor quite well.

This research used semi-structured questionnaires to collect data.

3.7 QUESTIONNAIRES

Questionnaires were used to gather data from the small scale farmers. Questionnaire have an advantage that they can be administered to a large number of participants at the same time. Moreover, this method proved to be cost effective and convenient in collecting data. The questionnaire was divided into four sections: the first section has the demographic questions and the other three section contains questions that are aligned to the objectives of the research. The questionnaire is organised in a Likert - type scale which has “bad” on one end of the continuum and “good” on the other end. A scale of 1 represent “bad” and 5 represent “good”. May (2009:8) claims that the Likert scale is an extensively used scale which is very convenient when a researcher wishes to measure a construct.

3.8 MEASURING INSTRUMENT

The researchers used validated items and constructs given in literature, similar to those set out in the American Customer Satisfaction Index (ACSI), 2009, methodology report (Falkenreck and Wagner, 2011:225). The dimensions measured were customer expectations, perceived product quality, perceived service quality, perceived value, customer satisfaction, customer complaints recovery, and customer loyalty. All of the dimensions were measured with at least three items. The items were measured on a 5 point Likert scale, ranging from bad (1) - good (5).

3.9 PILOT STUDY

A pilot study was carried out before the actual research, in a bid to check for irregularities, and ambiguities that could come with research instruments. Those who participated in the pilot study were excluded from the main survey. Falkenreck and Wagner (2011:225) maintains that reliability estimates the extent to which an instrument will measure the same way each instance it is re-used under similar conditions for the same subjects. As such to test for reliability, a pre-test study was carried out amongst a few selected respondents from across the targeted research participants, and those who participated in this exercise did not take part in the mainstream study. Falkenreck and Wagner (2011:225) posit that validity is the strength of conclusions, inferences or propositions. They further hint that validity involves the degree to which the research instrument is measuring what it is supposed to measure..

3.10 DATA ANALYSIS

In processing the data, the researcher coded the questionnaires as they were received from respondents. Then a data entry template was designed in CSPro version 6.3. After data entry the researcher exported the data to Stata 12 statistical software for basic descriptive analysis by demographic variables and structural modelling as well as factor analysis. The output data was presented using tables, graphs, charts and testing of hypothesis to enable easy comparison and clear projection of the situation.
Structural equation modeling (SEM) is a comprehensive statistical approach to testing hypotheses about relations among observed and latent variables (Hoyle, 2009). It is a methodology for representing, estimating, and testing a theoretical network of (mostly) linear relations between variables (Rigdon, 2009). tests hypothesized patterns of directional and non-directional relationships among a set of observed (measured) and unobserved (latent) variables (MacCallum & Austin, 2009).

The researcher used structural equation modeling (SEM) to represent, estimate, and to test a theory derived network of relationships between variables (measured variables and latent constructs).However the researcher had to confirm each construct using factor analysis (CFA) as covered in section 4.5.1 below. The purpose of CFA is to establish whether a network of relationships derived from theory fits closely the sample data by checking the difference between sample and model predicted covariances.

The researcher moderated the effect of multivariate non-normality,by using the maximum likelihood (ML) estimation with robust variance against departures from multivariate normality even in a small manner (Anderson and Gerbing 2009; Sweeney 2009; Tabachnick and Fidell 2009), was applied.

Goodness of fit for each constructs were checked using Comparative Fit Index (CFI) and Tucker Lewis Index (TLI) and Root Mean Square Error (RMSE). Literature recommends CFI and TFI ≥0.9 and small RMSE ≤ 0.05 (Hair *et al.,* 2014:114).

3.11 VALIDITY AND RELIABILITY

3.11.1 Validity

Sireci (2009:19) defines validity as the degree to which an instrument satisfies the purpose it was constructed for. Validity also point to the extent to which it correlates with particular criterion external to the instrument. A valid instrument for research is one that would have demonstrated that it detects real ability, attitude or prevailing situation that a

researcher can identify and characterise. If the ability or attitude is itself stable, and if the respondent's answer to the research item is not affected by other unpredictable elements or factors, then each run of the instrument should yield basically the same results (Sireci, 2009:35). In order for a researcher to ensure validity, questionnaires focused on issues to do with impact of brand awareness on maize seed technological adoption by small scale farmers. Construct validity was measured using factor extracted variance and the recommended cut-off is greater than or equal to 0.5 (Hair et al., 2014:106).

A factor loading is the degree to which every variable correlates with a factor. Loading variables with poor factor loadings reduces reliability (measured by cronbach' alpha and CR). The items with poor factor loadings, below 0.3 are recommended to be deleted. When the factor loading is very high (above 0.6), then the relevant variable describes that factor quite well.

3.11.2 Reliability

Alwin (2010:406) states that reliability is a statistical concept and is related to consistency and dependability, that is, consistency in obtaining the same relative answer when measuring phenomena that have not changed. Types of reliability include the following:

Test-retest reliability (coefficient of stability). Consistency is estimated by comparing two or more repeated administrations with the measuring instruments. This gives an indication of the dependability of the result on one occasion which may then be compared with the results obtained on another instance.

Internal consistency reliability - this indicate how good the test items measure the same thing.

Split-half reliability by correlating the results obtained from two halves of the same measuring instrument, one can calculate the split-half reliability.

The reliability of the data collected depends largely on the design of the questions, structure of the questionnaire and the rigour of pilot testing. Cronbach's alpha and composite reliability were measures used to test reliability consitency. The value is recommended to be greater than or equal to 0.7 for it to have strong reliability.

3.12 LIMITATIONS

The study applied the quantitative approach to research and as such the researcher missed out on the benefits that could have come along with using qualitative techniques. Time was the major limiting factor, though the researcher had a keen interest to triangulate qualitative and quantitative techniques in order to perform an in-depth examination of the subject. Triangulation would also have helped with examination of complex questions, which is impossible with quantitative methods alone.

3.13 ETHICAL CONSIDERATIONS

Before commencement of this proposed study verbal consent was sought from the targeted participants . Participation in this study was voluntary, and the researcher tried by all means to remain very private and confidentiality during and even post the research with regard to the research outcomes. The research instruments did not ask for personal details such as surname, department or occupation.

3.14 CHAPTER SUMMARY

This chapter has discussed the methodology used for the purpose of this study. The study adopted a positivistic philosophy with a quantitative research design. The population of the study was small scale maize crop farmers. Probability sampling techniques were used to come up with a total sample size of 370 (185 per district). Questionnaires were used as data collection tools. A pilot test was done and the research instrument was tested for reliability and validity. The research observed some ethical considerations. The following chapter presents findings and discussions.

CHAPTER 4: STATISTICAL ANALYSIS AND DATA TRANSFORMATION

4.1 INTRODUCTION

This chapter presents findings of the fieldwork conducted in Manica, Mozambique and Harare, Zimbabwe. A total of 370 questionnaires were distributed (185 per district for the two countries) with a response rate of 100%, all respondents completed the interviews. The overall aim of this study was to analyse brand awareness impact on adoption of hybrid seed maize technology by small scale farmers. The discussion of the research findings shall therefore be done in line with the specific research objectives whilst giving answers to the research questions presented in chapter 1. Data discussions and analysis in this chapter are done with the guidance of the theoretical framework. linking the findings to literature.

4.2 DIFFERENTIATION OF RESEARCH PARTICIPANTS

Research evidence has shown that the study findings may differ by respondents due to differences in demographic characteristics (Pannucci, 2010, 619-25). The study demographic details include sex, age, level of education, household size and employment status.

4.3 DATA ANALYSIS RESULTS

Descriptive statistics (percentages) were used to eastablish the extent of brand switching among small scale farmers.

And Structural equation modelling was used to :

- determine the links between brand awareness and seed maize technology adoption
- specify the nature and extent of correlations between hybrid maize seed technology adoption and the supplier brand description or personality
- determine the structure of relationships between adoption and brand awareness

4.4 SECTION A: DEMOGRAPHIC POFILE

4.4.1. Gender

There was no association between gender and country, chi-square value =3.97, p = 0.05).

Table 4.1 shows that, out of 370 interviewed participants, 209 (56.49%) were male and 161 (43.51%) were female, the percentage difference was statistically significant (p=0.01). Within country, there was a good gender balance between males and females, thus the gender difference was statistically insignificant (p>0.05).

Table 4. 1: Percentage distribution of Gender within country

Country	Gender		Total	P value
	Male	Female		
Mozambique	114 (61.62%)	71 (38.38%)	185 (100.00%)	0.17
Zimbabwe	95 (51.35%)	90 (48.65%)	185 (100.00%)	0.16
Pooled	209 (56.49%)	161 (43.51%)	370 (100.00%)	0.01*

*significant at 95% level of confidence; chi-square value =3.97, p = 0.05, insignificant association.

***Source**: Author*

The results in Table 4.2 reveal that any difference in the findings between Zimbabwe and Mozambique may be explained by other factors, excluding gender.This finding shows that gender is a homogenous factor, the country differences was statistically insignificant (p>0.05).

***Table 4. 2**: Association between gender and country*

Gender	Country		Total	P value
	Mozambique	Zimbabwe		
Male	114 (54.55%)	95 (45.45%)	209 (100.00%)	0.19
Female	71 (44.10%)	90 (55.90%)	161 (100.00%)	0.46
Pooled	185 (50.00%)	185 (50.00%)	370 (100.00%)	1.00

***Note:** chi-square value =3.97, p = 0.05, no association.*

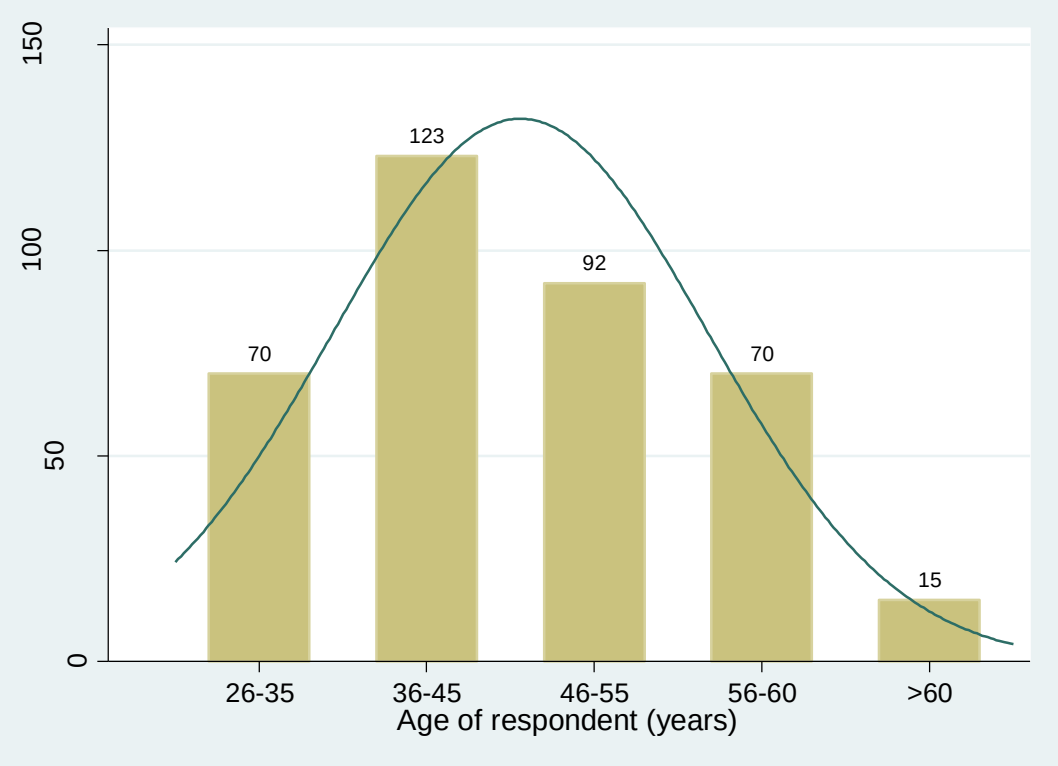
***Source**: Author*

4.2.1 Age of respondents

There was a significant association (chi-square value = 34.41, p<0.001) between age category and country, this means the respondents in the two countries were different by age categories.

The respondent age was normally distributed as shown in Figure 4.1. The modal age class interval was 36-45 years (n=123, 33.24%). This means that the most common age group of the study sample was between 36-45 years. Table 4.3 shows further details in pecentages.

Figure 4. 1: Age distibution of respondents



***Source**: Author*

Table 4.3 shows that a few respondents, 15 (4.05%) were above 60 years. The respondents of age classes 56-60 and 26-35 years, were similar in frequency, 70 (18.82%). In table 4.4, further details of age distribution by country is given.

Table 4. 3: Overall age (years) distibution

Age of respondent	Frequency	Percent
26-35	70	18.92
36-45	123	33.24
46-55	92	24.86
56-60	70	18.92
>60	15	4.05
Total	370	100.00

***Source**: Author*

The number of respondents differ significantly (p<0.05) by country when stratified by th following age categories: 26-35 years, p<0.001; 36-45 years, p=0.04; 46-55 years, p<0.001; and 56-60 years, p=0.04.Table 4.4 below gives details of the marital status of the respondents.Table 4.4 present their marital status.

Table 4. 4: Association between age category and country

Age	Country		Total	P value
	Mozambique	Zimbabwe		
26-35	50 (71.43%)	20 (28.57%)	70 (100.00%)	< 0.001
36-45	73 (59.35%)	50 (40.65%)	123 (100.00%)	0.04
46-55	29 (31.52%)	63 (68.48%)	92 (100.00%)	< 0.001
56-60	26 (37.14%)	44 (62.86%)	70 (100.00%)	0.04
>60	7 (46.67%)	8 (53.33%)	15 (100.00%)	0.80
Total	185 (50.00%)	185 (50.00%)	370 (100.00%)	1.00
***Note**: *significant at 95% level of confidence; there was a significant association, chi-square value =34.41, p < 0.001.*				

***Source**: Author*

4.2.2 Marital Status of respondents

There was no association between marital status and country, chi-square value = 4.58, p = 0.33. Marital status did not change by country location.

In Table 4.5, the researcher displays marital status findings. The majority (n=208, 56.22%) of the respondents were married, followed by those who indicated that they are widowed (n=97, 26.22%).The widowed constitutes the widower (n=34, 9.19%) and the widows (n=63, 17.03%). The respondents who indicated that they are single were (n=162, 43.78%). Single respondents were deduced from those who were never married (n=41, 11.08%); widower (n=34, 9.19%); widow (n=63, 17.03%); and separated (24, 6.49%). Further details by country ar presented in table 4.5.

Table 4. 5: Marital status of the respondents

Marital status	**Frequency**	**Percent**
Married	208	56.22
Never married	41	11.08
Widower	34	9.19
Widow	63	17.03
Separated	24	6.49
Total	370	100.00

***Source**: Author*

Marital status details of the respondents are shown in Table 4.6 below. Only 46.27% (Mozambique) against 42.24% (Zimbabwe) of the sampled household heads are married. Generally the marital status groups in Zimbabwe and Mozambique are equally distributed across the countries, since the differences are not statistically significant (p>0.05) with exception of those who are separated (p=0.02). Researchers presented in table 4.6 education levels of the respondents.

Table 4. 6: Marital status of the respondents by country

Marital status	**Country**		**Total**	**P value**
	Mozambique	Zimbabwe		0.68
Married	107 (51.44%)	101 (48.56%)	208 (100.00%)	0.55
Never married	22 (53.66%)	19 (46.34%)	41 (100.00%)	0.49
Widower	17 (50.00%)	17 (50.00%)	34 (100.00%)	0.99
Widow	32 (50.79%)	31 (49.21%)	63 (100.00%)	0.86
Separated	7 (29.17%)	17 (70.83%)	24 (100.00%)	0.02*
Total	185 (50.00%)	185 (50.00%)	370 (100.00%)	1.00

Note: **significant at 95% confidence level. No association, chi-square value = 4.58, p = 0.33.*

Source*: Author*

4.2.3 Highest Education levels for households individuals

There was a significant association between education level and country location, chi-square value = 87.68, p< 0.001.Thus, respondents' education level was different by country location.

The respondents education levels are presented in Table 4.7 below.The majority (n=177, 47.84%) of the respondents have acquired secondary level education whilst those with tertiary education and were very few (n= 45, 12.16%). Similarly, respondents who never attended school school were also few (n= 47, 12.79%). Second from the majority were, those with primary education level (n=101, 27,30%). Table 4.7 gives more education details in Mozambique and Zimbabwe.

Table 4. 7: Education levels of the respondents

Education level	**Frequency**	**Percent**
Never attended school	47	12.70
Primary school	101	27.30
Secondary high school	177	47.84
Tertiary	45	12.16
Total	370	100.00

***Source**: Author*

Table 4.8 shows education levels split by country. Zimbabwe had a generally high level of education compared to Mozambique ($p<0.05$). This is in agremment with UNESCO's Institute for Statistics (2011:79) which repoted that Zimbabwe has a high literacy rate. Zimbabwe recorded little cases of school primary education as highest level of education 25 (13.51%) whilst Mozambique differed significantly ($p<0.001$) by recording 76 (41.08%). On the other hand, there was an insigficant ($p=0.58$) difference in proportion of respondents who never attended school, 41 (22.16%) in Mozambique versus 6 (3.24%) in Zimbabwe. The findings of this study also concur with Nkhori (2009:59) who argued that the problem of households who never attended school is likely to as access to education is improving.Table 4.8 gives details of the households age.

Table 4. 8: Education level by country

Education level	**Country**		**Total**	**P value**
	Mozambique	Zimbabwe		
Never attended school	41 (22.16%)	6 (3.24%)	47 (12.70%)	0.58
Primary school	76 (41.08%)	25 (13.51%)	101 (27.30%)	<0.001*
Secondary high school	59 (31.89%)	118 (63.78%)	177 (47.84%)	<0.001*
Tertiary	9 (4.86%)	36 (19.46%)	45 (12.16%)	0.07
Total	185 (100%)	185 (100%)	370	1.00

Note: **significant association at 95% confidence level. Significant association, chi-square value = 87.68, p<0.001.*

Source*: Author*

4.2.4 Household Heads Age distribution

There was a significant association between age category of household head and country location, chi[square value = 33.08, p< 0.001.

Table 4.9 shows that the majority (n= 202, 54.59%) of households heads were male above 18 years followed by female above 18 years (n= 106, 28.65%). According to Kamarae (2009:74), Stacey (2009:9) and Aina (2009:23), males have more dominance over females whom they regard as the subordinates. The research results are therefore in line with this view as they show the dominance of men as being household heads in especially in an African society with the perspective of patriarchal dominance.

Table 4. 9: Age of household heads

Household Head Age	Frequency	Percent
Male adult (>18 years)	202	54.59
Female adult (>18 years)	106	28.65
Male child (< 18 years)	36	9.73
Female child (< 18 years)	19	5.14
Unknown	7	1.89
Total	370	100.00

***Source**: Author*

Table 4.10 is in support with results in table 4.8, most families are male headed in an African society. In similarity (p=0,05), most families in Mozambique (n=115, 56.93%) and in Zimbabwe (n=87, (43.07%) are headed by male adults (>18 years), since they are partriachical societies The results are also in line with the national statistics of the Zimstat Report (2012:36) which dominance of male headed households, in the case of Zimbabwe. In Zimbabwe and Mozambique some families are headed by children less than 18 years, and the two countries differ significantly (p>0.05) on child headed family prevalences (table 4.9).This could be due to differences in age specific mortality rates resulting in increased varying numbers of orphaned children (< 18 years). Section B below introduces farming experience of households in this study.

Table 4. 10: Association between age of household head and country location

Country	Country		Total	P value
Household Head Age	Mozambique	Zimbabwe		
Male adult (>18 yrs)	115 (56.93%)	87 (43.07%)	202 (100%)	0.05
Female adult (>18 yrs)	59 (55.66%)	47 (44.34%)	106 (100%)	0.25
Male child (< 18 yrs)	9 (25.00%)	27 (75.00%)	36 (100%)	0.007*
Female child (< 18 yrs)	2 (10.53%)	17 (89.47%)	19 (100%)	0.007*
Unknown	0 (0.00%)	7 (100.00%)	7 (100%)	-
Total	185 (50.00%)	185 (50.00%)	370 (100%)	1.00
***Note:** *significant at 95% confidence level, significant association chi-square value = 33.08, p< 0.001.*				

***Source**: Author*

4.3 SECTION B: FARMING EXPERIENCE

4.3.1 After School have you ever studied farming?

There was a significant association between studying farming after school and country, chi-square value = 10.45, p=0.001. About 171 (46.22%) of respondents had studied farming after schooling while the majority 199 (53.78%) did not. Table 4.11 shows that Zimbabwe had majority (n=101, 59.06%) compared to Mozambique (n=70, 40.94%) of respondents who studied farming after school. The difference was significant, p=0.002. Table 4.11 gives detail of the cereal crops produced.

Table 4. 11: Association between studying farming after school and country

Study farming	**Country**		**Total**	**P value**
	Mozambique	Zimbabwe		
Yes	70 (40.94%)	101 (59.06%)	171 (100%)	0.002*
No	115 (57.79%)	84 (42.21%)	199 (100%)	<0.001*
Total	185 (50.00%)	185 (50.00%)	370 (100%)	1.00
Note: **significant at 95% confidence level. Significant association, chi-square value = 10.45, p=0.001*				

Source*: Author*

4.3.2 Cereal crops produced

Table 4.12 shows that there was no significant difference between two countries on maize (p = 1.00), wheat (p = 0.64) and other (p = 0.14) cereal crops.Thus, commonly produced cereal crops in Zimbabwe and Mozambique were maize, wheat and other crops. Subsection 4.3.2.3 details the respondents farming experience.

Table 4. 12: Cereal crop production frequency scores by country

Crop	**Country**		**Total**	**Chi / p value**
	Mozambique	Zimbabwe		
Maize	178 (97.27)	182 (98.38)	360 (97.83)	0.53 /1.00
Sorghum	11 (6.01)	27 (14.59)	38 (10.33)	7.32 / 0.04*
Millet	0 (0.00)	28 (15.14)	28 (7.61)	29.98 / < 0.001*
Finger millet	0 (0.00)	23 (12.43)	23 (6.25)	24.27 / < 0.001*
Wheat	4 (2.19)	10 (5.41)	14 (3.80)	2.61 / 0.64
Other	45 (24.59)	28 (15.14)	73 (19.84)	5.17 / 0.14
Total	238 (161.08)	298 (130.05)	536 (145.65)	
Cases	183	185	368	

Note: chi – spearman chi-square value.

** significant at 95% confidence level*

***Source**: Author*

4.3.3 Length of farming experience

Results of the study show that the majority of the sampled households heads had a farming experience of 4 - 10 years with Mozambique 40.67% against Zimbabwe 51.40% as shown in Figure 4.2 below. Table 4.13 gives the extent of differences in farming experience by country.

Figure 4. 2: Length of farming experience in years by country

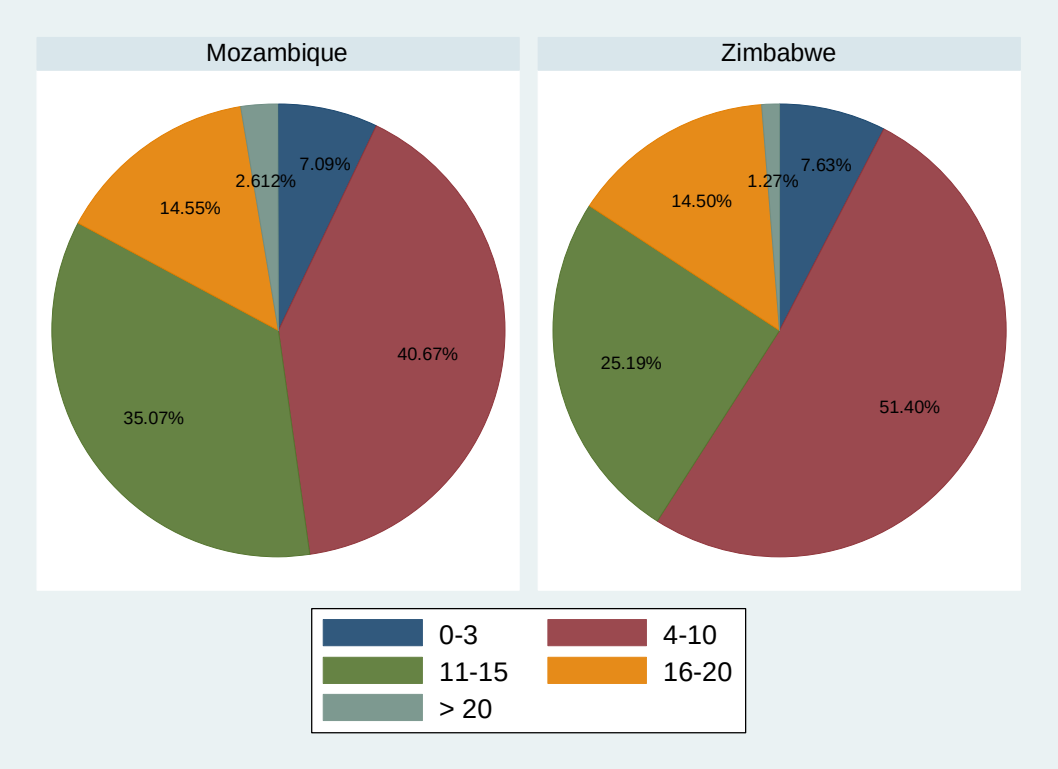


Table 4.13 showS that the respondents' length of farming experience between the two countries were similar (p>0.05) since the two countries are both developing , and have many things in common like poverty, small scale farming environment and rural populations.The next sub-section 4.3.2.4 details the quantity of area operated by small scale farmers in (hectares).

Table 4. 13: Respondents farming experience in years by country

Farming experience in years	**Country**		**Total**	**P value**
	Mozambique	Zimbabwe		
0-3	14 (50.00%)	14 (50.00%)	28 (100%)	1.00
4-10	79 (45.40%)	95 (54.60%)	174 (100%)	0.23
11-15	56 (54.37%)	47 (45.63%)	103 (100%)	0.38
16-20	31 (55.36%)	25 (44.64%)	56 (100%)	0.43
> 20	5 (55.56%)	4 (44.44%)	9 (100%)	0.74
Total	185 (50.00%)	185 (50.99%)	370 (100%)	1.00

***Source**: Author*

4.3.4 Area Operated In Hectares

From Table 4.14, the researchers deduced that 91.1% of the farmers operate in less than 10 hectares with a breakdown of 0.5 -1 hectares, 77(20.9%) farmers; 2-5 hectares, 174 (47.2%) and 11-15 hectares, 27 (7.3%), table 4.13. The results show that small scale farmers are producing from small pieces of land, and this is good for proper management since they have limited labour force and inputs. Table 4.14 shows association between area operated and country.

Table 4. 14: Area operated by small scale maize farmers

Area	**Frequency**	**Percent**
0.5-1	77	20.9
2-5	174	47.2
6-10	85	23.0
11-15	27	7.3
> 20	6	1.6
Total	369	100.0

***Source**: Author*

Table 4.15 shows that there was an association between area operated and country location, chi-square value = 62.66, $p < 0.001$. This means area operated categories differ significantly by country. This may possibly be explained by Zimbabwean land distribution which began in 2001 attributable to larger pieces of land to operate on. Figure 4.15 gives detail of the amount of seed planted per hectare.

Table 4. 15: Association between area operated and country

Area operated (ha)	**Country**		**Total**	**P value**
	Mozambique	Zimbabwe		
0.5-1	22 (28.57%)	55 (71.43%)	77 (100%)	< 0.001*
2-5	123 (70.69%)	51 (29.31%)	174 (100%)	< 0.001*
6-10	30 (35.29%)	55 (64.71%)	85 (100%)	0.01*
11-15	5 (18.52%)	22 (81.48%)	27 (100%)	0.01*
> 20	4 (66.67%)	2 (33.33%)	6 (100%)	0.44
Total	184 (49.86%)	185 (50.14%)	369 (100%)	0.96
*Notes: *significant at 95% confidence level. Significant association, chi-square value = 62.66, p < 0.001.*				

***Source**: Author*

The maize seed quantity used by most 150 (40.5%) small scale farmers was between 16 – 20 kg per hectare. Only an insignificant proportion of farmers planted between 0 – 5 kg per hectare followed by 6 – 10 kg per hectare, 31 (8.4%) farmers (Table 4.15). Table 4.16 presents the association between seed quantity and country.

Table 4. 16: Seed quantity planted per hectare (ha) in Kg

Quantity (Kg/ha)	**Frequency**	**Percent**
0-5	5	1.35
6-10	31	8.38
11-15	67	18.11
16-20	150	40.54
21-25	116	31.35
Unknown	1	0.27
Total	369	100.0

***Source**: Author*

Table 4.17 shows a significant association between seed planted per hectare and country, chi-squre value = 71.95, p < 0.001.The amount of seeds planted differ by country, this may be explained by different seed buying behaviour, and seed supplier

brand description. In the next section C , the researcher describe sources of maize seeds.

Table 4. 17: Association between seed planted per hectare and country

Quantity (Kg/ha)	**Country**		**Total**	**P value**
	Mozambique	Zimbabwe		
0-5	0 (0.00%)	5 (100.00%	5 (100%)	-
6-10	10 (32.26%)	21 (67.74%	31 (100%)	0.06
11-15	47 (70.15%)	20 (29.85%	67 (100%)	0.002*
16-20	101 (67.33%)	49 (32.67%	150 (100%)	<0.001*
21-25	27 (23.28%)	89 (76.72%	116 (100%)	<0.001*
Unknown	0 (0.00%)	1 (100.00%	1 (100%)	-
Total	185 (50.00%)	185 (50.00%	370 (100%)	1.00

***Source**: Author*

4.4 SECTION C: MAIZE SEED

4.4.1 From whom do you purchase maize seed?

The majority 215 (58.1%) of small scale farmers obtain their seeds from Agro-dealers, followed by 83 (22.4%) from village based agents. A few 31 (8.4%), small scale farmers get their seeds from seed company represented, (table 4.17)

Table 4. 18: Source of maize seed

Source of seed	**Frequency**	**Percent**
Wholesaler / large supermarket	41	11.1
Agro-dealer	215	58.1
Seed company representative	31	8.4
Village based agent	83	22.4
Total	370	100.0

***Source**: Author*

Table 4.19 shows that there is a significant association between source of maize seed and country, chi-square value = 30.15, p < 0.001, thus, sources of maize seed varies by country. This may possibly be explained by factors like difference in access to seed source and affordability.of the seed prices. Table 4.19 gives detail on farmers' brand preference and awareness.

Table 4. 19: Source of maize seed by country

Maize seed Source	**Country**		**Total**	**P value**
	Mozambique	Zimbabwe		
Wholesaler / large supplier	8 (19.51%)	33 (80.49%)	41 (100%)	< 0.001*
Agro-dealer	131 (60.93%)	84 (39.07%)	215 (100%)	0.002*
Seed company represen	14 (45.16%)	17 (54.84%)	31 (100%)	0.59
Village based agent	32 (38.55%)	51 (61.45%)	83 (100%)	0.04*
Total	185 (50.00%)	185 (50.00%(	370 (100%)	1.00
*Note: *significant at 95% confidence level. Significant association, chi-square value = 30.16, p <0.001.*				

***Source**: Author*

4.4.2 Which 3 maize seed brands are you aware of?

The top three brands of first choice were K2, Pannar and Seedco. Among these three brands the most (n= 111, 30.0%) preferred brand of first choice was K2 followed by Pannar (n= 107, 28.9%) and Seedco (n= 83, 22.4%). The second preferred top three brands were Pioneer (n= 87, 23.5%) , Sygenta (n= 81, 21.9%), and Progen (n= 61, 16.5%). In the third category of preference were Pioneer (n= 85, 23.0%), Progen (59, 15.9%), and Emillia (50, 13.5%). The farmers were more aware of K2 (1st preferred) , Pioneer (2nd and 3rd preferred) and Pannar (also in the 1st preference class but preceded by K2 brand), table 4.19.

Table 4. 20: Brand awareness and preference

1st preference		2nd preference		3rd preference	
Brand	**n (%)**	**Brand**	**n (%)**	**Brand**	**n (%)**
K2	111(30.0%)	Pioneer	87 (23.5%)	Pioneer	85(23.0%)
Pannar	107(28.9%)	Sygenta	81 (21.9%)	Progen	59(15.9%)
Seedco	83(22.4%)	Progen	61 (16.5%)	Emilla	50(13.5%)
Pioneer	28 (7.6%)	Arda	58 (15.7%)	Semo	47(12.7%)
Progen	15 (4.1%)	Pannar	49 (13.2%)	Dengo	46(12.4%)
Semoc	13 (3.5%)	Semoc	12 (3.2%)	Arda	26 (7.0%)
Agriseeds	7 (1.9%)	Agriseeds	7 (1.9%)	Agriseeds	22 (5.9%)
Manica mbeu	2 (.5%)	k2	7 (1.9%)	k2	8 (2.2%)
Sygenta	2 (.5%)	Primeseeds	5 (1.4%)	Mukushi	8 (2.2%)
Phonex	1 (.3%)	manica mbeu	1 (.3%)	Seedco	7 (1.9%)
Primeseeds	1 (.3%)	Phonex	1 (.3%)	Pannar	6 (1.6%)
-		Seedco	1 (.3)	Manica mbeu	2 (.5%)
-		-		Primeseeds	2 (.5%)
-		-		Phonex	1 (.3%)
-		-		Sygenta	1 (.3%)
-		-		-	
Total	**370(100.0%)**	**Total**	**370 (100.0%)**	**Total**	**370 (100.0%)**

Source*: Author*

Table 4.21 shows an association between seed brand and country, $p<0.05$ for agriseeds, pannar, pioneer, progen, seedco, semoc, sygenta, emilla and mukushi. The differences may be due to different factors like seed brand personality or description , customer behaviour and other.The next sub-section 4.3.3 details the specific seed brand used for maize production.

Table 4. 21: Seed brand versus country

Seed brand	Country		Total	chi2/p*
	Mozambique	Zimbabwe		
agriseeds	104 (56.2%)	61 (33.0%)	165 (44.6%)	20.2/<0.001*
k2	74 (40.0%)	55 (29.7%)	129 (34.9%)	4.3/0.57
manica mbeu	2 (1.1)	4 (2.2%)	6 (1.6%)	0.7/1.00
pannar	101 (54.6%)	43 (23.2%)	144 (38.9%)	38.3/<0.001*
phonex	9 (4.9%)	24 (13.0%)	33 (8.9%)	7.5/0.09
pioneer	117 (63.2%)	62 (33.5%)	179 (48.4%)	32.7/<0.001*
primeseeds	5 (2.70%)	4 (2.16%)	9 (2.4%)	0.1/1.00
progen	32 (17.30%)	111 (60.00%)	143 (38.7%)	71.1/<0.001*
seedco	24 (13.0%)	76 (41.1%)	100 (27.0%)	37.1/<0.001*
semoc	16 (8.7%)	70 (37.8%)	86 (23.2%)	44.2/<0.001*
sygenta	25 (13.5%)	59 (31.9%)	84 (22.7%)	17.8/<0.001*
arda	58 (31.4%)	39 (21.1%)	97 (26.2%)	5.0/0.37
dengo	34 (18.4%)	47 (25.4%)	81 (21.9%)	2.7/1.00
emilla	66 (35.7%)	0 (0.0%)	66 (17.8%)	80.3/<0.001*
mukushi	1 (0.5%)	19 (10.3%)	20 (5.4%)	17.1/<0.001*
Total	668 (361.1%)	674 (364.3%)	1342 (362.7%)	
Cases	185	185	370	

***Source**: Author* ; **significant at 95% confidence level*

4.4.3 Which seed brand have you been using regularly?

Table 4.21 shows that the most used maize seed brands were pannar (n= 116, 31.35%), seedco (n= 81, 21.89%) and K2 (n= 39, 10.54%) respectively.Table 4.22 gives more details by country.

Table 4. 22: Regular seed brand used

Regular seed brand	Frequency	Percent
agriseeds	9	2.43
k2	39	10.54
manica mbeu	1	0.27
matuba	9	2.43
pannar	116	31.35
phonex	1	0.27
pioneer	40	10.81
progen	17	4.59
seedco	81	21.89
semoc	14	3.78
sygenta	1	0.27
Unknown	42	11.35
Total	370	100.00

***Source**: Author*

Table 4.23 shows that there was an association between maize seed brand regularly used and country, chi-square value = 209.92, $p<0.001$. Thus, regular use of maize seed brands was differing by country. This may be explained by brand performance in different envionments, thus farmers choose brands suitable with weather conditions of their regions. The next sub-section 4.3.3.4 describe the extent of brand swithing among small scale farmers.

Table 4. 23: Regular seed brand by country

Regular seed brand			Total	P value
	Mozambique	Zimbabwe		
agriseeds	0 (0.0%)	9 (100.0%)	9 (100.0%)	-
k2	13 (33.3%)	26 (66.7%)	39 (100.0%)	0.01*
manica mbeu	1 (100.0%)	0 (0.0%)	1 (100.0%)	-
matuba	9 (100.0%)	0 (0.0%)	9 (100.0%)	-
pannar	102 (87.9%)	14 (12.1%)	116 (100.0%)	< 0.001*
phonex	1 (100.0%)	0 (0.0%)	1 (100.0%)	-
pioneer	2 (5.0%)	38 (95.0%)	40 (100.0%)	< 0.001*
progen	0 (0.0%)	17 (100.0%)	17 (100.0%)	-
seedco	7 (8.6%)	74 (91.4%)	81 (100.0%)	< 0.001
semoc	14 (100.0%)	0 (0.0%)	14 (100.0%)	-
sygenta	0 (0.0%)	1 (100.0%)	1 (100.0%)	-
Total	149 (45.4%)	179 (54.6%)	328 (100.0%)	0.02*

***Source**: Author*

4.4.4 Did you ever change the maize seed brand to another brand from 2012 to date?

The majority of farmers indicated that they once switched from one seed brand to another, 298 (80.8%). Only 71 (19.2%) of farmers indicated that they never switched brands. High brand switching behaviour may possibly be explained by low brand loyalty, low product satisfaction and other mediating variables discussed in detail in section D. Table 4.24 splits brand switching by country.

Table 4. 24: Frequency of brand switching

Status	Frequency	Percent
Yes	298	80.8
No	71	19.2
Total	369	100.0

***Source**: Author*

Table 4.25 shows that there was an association between brand switching and the country of farmer, chi-square value = 10.73, p =0.001. Thus, Brand switching is more (p= 0.003) prevalent in Mozambique, (n=161, 87%) compared to Zimbabwe (n=137, 74.05%). Both countries brand loyalty is a major problem. The next subsection 4.3.3.5 discusses the reasons for brand switching.

Table 4. 25: Frequency of brand switching by country

Ever Switched, since 2012?	**Country**		**Total**	**P value**
	Mozambique	Zimbabwe		
Yes	161(87.50%)	137(74.05%)	298(80.76%)	0.003*
No	23 (12.50%)	48 (25.95%)	71 (19.24%)	0.197
Total	184 (100%)	185 (100%)	369 (100%)	1.00

***Source**: Author*; ** significant at 95% Confidence level. Signficant association, chi-square value = 10.73, p =0.001*

4.4.5 Why did you switch to another maize seed brand, year 2012 -16 ?

Table 4.26 gives the resons why small scale famers changed their seed brand for another brand. The first major reason (n=60, (23.90%) mentioned was to try new brands.Farmers prefer new solutions to improve maize their yields. The second major reason (n=44, 17.53%) mentioned was climate change, thus they prefer seed qualities that withstand the existing climate challenges associated with varying an sometimes eratic or excessive rains and temperatures.

Table 4. 26: Reasons for switching to another maize seed brand (year, 2012-16)

Reason	Frequency	Percent
F.A.O voucher program	17	6.77
advert	29	11.55
availability	29	11.55
cheaper	17	6.77
climate change	44	17.53
distance	3	1.20
extension teachings	5	1.99
free from government	6	2.39
high yield potential	34	13.55
to improve on qualit	7	2.79
try new brand	60	23.90
Total	251	100.00

***Source**: Author*

There is a significant association between the reason of brand switching and country location, chisquare value = 75.61, $p<0.001$.

Table 4. 27: Reason for brand switching by country

Reason	**Country**			**P value**
	Mozambique	Zimbabwe	Total	P value
FAO voucher program	17 (100.00%)	0 (0.00%)	17 (100%)	-
advert	17 (58.62%)	12 (41.38%)	29 (100%)	0.15
availability	17 (58.62%)	12 (41.38%)	29 (100%)	0.15
cheaper	4 (23.53%)	13 (76.47%)	17 (100%)	0.01*
climate change	33 (75.00%)	11 (25.00%)	44 (100%)	<0.001*
distance	0 (0.00%)	3 (100.00%)	3 (100%)	-
extension teachings	3 (60.00%)	2 (40.00%)	5 (100%)	0.48
free from government	6 (100.00%)	0 (0.00%)	6 (100%)	-
high yield potential	4 (11.76%)	30 (88.24%)	34 (100%)	<0.001*
to improve on qualit	0 (0.00%)	7 (100.00%)	7 (100%)	-
try new brand	41 (68.33%)	19 (31.67%)	60 (100%)	<0.001*
Total	142 (56.57%)	109 (43.43%)	251 (100%)	0.002*
*Note: *significant at 95% confidence level. Significant association, chi-square value =75.61, p<0.001.*				

***Source**: Author*

4.5 RELIABILITY AND VALIDITY

4.5.1 Reliability analysis

Reliability refers to accuracy and precision of a measurement instrument. The reseacher measured the reliability of the study tool using the Cronbach's alpha and Composite reliability (CR) scale. Hair *et al.,* (2014:106-121) recommended a minimum value of 0.6.

A factor loading is the degree to which every variable correlates with a factor. Loading variables with poor factor loadings reduces reliability (measured by cronbach' alpha and

CR). The researcher deleted items with poor factor loadings, below 0.3. Table 4.32 of appendix 1 shows the retained factor loadings. When the factor loading is very high (above 0.6), then the relevant variable describes that factor quite well.

Table 4.28 below shows that the cronbach's alpha of the constructs ranges from 0.71 to 0.80. Hair *et al.,* (2014:115) recommended a minimum Cronbach's alpha value of 0.6 This indicates a substantial consistency reliability of the measures found in the study. The measurement is therefore deemed reliable.

Convergent validity,was assessed using the Average Variance Extracted (AVE) score of 0.5 as suggested by Echchabi and Aziz (2012:856) was attained. Table 4.28 shows the average variance extracted score ranging from 0.51 to 0.86. Hair *et al.*, (2014:118), cited that the AVE value of 0.50 or higher indicates a convergent validity of the construct. Table 4.28 shows item responses by country, for similar measures.

Table 4. 28: Overall reliability and validity of constructs

Construct	No. of indicators	AVE	CR	Cronbach's alpha
Price	3	0.67	0.84	.75
Perception	3	0.86	0.84	.78
satisfaction	6	0.80	0.83	.74
quality	3	0.55	0.81	.75
expectation	5	0.76	0.79	.74
recovery	5	0.51	0.80	.71
loyalty	8	0.55	0.80	.79

Note: *AVE – Average Variance Extracted; CR – Composite Reliability*

Source*: Author*

The researcher stratified the reliability and validity analysis by country. Table 4.29 below shows countries cronbach's alpha ranges, 0.75 to 0.90 for Zimbabwe and 0.73 to 0.88 for Mozambique. For Zimbabwe the CR ranged from 0.77 to 0.92 versus 0.75 to 0.89 for Mozambique. Since the ranges are high above 0.60 (Echchabi and Aziz, 2012:849-858); this indicates a substantial consistency reliability of the measures found in the study. The measurement is therefore deemed reliable.

Table 4.29 shows country average variance extracted (AVE) scores. The ranges of AVE scores were 0.51 to 0.86 for Mozambique against 0.5 to 0.83 for Zimbabwe. Hair *et al.,* (2014:119), cited that the AVE value of 0.50 or higher indicates a convergent validity of the construct.

Table 4. 29: Reliability and Validity of the constructs by country

Country	Construct	No.Indicators	AVE	CR	Cronbach's alpha
Zw	Expectation	5	0.72	0.82	.80
Zw	Awareness	3	0.74	0.85	.82
Zw	Perception	5	0.79	0.81	.79
Zw	Recovery	5	0.83	0.86	.84
Zw	Adoption	3	0.50	0.77	.75
Zw	Price	5	0.60	0.82	.80
Zw	Satisfaction	5	0.80	0.92	.90
Zw	Quality	3	0.51	0.81	.80
Zw	Loyalty	8	0.78	0.87	.83
Moz	Recovery	5	0.68	0.80	.78
Moz	Adoption	3	0.96	0.82	.78
Moz	Price	3	0.74	0.78	.74
Moz	Satisfaction	6	0.74	0.80	.76
Moz	Quality	3	0.53	0.78	.74
Moz	Perception	5	0.64	0.75	.73
Moz	Expectation	5	0.78	0.80	.79
Moz	Loyalty	8	0.54	0.89	.88
Moz	Awareness	3	0.67	0.78	.76

Note: *AVE – Average Variance Extracted; CR – Composite Reliability; Zw = Zimbabwe; Moz – Mozambique*

Source*: Author*

4.5.2 Confirmatory analysis and structural equation modelling

Structural equation modeling (SEM) is a comprehensive statistical approach to testing hypotheses about relations among observed and latent variables (Jackson, Gillaspy and

Purc-Stephenson, 2009:6). It is a methodology for representing, estimating, and testing a theoretical network of (mostly) linear relations between variables (Reinartz, Haenlein and Henseler, 2009:336). tests hypothesized patterns of directional and non-directional relationships among a set of observed (measured) and unobserved (latent) variables (Jackson, Gillaspy and Purc-Stephenson, 2009:6).

The researcher used structural equation modeling (SEM) to represent, estimate, and to test a theory derived network of relationships between variables (measured variables and latent constructs). However the researcher had to confirm each construct using factor analysis (CFA) as covered in section 4.5.1 below. The purpose of CFA is to establish weather a network of relationships derived from theory fits closely the sample data by checking the difference between sample and model predicted covariances.

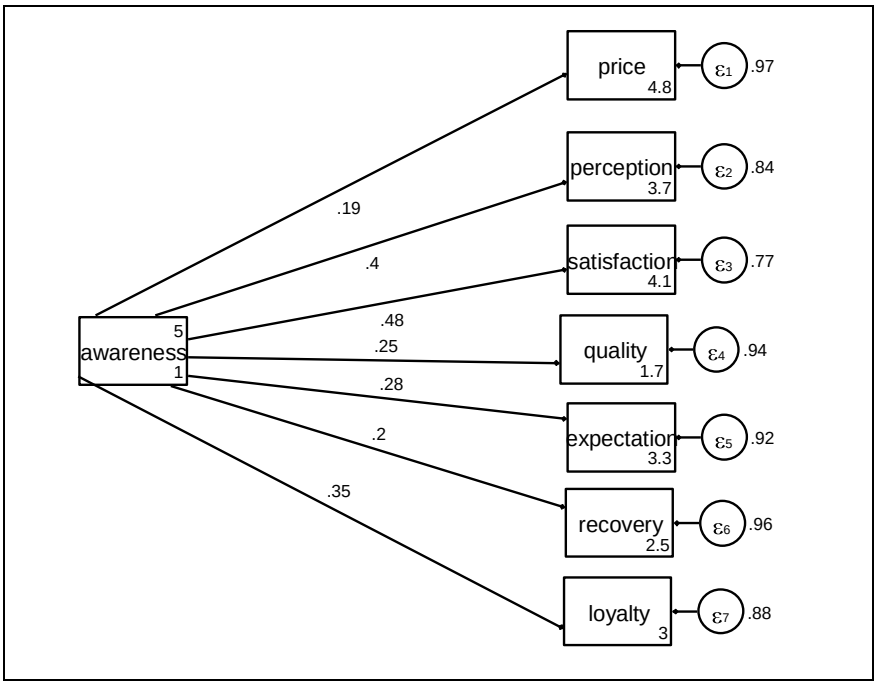
The researcher moderated the effect of multivariate non-normality, by using the maximum likelihood (ML) estimation with robust variance against departures from multivariate normality even in a small manner was applied (Chi, C.G. and Gursoy, D., 2009:245-253).

Goodness of fit for each constructs were checked using Comparative Fit Index (CFI) and Tucker Lewis Index (TLI) and Root Mean Square Error (RMSE). Literature recommends CFI and TFI ≥0.9 and small RMSE ≤ 0.05 (Hair *et al.,* 2014:119).

4.5.3 Awareness Construct

Figure 4.3 shows overall awareness construct. The are positive coefficients for all the mediating variables of this contruct meaning that there exists linear positive relationships between the construct and mediating variables (significant, p values <0.001). The whole wareness contruct had an acceptable good fit (CFI, 0.99; TFI, 0.98 RMSE, 0.017). Literature recommends CFI and TFI ≥0.9 and small RMSE ≤ 0.05 (Hair *et al.,* 2014:119). Figure 4.4 and Figure 4.5 spilts the construct by country. In figure 4.5 the author present the awareness construct for Mozambique.

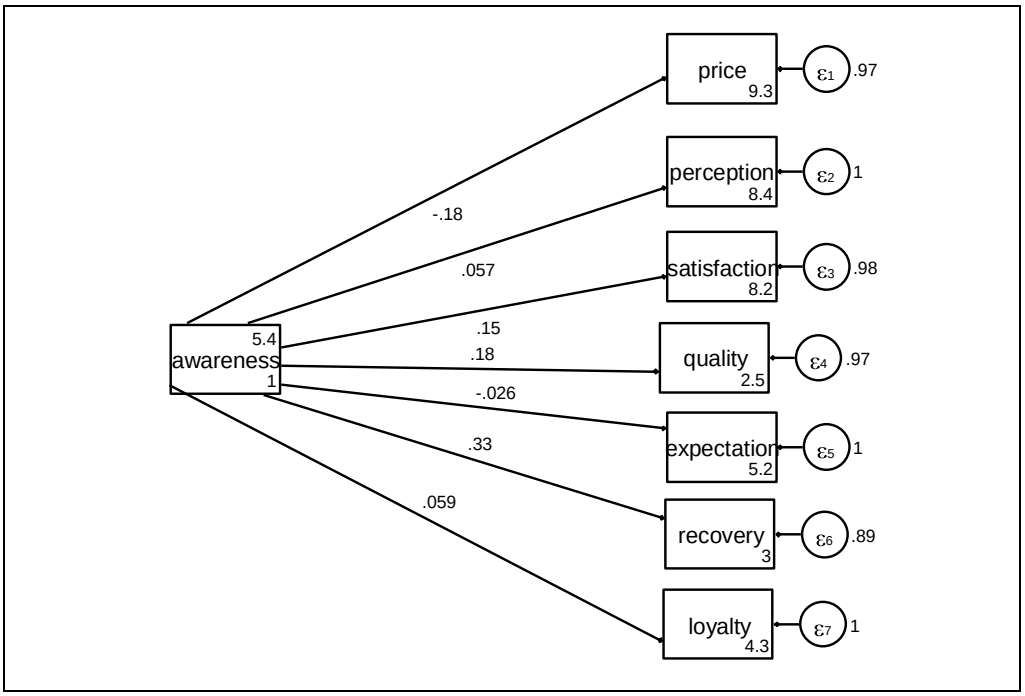
Figure 4. 3: Overall awareness construct



Source: *Author*

Figure 4.4 below shows the awareness construct for Mozambique. There are positive coefficients for the mediating variables of this construct with exception of price and expectation with negative coefficients, meaning that there exists both linear positive and negative relationships between the construct and mediating variables (significant, p values <0.001). The whole awareness contruct had an acceptable good fit (CFI, 0.89; TFI, 0.87 RMSE, 0.017). Figure 4.5 has the detail for Zimbabwe.

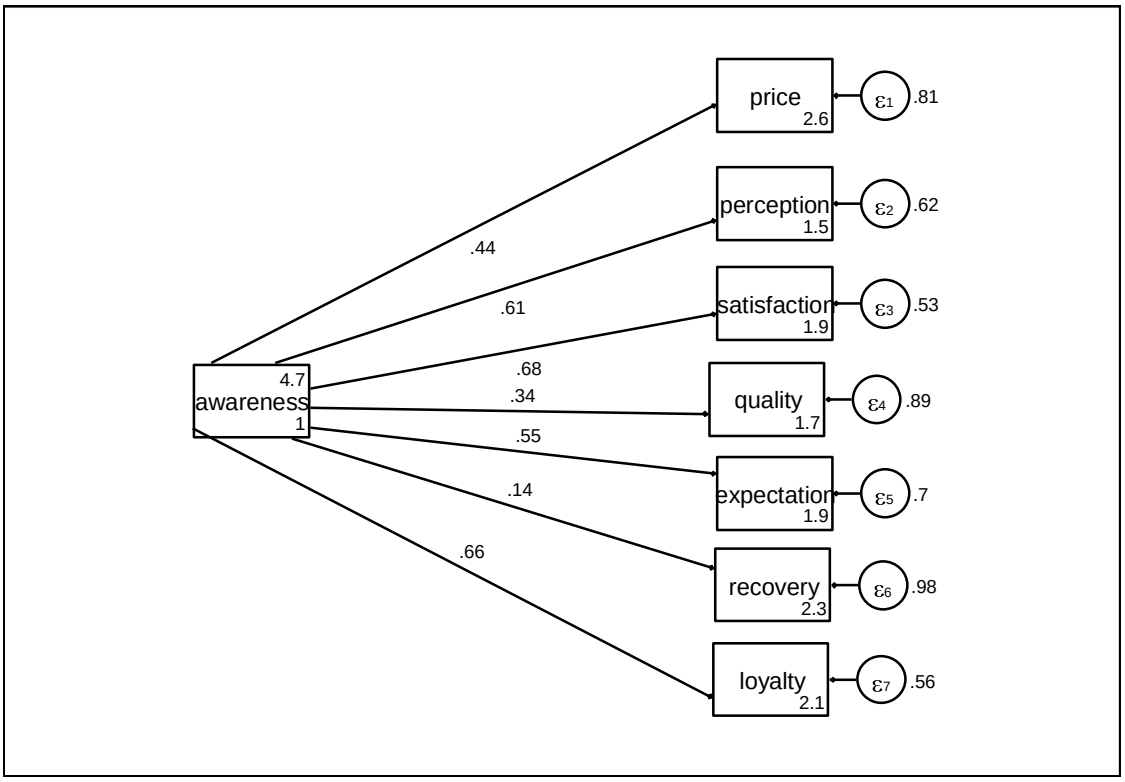
Figure 4. 4: Mozambique - awareness constructs



Source: *Author*

Figure 4.5 below shows the awareness construct for Zimbabwe. There are positive coefficients for all the mediating variables of this contruct meaning that there exists linear positive relationships between the construct and mediating variables (significant, p values <0.001). The whole awareness contruct had an acceptable good fit (CFI, 0.90; TFI, 0.87 RMSE, 0.008). Figure 4.6 has the detail for the overall adoption construct.

Figure 4. 5: Zimbabwe - awareness construct



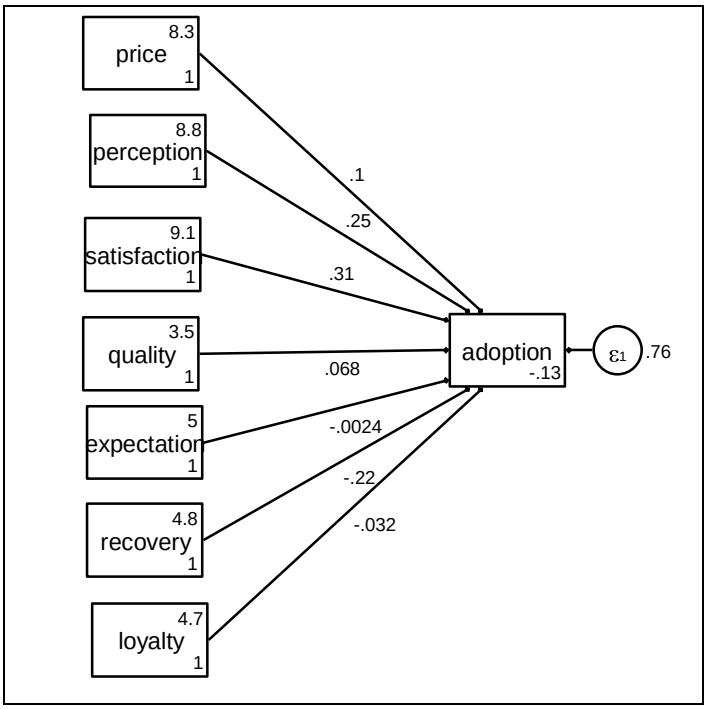
Source: *Author*

4.5.4 Mozambique - Adoption construct

The previous section 4.5.1 of CFA analysis on awareness contructs, has shown significance of stratifying the construct by country. This sub section present the stratified adoption constructs by country as well.

Figure 4.6 below shows the adoption construct for Mozambique. There are positive coefficients for the mediating variables with exception of expectation, recovery and loyalty. This means that some variables have negative and some have positive meditian but both with significant contributions (significant, p values <0.001). The whole adoption contruct had an acceptable good fit (CFI, 0.79; TFI, 0.77 RMSE, 0.033). Figure 4.8 has the detail for Zimbabwe.

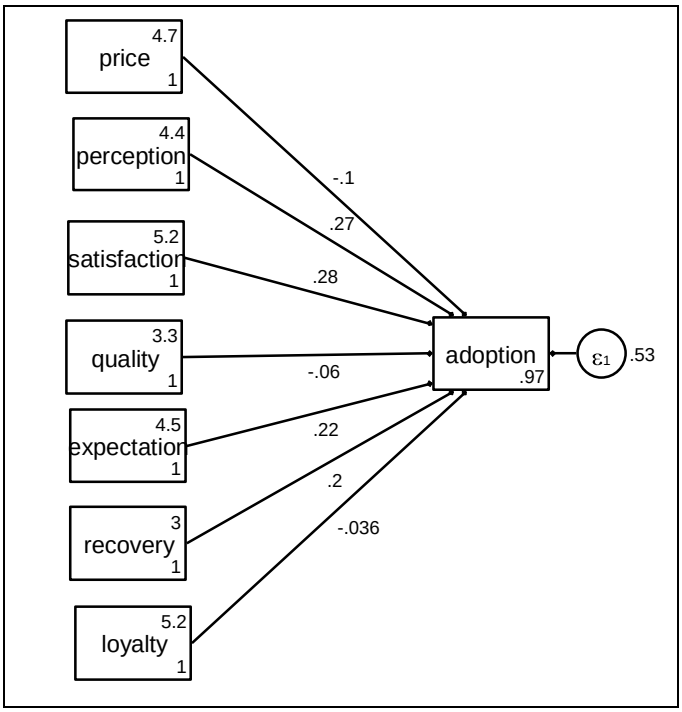
Figure 4. 6: Mozambique adoption construct



***Source**: Author*

Figure 4.7 below shows the doption construct for Zimbabwe. There are negative coefficients for some mediating variables (loyalty, quality and price) meaning that there exists linear negative relationships between these mediating variables and the construct (significant, p values <0.001).The rest of the variables had significant positive effects (p<0.05). The whole awareness contruct had an acceptable good fit (CFI, 0.88; TFI, 0.85 RMSE, 0.025).

Figure 4. 7: Zimbabwe - adoption construct

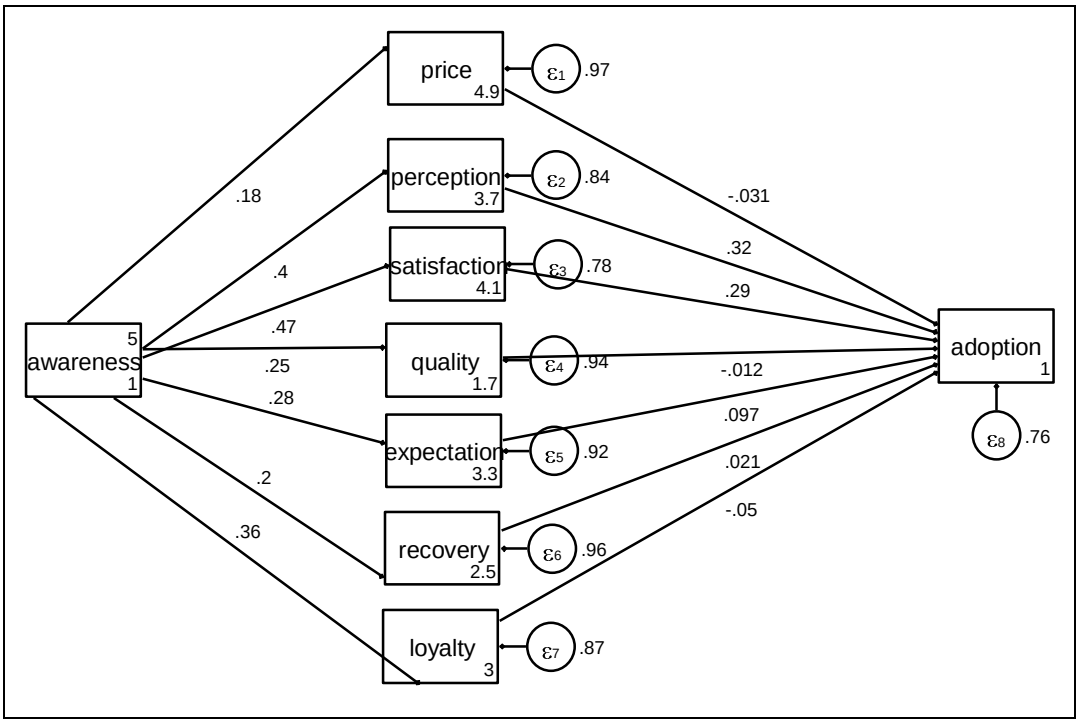


Source: *Author*

4.5.5 Structural model

The diagram in Figure 4.8 shows the structure with all contructs of the proposed model. The overall Model mediating variables have both positive and few negative contributions to adoption (all p values were < 0.001 see Table 4.8). The negative mediation to adoption according to their beta values are loyalty (β = -0.05); price, (β= - 0.03); and (β = -0.01).

Figure 4. 8: Overall Impact of brand awareness on hybrid maize seed adoption



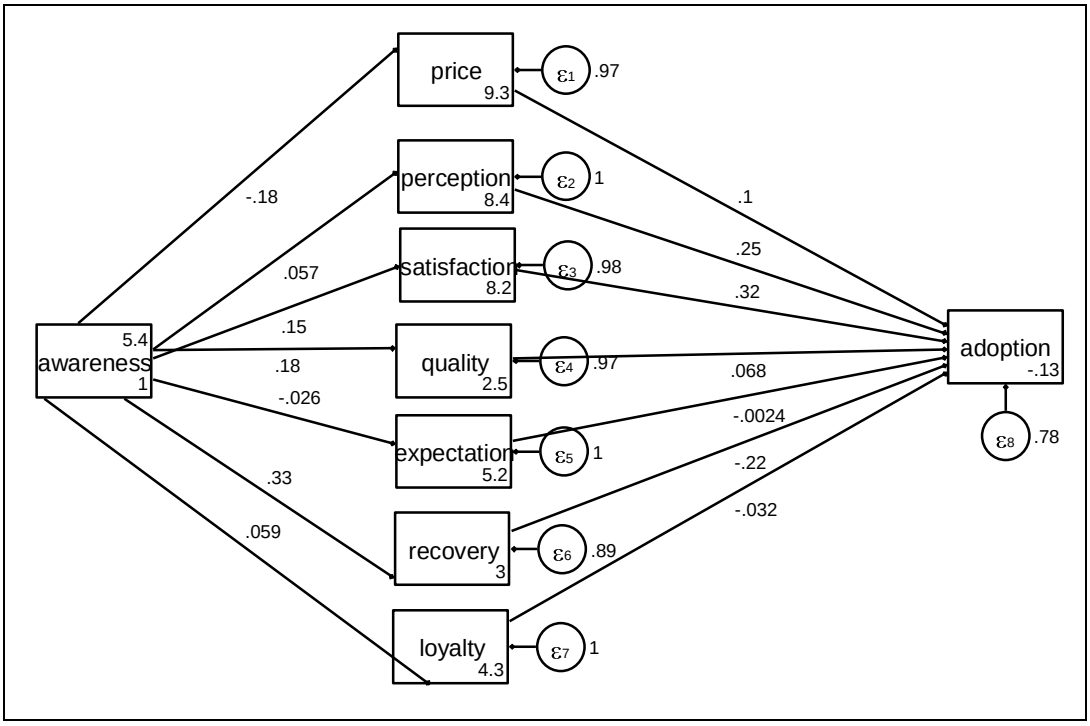
***Source**: Author*

Table 4.9 shows the significance and coefficients of the model paths. All path coefficients between awareness construct mediating variables were statistically significant thus p values (Pr >|z|) < 0.05 at 95% level of confidence. However this model is not reliable based on previous stratified results indicating non-homogeinity of the two sampled countries (Mozambique and Zimbabwe). Subsection 4.5.4 discusses the structural model by country sub analysis.

4.5.6 Structural models of brand awareness on hybrid seed maize adoption by country

The structural model for Mozambique in Figure 4.9 shows the paths coefficients relationships between brand awareness and mediating variables. Negative mediating variables are expectation (β= -0.002); recovery (β= -0.22); and loyalty (β= -0.03). There is a negative linear relationships between price (β= -0.18) and awareness. Table 4.10 shows significance values (Pr>;=|z|) or p values of the mediating variables by country. The path coefficients for the structural model of Zimbabwe is shown in figure 4.11.

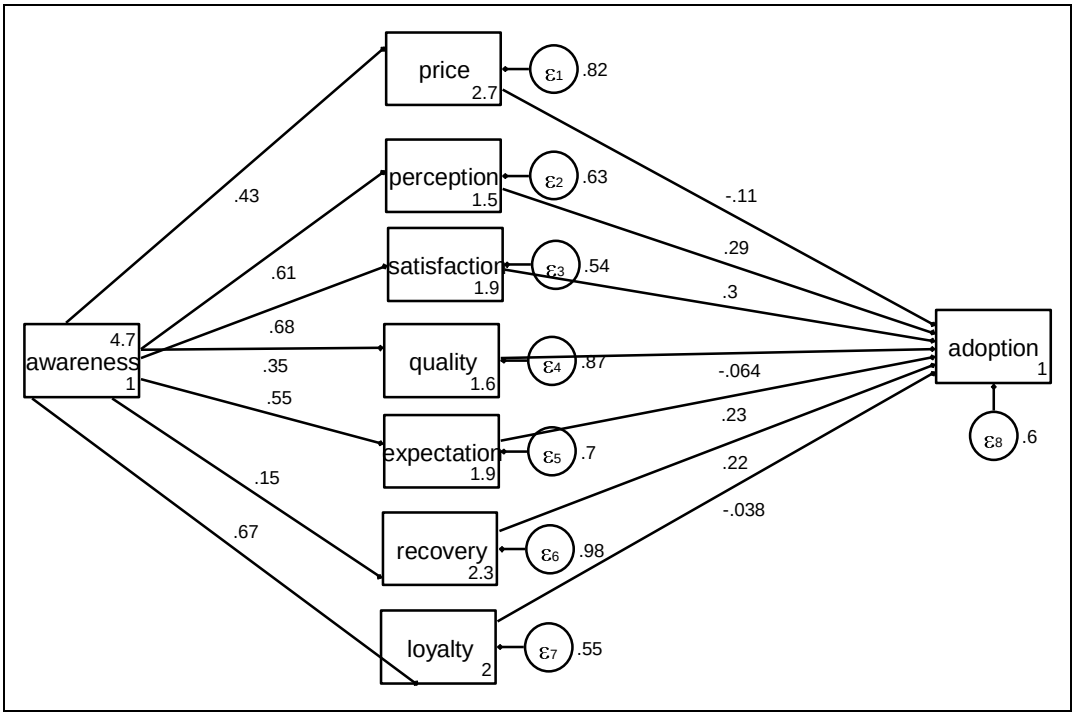
Figure 4. 9: Impact of brand awareness on hybrid maize seed adoption in Mozambique



Source: *Author*

Figure 4.10 shows the path coefficients for the structural model of Zimbabwe. The figure shows both positive and negative coefficients with negative path coefficients being loyalty (β= - 0.04); quality (β= - 064); and price (β= - 0.11). However from this figure alone, we cannot tell which mediating variables are significantly contributing to adoption. The detail about significance of the mediating variables is given in Table 4.29.

Figure 4. 10: Impact of brand awareness on hybrid maize seed adoption in Zimbabwe



Source: *Author*

Table 4.30 below shows the significance (Pr>|z|) of the beta coefficients for Mozambique and Mozambique.The relationship between awareness and adoption is mediated by mediating variables shown in Figure 4.9 and Figure 4.10.

The paths coefficients of the mediating variables as links between brand awareness and maize seed adoption show existence of positive and negative mediation as described in next two paragraphs below.

4.5.6.1 Mozambique

With reference to adoption, there was a significant negative mediating effect due to recovery (β= -0.22, p=0.01, significant p<0.05). This means that the customer recovery from the seed suppliers was very poor and may have resulted in low motivation for adoption of hybid maize seeds among small scale farmers. With respect to awareness there is a negative linear relationships between price (β= - 0.18, p = 0.003, significant p< 0.05) and awareness levels. This suggests that the supplier may gain popularity when the seed pricing is affordable, and this case low awareness was associated with high

pricing which are not affordable. This again may be attributable to existence of monopolistic markets with no completion among suppliers.

4.5.6.2 Zimbabwe

Table 4.30 shows significance values (Pr>;=|z|) or p values of the mediating variables by country.The path coefficients for the structural model of Zimbabwe is shown in figure 4.10 with some coefficients positive and whilst a few were negative. In relation to adoption the mediating variables with negative path coefficients were loyalty (β= - 0.04, p=0.74, insignificant p> 0.05); quality (β= -0.064, p=0.59, insignificant p> 0.05); and price (β= - 0.11, p=0.13, insignificant p> 0.05).

Table 4. 30: Impact of brand awareness on hybrid maize seed adoption by country

Standardized	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Structural						
price <-						
awareness						
Mozambique	-.1818317	.0617136	-2.95	0.003	-.3027881	-.0608753
Zimbabwe	.428846	.0670685	6.39	0.000	.2973941	.560298
_cons						
Mozambique	9.305676	.5962987	15.61	0.000	8.136952	10.4744
Zimbabwe	2.661247	.4626454	5.75	0.000	1.754478	3.568015
perception <-						
awareness						
Mozambique	.0569047	.0540975	1.05	0.293	-.0491244	.1629338
Zimbabwe	.6081013	.1132827	5.37	0.000	.3860713	.8301313
_cons						
Mozambique	8.446711	.6919234	12.21	0.000	7.090566	9.802856
Zimbabwe	1.517657	.7288323	2.08	0.037	.0891723	2.946142
satisfaction <-						
awareness						
Mozambique	.1537649	.0798161	1.93	0.054	-.0026719	.3102016
Zimbabwe	.6794056	.1085327	6.26	0.000	.4666855	.8921258
_cons						
Mozambique	8.226665	1.189854	6.91	0.000	5.894594	10.55874
Zimbabwe	1.948325	.810028	2.41	0.016	.360699	3.535951
quality <-						
awareness						
Mozambique	.1801	.0544988	3.30	0.001	.0732842	.2869157
Zimbabwe	.354687	.0593546	5.98	0.000	.238354	.4710199
_cons						
Mozambique	2.493222	.376792	6.62	0.000	1.754723	3.231721
Zimbabwe	1.621638	.2969603	5.46	0.000	1.039607	2.203669
expectation <-						
awareness						
Mozambique	-.0258448	.064712	-0.40	0.690	-.152678	.1009884
Zimbabwe	.55079	.0970274	5.68	0.000	.3606199	.7409602
_cons						
Mozambique	5.185835	.434825	11.93	0.000	4.333593	6.038076
Zimbabwe	1.855566	.6252546	2.97	0.003	.6300896	3.081042
recovery <-						
awareness						
Mozambique	.3278437	.0653707	5.02	0.000	.1997195	.455968
Zimbabwe	.1474553	.0677179	2.18	0.029	.0147307	.2801798
_cons						
Mozambique	3.026928	.502178	6.03	0.000	2.042677	4.011178
Zimbabwe	2.288743	.3509798	6.52	0.000	1.600835	2.976651
loyalty <-						
awareness						
Mozambique	.0593128	.0993374	0.60	0.550	-.135385	.2540105
Zimbabwe	.6723253	.0550418	12.21	0.000	.5644454	.7802052
_cons						
Mozambique	4.334984	.653593	6.63	0.000	3.053965	5.616003
Zimbabwe	2.013655	.4987787	4.04	0.000	1.036066	2.991243
adoption <-						
price						
Mozambique	.1006614	.1029917	0.98	0.328	-.1011986	.3025213
Zimbabwe	-.108507	.0714654	-1.52	0.129	-.2485765	.0315625
perception						
Mozambique	.2531743	.1059086	2.39	0.017	.0455974	.4607513
Zimbabwe	.2905597	.1751921	1.66	0.097	-.0528104	.6339298
satisfaction						
Mozambique	.3163492	.1180202	2.68	0.007	.0850338	.5476646
Zimbabwe	.3025403	.1066501	2.84	0.005	.0935098	.5115707
quality						
Mozambique	.0682753	.0992453	0.69	0.491	-.1262419	.2627925
Zimbabwe	-.0641488	.1200631	-0.53	0.593	-.2994681	.1711706
expectation						
Mozambique	-.002431	.1055715	-0.02	0.982	-.2093473	.2044854
Zimbabwe	.22911	.1298249	1.76	0.078	-.025342	.4835621
recovery						
Mozambique	-.2175179	.0857842	-2.54	0.011	-.3856518	-.0493841
Zimbabwe	.2156358	.0866271	2.49	0.013	.0458498	.3854218
loyalty						
Mozambique	-.0319952	.090313	-0.35	0.723	-.2090054	.145015
Zimbabwe	-.0377267	.1118145	-0.34	0.736	-.2568791	.1814257
_cons						
Mozambique	-.1304202	1.25166	-0.10	0.917	-2.58363	2.322789
Zimbabwe	1.026041	.481427	2.13	0.033	.0824613	1.96962
var(e.price)						
Mozambique	.9669372	.022443			.9239353	1.011941
Zimbabwe	.8160911	.0575242			.7107872	.9369958
var(e.perception)						
Mozambique	.9967619	.0061568			.9847675	1.008902
Zimbabwe	.6302128	.1377747			.4105829	.9673278
var(e.satisfaction)						
Mozambique	.9763564	.0245458			.9294134	1.02567
Zimbabwe	.538408	.1474754			.3147449	.9210098
var(e.quality)						
Mozambique	.967564	.0196305			.9298439	1.006814
Zimbabwe	.8741972	.0421046			.795449	.9607413
var(e.expectation)						
Mozambique	.999332	.0033449			.9927975	1.00591

S***ource:*** *Author*

4.5.7 Overall structural model by country

Model 2 explains 75% of the variation in hybrid seed adoption behaviour by small scale farmers when stratified country. According to Venkatesh and Zhang (2010:13), this is a good model for predicting the impact of small scale farmers on adoption of hybrid maize seed use. Table 4.30 and 4.31 show detail of goodness of fit: R squared value, fitted versus the modell predicted and respective residuals. Table 4.30 has relatively small residuals and high R= squared value of 75% (explined in this paragraph above). The top five Mediating variables with R-squared values ≥ 19% the inorder of their magnitude were satisfaction (R-squared = 46.7%); loyalty (R-squared = 43.9%); perception (R-squared = 37.5%); expectation (R- squared = 30.0%); price (R-squared = 19.1%).

Table 4. 31: Stratified structural model 2 goodness of fit - stratified by country

Equation-level goodness of fit

depvars	Variance fitted	Variance predicted	residual	R-squared	mc	mc2
observed						
price	26.32241	5.02896	21.29345	.1910524	.4370954	.1910524
perception	16.79251	6.30324	10.48927	.3753603	.6126665	.3753603
satisfaction	21.65469	10.10832	11.54637	.4667957	.6832245	.4667957
quality	8.995463	1.024791	7.970672	.1139231	.3375249	.1139231
expectation	15.09528	4.521305	10.57397	.2995179	.5472823	.2995179
recovery	20.96691	.4343776	20.53253	.0207173	.143935	.0207173
loyalty	33.59317	14.73574	18.85743	.4386529	.6623088	.4386529
overall				.7543778		

mc = correlation between depvar and its prediction
mc2 = mc^2 is the Bentler-Raykov squared multiple correlation coefficient

Table 4.31 shows a summary of goodness of fit of model 1. This model is unreliable compard to model 2, the overall model 1 explains only 46% of the total variations and the residuals are relatively higher compard to those in model 2. The researcher chose model 2 which stratify the structural model by country. Previous results have consistently shown that the two sampled countries are non-homogenous groups.This justifies the country specific structural modelling.

Table 4. 32: Overall structural model 1 Goodness of fit

Equation-level goodness of fit

depvars	fitted	Variance predicted	residual	R-squared	mc	mc2
observed						
price	19.15363	.6169893	18.53664	.0322127	.1794789	.0322127
perception	10.65518	1.681218	8.973963	.1577841	.3972204	.1577841
satisfaction	14.27513	3.173109	11.10202	.2222823	.4714682	.2222823
quality	8.258477	.5366523	7.721825	.064982	.2549157	.064982
expectation	13.26662	1.052438	12.21418	.0793298	.2816554	.0793298
recovery	19.37745	.8089377	18.56852	.0417463	.2043192	.0417463
loyalty	36.28613	4.591304	31.69483	.1265306	.3557113	.1265306
adoption	9.652604	2.294159	7.358445	.2376726	.4875167	.2376726
overall				.4596144		

mc = correlation between depvar and its prediction
mc2 = mc^2 is the Bentler-Raykov squared multiple correlation coefficient

***Source**: Author*

4.5.8 Chapter Summary

The Chapter summarises the findings from structural equation modelling. The best fitting model was the one stratified by country. The model explains about 75% of the variation in adoption. The researcher deduced that Mozambique seed suppliers need to address seed recovery as it is impacting negatively on adoption of maize hybrid seed.

The study findings from cross tabulations and frequances have shown that there is a high prevalence of brand switchingbehaviour associated with low adoption. The perceptions of brand performance were varying by country and demographic characteristics

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1. INTRODUCTION

This chapter summarises the main findings of the study and also gives recommendations for further study. The study was analysing the impact of brand awareness on hybrid technology adoption. In relation to awareness and adoption mediation we discuss in summary the relationship and impact as shown below in the chapter.

5.2. MAIN FINDINGS OF THE STUDY

The study shows that you cannot have a general model for the different countries adoption is influenced by different mediating factors in each country. Therefore brand managers cannot have a one size fits all model they have got to go into the different countries and different districts even wards to find out what is really influencing adoption.

5.2.1 Positive mediation effect

In agreement as discussed in the literature by Adeleke, (2012:12) quality has a tendency of increasing awareness which in turn increase adoption since the farmers will be motivated by good seed quality.

5.2.2 Mozambique

In Mozambique, improving seed quality is more likely to increase attraction of small scale farmes to purchase hybrid seed and therefore increase seed adoption.

1. Awareness -> Quality -> Adoption [both $p \leq 0.001$, accepted], Mozambique

5.2.3 Zimbabwe

In Zimbawe, awareness can be increased by raising brand perception, satisfaction and quality as well. A marketing strategy aiming to raise perception , satisfaction, and quality attracts more hybrid seed users. Thus perception , satisfaction, and quality are important mediating variables and this is supported with results of table 4.29 showing high percentage of variation in adoption explained by the mediating variables.

1. Awareness -> Perception -> Adoption [both p≤0.037, accepted], Zimbabwe
2. Awareness -> Satisfaction -> Adoption [both p≤0.018, accepted], Zimbabwe
3. Awareness -> Quality -> Adoption [both p<0.037, accepted], Zimbabwe

5.3 NEGATIVE MEDIATION EFFECT

On the other hand low adoption in each country was explained by negative coeffiecients, thus negative mediation associated with reduction in adoption level.

5.3.1 Mozambique

In Mozambique only recovery has a high negative impact on hybrid maize seed adoption, thus some seed suppliers are associated with poor customer care such that maize seed customers receive little or no attention when they need help. The customer may be suffering, receiving defacted seeds with poor germination which cannot be refunded at all. Such poor customer management has a significant cost on adoption. This can be proven by the fact that Mozambique has been dependent on donor seed where there was a lot of fake seed in put on the market. Farmers then will want to deal with a reliable company able to compensate when poor seed lands in their hands.

1. Awareness -> Price -> Adoption [1st p=0.03, 2nd p=0.325, partially accepted],Mozambique
2. Awareness -> Expectation -> Adoption [1st p=0.690, 2nd p=0.952, failed], Mozambique
3. Awareness -> Recovery -> Adoption [1st p<0.001, 2nd p=0.011, accepted],Mozambique*
4. Awareness -> Loyalty -> Adoption [1st p<0.550, 2nd p=0.723, failed], Mozambique

5.3.2 Zimbabwe

Poor quality is associated with low adoption (Alwi, 2009). Thus in Zimbabwe small scale farmers are experiencing poor quality services. More should be done by Zimbabwe seed suppliers to meet a high standard of quality services to increase adoption as increasing quality increases awareness and in turn adoption (Venkatesh and Zhang, 2010:5-25).

Farmers are more sensitive to quality there has been a decline in quality since the land reform came into effect.

1. Awareness -> Price -> Adoption [1st p=0.03, 2nd p=0.325, partially accepted], Zimbabwe
2. Awareness -> Quality -> Adoption[both p<0.037, accepted], Zimbabwe
3. Awareness -> Loyalty -> Adoption [1st p<0.550, 2nd p=0.723, failed], Zimbabwe

5.4 STRUCTURAL MODELS

In Chapter 4 we observed that the overall prevalence of brand switching by small scale farmers was 80.8% (n=298). Structural modeling mediation effects were varying in causal route, suggesting adoption variations and mediation instability. The researcher employed two different model structures namely the crude and stratified country specific model. The country specific model had the best accuracy and performance. In this context the crude structural model explained 46% of variation of adoption behaviour among the small scale farmers; the variation explained confirms positive relationships between awareness and adoption of hybrid maize seed (Venkatesh and Zhang, 2010:67; Borges and Lansink, 2016:89-96)

Previous researches by Venkatesh, Thong and Xu, (2012:36) show consistency with this study findings. The results supported the hypothesis that there was a statistically significant (p<0.001) relationship between brand awareness and maize seed hybrid technology adoption. The overall structural model shows several causal paths with direct causal effects, reflecting the impact of brand awareness on adoption of hybrid maize seed by small scale farmers. This means improving awareness eventually improves use of improved hybrid seed among small scale farmers in Mozambique and Zimbabwe. This finding diverges from the findings of Venkatesh and Zhang (2010:55) in the US, but confirms results from Chu (2013:56) in Zambia and Gupta (2009:32) in Korea. The overall picture is shown by analyzing the whole sample without splitting by country. Even after splitting the analysis by country adoption is influenced by brand awareness, of course with specific intermediating variables differing by country possibly because of observed differences in education levels between the two countries.

The stratified model approach best explained differences in existence as described by other researchers from different countries like China (Lu, Yu & Liu 2009:12; Jordan

(AbuShanab & Pearson 2009:45), and Taiwan (Wang et al. 2010:80). The study results show that brand awareness had a significant positive impact on hybrid maize seed adoption. Mediating variables are of great significance for this relationship to hold.

5.5 RECOMMENDATIONS

1. Zimbabwean policy makers need to formulate quality insurance policies to safe guard small scale farmers from low quality supplies
2. The Mozambiquan policy makers need to formulate and enforce security measures of good customer recovery
3. Both Mozambique and Zimbabwean government need to monitor and evaluate the reasons of high brand switching and then educate small scale farmers accordingly
4. Private seed sector need to prepare and focus on improving brand recovery and quality.

5.6 CONCLUSION

The overall prevalence of brand switching was 298 (80.8%) among small scale farmers since year 2012 to 2015. More brand switching was in Mozambicans 87.5 % (n=161) compared to Zimbabweans 74.05% (n=137). From this study we observed that Increasing Brand awareness increases the likelihood of hybrid seed maize adoption. In common for both Zimbabwe and Mozambique, the advantages of hybrid maize seed adoptionis best achieved by strategies that prioritize improving the quality of seed. The quality of seed was the major alarming negative and positive predictor of low hybrid seed maize technology adoption among small scale farmers. On the contrary, among Mozambicans, recovery of lost value through supplier stands out as a negative predictor of low adoption. Several mediation factors differ in significance of their effects by country. For Zimbabwe, perception and satisfaction level had a significant effect on hybrid seed maize technology adoption whilst the same were not significant in Mozambique. Thus different countries behave different in terms of adoption behaviour. Therefore technology adoption strategies have got to be country specific. This leads to the need for further research that includes more districts per country covering more southern African countries in order to get a representative idea of how brand awareness positively influences hybrid seed maize adoption by small scale farmers. Adoption of

hybrid seed maize technology by small scale farmers will lead to improved yields and subsequent food security at household level.

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APPENDIX I:QUESTIONNAIRE

Maize Seed Hybrid Technology Adoption Household Survey

Introduction (interviewer):

"Good morning/afternoon. My name is …… We are conducting a survey on maize seed to learn how small scale farmers make seed buying decisions in this region. Your name will not appear in public. Your answers will not affect any benefits or subsidies you may receive now or in the future. Should we take a few minutes of your time?

Household questionnaire

Date completed: (D)..... (M).....2016

SECTION A

Please mark the most appropriate description with an X

1. **Gender**

Male	Female
1	2

2. **Your age**

26-35	36-45	46-55	56-60	>60
1	2	3	4	5

3. **Marital Status**

Married	Never married	Widower	Widow	Separated
1	2	3	4	5

4. **Education Level**

Never attended	Primary school	Secondary	Tertiary

school		high school	
1	2	3	4

5. **Household Head**

Male Adult (>18years)	Female Adult (>18years)	Male Child (< 18 years)	Female Child (< 18 years)
1	2	3	4

SECTION B

6. **After School have you ever studied farming?**

Yes	No
1	2

7. **Cereal crops produced**

Maize	Sorghum	Millet	Finger millet	Wheat	Other
1	2	3	4	5	6

8. **Farming experience in years**

0-3	4-10	11-15	16-20	>20
1	2	3	4	5

9. **Area operated in hectares**

5-50	60-150	160-250	260-500	>500
1	2	3	4	5

10. **Average seed quantity planted per hectare in Kg**

0-50	51-100	110-150	160-250	>250
1	2	3	4	5

SECTION C

11. **From whom do you purchase maize seed?**

Co-operative	Agent	Seed company representative	Others
1	2	3	4

12. **Which 3 maize seed brands are you aware of?** (fill in the order mentioned from most preferred to least preferred)

…….	…….	…….	……..
1	2	3	4

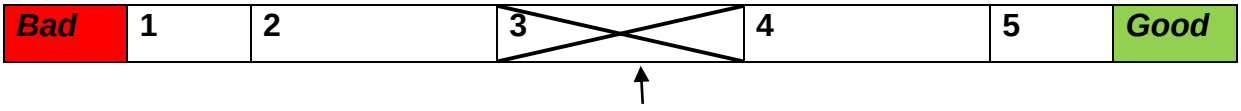
13. **Which seed brand have you been using regularly?** _____.
14. **Did you ever change the maize seed brand to another brand from 2012 to date?**

Yes	No
1	2

15. **If YES, in 14 above, Why did you switch to another maize seed brand**

_____

16. **Please describe the *General* seed industry, their products and services by placing X on the most appropriate number at each of the scales below for an illustrated below:**



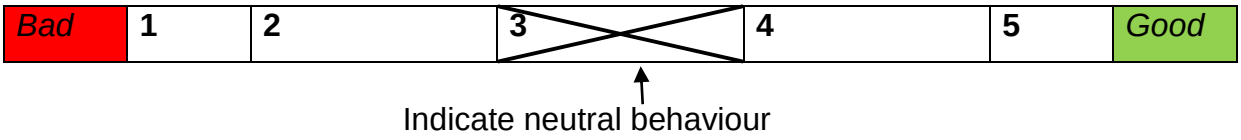
Indicate neutral behaviour

How I perceive the seed industry in general *[1-2 perception]*							
1	The seed industry does not understand my farming needs.	**1**	**2**	**3**	**4**	**5**	The seed industry understands my farming needs.

2	The seed industry do not play an important role in my business.	**1**	**2**	**3**	**4**	**5**	The seed industry play an important role in my business.
How I perceive the seed company from which I buy, agents & distributors *[3-4 perception]*							
3	Provide slow service.	**1**	**2**	**3**	**4**	**5**	Provide fast service.
4	Do not provide services specific to my needs.	**1**	**2**	**3**	**4**	**5**	Provide services specific to my needs.
Who influences my buying decision *[5-7 adoption]*							
5	My family do not play any role in my seed purchasing decision.	**1**	**2**	**3**	**4**	**5**	My family play any role in my seed purchasing decision.
6	Agricultural organisations where I am a member, do not play a role in my seed purchasing decision.	**1**	**2**	**3**	**4**	**5**	Agricultural organisations where I am a member, play a role in my seed purchasing decision.
7	I do not use the same seed to follow other farmers in my area.	**1**	**2**	**3**	**4**	**5**	I use the same seed to follow other farmers in my area.
How do I feel about different seed brands *[8-10 loyalty]*							
8	When my preferred brand is not available I will take time before buying other brands.	**1**	**2**	**3**	**4**	**5**	When my preferred brand is not available I will quickly buy other brands.
9	I do not always buy the same brand of maize seed.	**1**	**2**	**3**	**4**	**5**	I always buy the same brand of maize seed.
10	I like to test new maize seed brands.	**1**	**2**	**3**	**4**	**5**	I only purchase reputable maize seed brands.

SECTION D

17. **Please describe the your current seed brand of choice, its related products and services by placing X on the most appropriate number at each of the scales below for an illustrated below:**



Regarding expectations							
1	Rarely meet my expectations.	**1**	**2**	**3**	**4**	**5**	Always meet my expectations.
2	The seed distributors / Agents rarely fulfil their function well.	**1**	**2**	**3**	**4**	**5**	The seed distributors / Agents always fulfil their function well.
3	Does not offer benefits expected.	**1**	**2**	**3**	**4**	**5**	Offers benefits expected .
4	Support does not meet my interests.	**1**	**2**	**3**	**4**	**5**	Support matches my interests.
5	Not associated with effectiveness and efficiency.	**1**	**2**	**3**	**4**	**5**	Associated with effectiveness and efficiency.
Regarding perceptions							
6	Does not increase my maize yield production.	**1**	**2**	**3**	**4**	**5**	Increase my maize yield production.
7	Does not increase the quality of output of my Yield.	**1**	**2**	**3**	**4**	**5**	Increase the quality of output of my yield.
8	Do not provide good technical / agronomic services.	**1**	**2**	**3**	**4**	**5**	Provide good technical / agronomic services.

9	Do not provide me with good information about their products.	**1**	**2**	**3**	**4**	**5**	Provide me with good information about their products.
10	Is unpleasant to do business with.	**1**	**2**	**3**	**4**	**5**	Is pleasant to do business with.
Regarding recovery							
11	Not always reachable when I have a problem.	**1**	**2**	**3**	**4**	**5**	Always reachable when I have a problem.
	No provision to conduct and return seed if I buy the wrong seed.	**1**	**2**	**3**	**4**	**5**	Have a provision to conduct and return seed if I buy the wrong seed.
13	Do not quickly attend to my needs.	**1**	**2**	**3**	**4**	**5**	Quickly attend to my needs.
14	Do not properly handle my complaints.	**1**	**2**	**3**	**4**	**5**	Properly handle my complaints.
15	Do not accept defaults return.	**1**	**2**	**3**	**4**	**5**	Accept default returns.
Regarding Adoption							
16	My family do not play any role in my seed purchase decision.	**1**	**2**	**3**	**4**	**5**	My family play a role in my seed purchase decision.
17	Agricultural organisations where I am a member, do not play any role in my seed purchase decision.	**1**	**2**	**3**	**4**	**5**	Agricultural organisations where I am a member, play a role in my seed purchase decision.
18	I do not use the same seed to follow other farmers in my area.	**1**	**2**	**3**	**4**	**5**	I use the same seed to follow other farmers in my area.

19	Advertisements do not influence my seed purchase decision.	**1**	**2**	**3**	**4**	**5**	Advertisements influence my seed purchase decision.
20	I do not necessarily purchase the cheapest fertiliser.	**1**	**2**	**3**	**4**	**5**	I purchase the cheapest fertiliser.
21	I buy seed not because of the support from the seed company.	**1**	**2**	**3**	**4**	**5**	I buy seed because of the support from the seed company.
Regarding price							
22	The maize seed suppliers do not understand my farming needs.	**1**	**2**	**3**	**4**	**5**	The maize seed suppliers do understand my farming needs.
23	Maize Seeds are not reasonably priced.	**1**	**2**	**3**	**4**	**5**	Maize Seeds are reasonably priced.
24	The maize seeds do not have good value for money or profit	**1**	**2**	**3**	**3**	**5**	The maize seeds have good value for money or profit
25	The maize seed supplier does not a direct impact in the profitability of my business.	**1**	**2**	**3**	**4**	**5**	The maize seed supplier has a direct impact on the profitability of my farming business.
26	I do not think that at the current price, maize seeds provide good value or profit	**1**	**2**	**3**	**4**	**5**	At the current price, maize seeds provide good value or profit
Regarding satisfaction							
27	I do not think that I did the right thing when I used this	**1**	**2**	**3**	**4**	**5**	I think that I did the right thing when I used this

	brand.						brand.
28	I do not believe that using this brand is usually a very satisfying experience.	**1**	**2**	**3**	**4**	**5**	I believe that using this brand is usually a very satisfying experience.
29	I am not very satisfied with my decision to use this brand.	**1**	**2**	**3**	**4**	**5**	I am very satisfied with my decision to use this brand.
30	My choice to use this brand has not been a wise one.	**1**	**2**	**3**	**4**	**5**	My choice to use this brand has been a wise one.
31.	This brand does not satisfy my needs.	**1**	**2**	**3**	**4**	**5**	This brand does a good job of satisfying my needs.
Regarding quality							
32.	I am uncertain if I will buy from them again.	**1**	**2**	**3**	**4**	**5**	I am certain that I will buy from them again.
33.	Do not provide me with good information about their products.	**1**	**2**	**3**	**4**	**5**	Provide me with good information about their products.
34.	Do not visit my farm.	**1**	**2**	**3**	**4**	**5**	Visit my farm regularly.
35.	Do not provide me with after sales services.	**1**	**2**	**3**	**4**	**5**	Provide me with after sales services.
26.	Is rigid to do business with.	**1**	**2**	**3**	**4**	**5**	Is flexible to do business with.
37.	Supply low quality products at a competitive price.	**1**	**2**	**3**	**4**	**5**	Supply high quality products at a competitive price.
38.	Does not value me as client.	**1**	**2**	**3**	**4**	**5**	Value me as a client.
39.	Does not deliver my products.	**1**	**2**	**3**	**4**	**5**	Deliver my products.
Regarding loyalty							
40.	I do not consider myself	**1**	**2**	**3**	**4**	**5**	I consider myself loyal to

	loyal to this brand.						this brand.
41.	I do not consider this is the only brand of this product I need.	**1**	**2**	**3**	**4**	**5**	I consider this is the only brand of this product I need.
42.	I do not buy this brand whenever I can.	**1**	**2**	**3**	**4**	**5**	I buy this brand whenever I can.
43.	I do not buy as much of this brand as I can.	**1**	**2**	**3**	**4**	**5**	I buy as much of this brand as I can.
44.	This is the one brand I would not prefer to buy or use.	**1**	**2**	**3**	**4**	**5**	This is the one brand I would prefer to buy or use.
45.	I would not go out of my way to use this brand.	**1**	**2**	**3**	**4**	**5**	I would go out of my way to use this brand.
46.	If this brand was not available, it would make little difference to me.	**1**	**2**	**3**	**4**	**5**	If this brand was not available, it would make little difference to me.
Regarding awareness							
47.	I have no opinion about this brand.	**1**	**2**	**3**	**4**	**5**	I have an opinion about this brand.
48.	I have not heard of this brand.	**1**	**2**	**3**	**4**	**5**	I have heard of this brand.
49.	I am not aware of this brand.	**1**	**2**	**3**	**4**	**5**	I am aware of this brand.
50.	I do not frequently think of this brand.	**1**	**2**	**3**	**4**	**5**	I frequently think of this brand.
	I do not know what this brand stands for.	**1**	**2**	**3**	**4**	**5**	I know what this brand stands for.

18. Do you grow hybrid maize seed?

Yes	No
1	2

19. State the name of your current seed brand, which you described above……

20. According to you, what is the single most important key success factor for maize hybrid seed adoption? -

_____

THANK YOU FOR PARTICIPATING IN THIS STUDY

APPENDIX II:SEM TABLES

Table 4. 33: General seed industry: Item analysis for generation of construct scores

Country	Construct	Item loadings	Cronbach's alpha
Mozambique	Perception	Item 3(.51)	.75
		Item 4 (.51)	
Zimbabwe	Perception	Item 3 (.62)	.78
		Item 4 (.62)	
Mozambique	Adoption	Item 6 (.59)	.74
		Item 7 (.59)	
Zimbabwe	Adoption	Item 5 (.60)	.75
		Item 6 (.60)	
Mozambique	Loyalty	Item 9 (.51)	.74
		Item10 (.51)	
Zimbabwe	Loyalty	Item 9 (.66)	.71
		Item10 (.66)	
Mozambique	Expectation	Item 1 (.65)	.79
		Item 2 (.49)	
		Item 3 (.74)	
		Item 4 (.83)	
		Item 5 (.65)	
Zimbabwe	Expectation	Item 1 (.61)	.80
		Item 2 (.66)	
		Item 3 (.65)	
		Item 4 (.64)	
		Item 5 (.71)	

Source: *Author*

Table 4. 34: Brand of choice: Item analysis for generation of construct scores

Country	Construct	Item Loadings	Cronbach's Alpha
Mozambique	Expectation	Item 1 (.65)	.79

		Item 2 (.49)	
		Item 3 (.74)	
		Item 4 (.83)	
		Item 5 (.65)	
Zimbabwe	Expectation	Item 1 (.61)	.80
		Item 2 (.66)	
		Item 3 (.65)	
		Item 4 (.64)	
		Item 5 (.71)	
Mozambique	Perception	Item 6(.44)	.73
		Item 7 (.51)	
		Item 8 (.41)	
		Item 9 (.40)	
		Item10 (.43)	
Zimbabwe	Perception	Item 6 (.69)	.79
		Item 7 (.75)	
		Item 8 (.60)	
		Item 9 (.62)	
		Item10 (.58)	
Mozambique	Recovery	Item11 (.58)	.78
		Item12 (.74)	
		Item13 (.59)	
		Item14 (.81)	
		Item15 (.55)	
Zimbabwe	Recovery	Item11 (.70)	.84
		Item12 (.74)	
		Item13 (.74)	
		Item14 (.71)	
		Item15 (.62)	
Mozambique	Adoption	Item17 (.72)	.78
		Item18 (.72)	
Zimbabwe	Adoption	Item16 (.60)	.75
		Item17 (.60)	
Mozambique	Price	Item23 (.59)	.74

		Item24 (.59)	
Zimbabwe	Price	Item22 (.62)	.80
		Item23 (.62)	
		Item24 (.52)	
		Item25 (.55)	
		Item26 (.51)	
Mozambique	Satisfaction	Item27 (.40)	.76
		Item28 (.73)	
		Item29 (.53)	
		Item30 (.66)	
		Item31 (.55)	
		Item32 (.66)	
Zimbabwe	Satisfaction	Item27 (.81)	.90
		Item28 (.67)	
		Item29 (.79)	
		Item30 (.76)	
		Item31 (.82)	
		Item32 (.74)	
Mozambique	Quality	Item34 (.59)	.74
		Item35 (.72)	
		Item36 (.69)	
Zimbabwe	Quality	Item34 (.71)	.80
		Item35 (.77)	
		Item36 (.70)	
Mozambique	Loyalty	Item40 (.68)	.88
		Item41 (.71)	
		Item42 (.56)	
		Item43 (.75)	
		Item44 (.81)	
		Item45 (.71)	
		Item46 (.85)	
		Item50 (.54)	
Zimbabwe	Loyalty	Item40 (.62)	.83
		Item41 (.75)	
		Item42 (.66)	

		Item43 (.60)	
		Item44 (.60)	
		Item45 (.58)	
		Item46 (.42)	
		Item50 (.67)	
Mozambique	Awareness	Item48 (.70)	.76
		Item49 (.70)	
Zimbabwe	Awareness	Item48 (.77)	.82
		Item49 (.77)	

***Source**: Author*

Table 4. 35: Awareness construct equation levels

Standardized	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Structural						
price <-						
awareness	.185538	.0681639	2.72	0.006	.0519393	.3191368
_cons	4.834085	.4858692	9.95	0.000	3.881799	5.786371
perception <-						
awareness	.4011616	.073882	5.43	0.000	.2563556	.5459676
_cons	3.669243	.5826225	6.30	0.000	2.527324	4.811163
satisfaction <-						
awareness	.4750772	.0748613	6.35	0.000	.3283518	.6218027
_cons	4.077314	.6592174	6.19	0.000	2.785272	5.369357
quality <-						
awareness	.2502878	.0414684	6.04	0.000	.1690112	.3315644
_cons	1.676275	.2320284	7.22	0.000	1.221507	2.131042
expectation <-						
awareness	.281382	.0597061	4.71	0.000	.1643601	.3984038
_cons	3.32845	.3896562	8.54	0.000	2.564738	4.092162
recovery <-						
awareness	.1993356	.054487	3.66	0.000	.092543	.3061282
_cons	2.507488	.2967661	8.45	0.000	1.925838	3.089139
loyalty <-						
awareness	.3535507	.065783	5.37	0.000	.2246183	.4824831
_cons	3.00885	.436521	6.89	0.000	2.153284	3.864415
var(e.price)	.9655756	.025294			.9172515	1.016446
var(e.perception)	.8390694	.0592772			.7305729	.9636785
var(e.satisfaction)	.7743016	.0711298			.6467197	.9270523
var(e.quality)	.937356	.0207581			.8975413	.978937
var(e.expectation)	.9208242	.0336005			.8572683	.989092
var(e.recovery)	.9602653	.0217224			.9186202	1.003798
var(e.loyalty)	.8750019	.0465153			.7884224	.971089

***Source**: Author*

Table 4. 36: Awareness construct equation levels by country

Standardized	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Structural						
price <-						
awareness						
Mozambique	-.1818317	.061713	-2.95	0.003	-.302787	-.0608764
Zimbabwe	.4370954	.0670553	6.52	0.000	.3056694	.5685214
_cons						
Mozambique	9.305676	.5962932	15.61	0.000	8.136963	10.47439
Zimbabwe	2.605958	.4625713	5.63	0.000	1.699335	3.512581
perception <-						
awareness						
Mozambique	.0569047	.054097	1.05	0.293	-.0491234	.1629328
Zimbabwe	.6126665	.112251	5.46	0.000	.3926585	.8326745
_cons						
Mozambique	8.446711	.691917	12.21	0.000	7.090578	9.802843
Zimbabwe	1.499773	.7250757	2.07	0.039	.0786502	2.920895
satisfaction <-						
awareness						
Mozambique	.1537649	.0798154	1.93	0.054	-.0026704	.3102002
Zimbabwe	.6832245	.1074044	6.36	0.000	.4727157	.8937333
_cons						
Mozambique	8.226665	1.189843	6.91	0.000	5.894616	10.55871
Zimbabwe	1.935249	.8052491	2.40	0.016	.3569893	3.513508
quality <-						
awareness						
Mozambique	.1801	.0544983	3.30	0.001	.0732852	.2869148
Zimbabwe	.3375249	.0594663	5.68	0.000	.2209731	.4540768
_cons						
Mozambique	2.493222	.3767885	6.62	0.000	1.75473	3.231714
Zimbabwe	1.678105	.2950758	5.69	0.000	1.099767	2.256443
expectation <-						
awareness						
Mozambique	-.0258448	.0647114	-0.40	0.690	-.1526769	.1009872
Zimbabwe	.5472823	.0954519	5.73	0.000	.3602	.7343646
_cons						
Mozambique	5.185835	.4348209	11.93	0.000	4.333601	6.038068
Zimbabwe	1.877425	.6168444	3.04	0.002	.6684323	3.086418
recovery <-						
awareness						
Mozambique	.3278437	.0653701	5.02	0.000	.1997207	.4559668
Zimbabwe	.143935	.066759	2.16	0.031	.0130899	.2747802
_cons						
Mozambique	3.026928	.5021733	6.03	0.000	2.042686	4.011169
Zimbabwe	2.305561	.3468389	6.65	0.000	1.625769	2.985353
loyalty <-						
awareness						
Mozambique	.0593128	.0993365	0.60	0.550	-.1353832	.2540087
Zimbabwe	.6623088	.0539608	12.27	0.000	.5565475	.76807
_cons						
Mozambique	4.334984	.6535869	6.63	0.000	3.053977	5.615991
Zimbabwe	2.071528	.4882023	4.24	0.000	1.114669	3.028387
var(e.price)						
Mozambique	.9669372	.0224428			.9239357	1.01194
Zimbabwe	.8089476	.0586191			.7018421	.9323982
var(e.perception)						
Mozambique	.9967619	.0061567			.9847676	1.008902
Zimbabwe	.6246397	.1375449			.4056916	.9617521
var(e.satisfaction)						
Mozambique	.9763564	.0245456			.9294139	1.02567
Zimbabwe	.5332043	.1467627			.3108875	.9145006
var(e.quality)						
Mozambique	.967564	.0196303			.9298442	1.006814
Zimbabwe	.8860769	.0401427			.8107906	.968354
var(e.expectation)						
Mozambique	.999332	.0033449			.9927976	1.00591
Zimbabwe	.7004821	.1044783			.5229241	.9383296
var(e.recovery)						
Mozambique	.8925185	.0428624			.8123423	.9806078
Zimbabwe	.9792827	.0192179			.9423315	1.017683
var(e.loyalty)						
Mozambique	.996482	.0117838			.9736517	1.019848
Zimbabwe	.5613471	.0714774			.4373673	.7204713

Source: *Author*

Table 4. 37: Overall impact of brand awareness on hybrid maize seed adoption

Standardized	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Structural						
price <-						
awareness	.1794789	.0683718	2.63	0.009	.0454726	.3134851
_cons	4.871204	.4872255	10.00	0.000	3.91626	5.826149
perception <-						
awareness	.3972204	.0740667	5.36	0.000	.2520523	.5423885
_cons	3.687964	.5838578	6.32	0.000	2.543624	4.832304
satisfaction <-						
awareness	.4714682	.0750949	6.28	0.000	.3242849	.6186515
_cons	4.094519	.6607639	6.20	0.000	2.799446	5.389592
quality <-						
awareness	.2549157	.0413235	6.17	0.000	.1739231	.3359082
_cons	1.654832	.2314292	7.15	0.000	1.201239	2.108425
expectation <-						
awareness	.2816554	.0599919	4.69	0.000	.1640735	.3992373
_cons	3.323116	.3906971	8.51	0.000	2.557364	4.088868
recovery <-						
awareness	.2043192	.0551084	3.71	0.000	.0963087	.3123297
_cons	2.488255	.3001811	8.29	0.000	1.89991	3.076599
loyalty <-						
awareness	.3557113	.0659775	5.39	0.000	.2263978	.4850248
_cons	2.987714	.4368704	6.84	0.000	2.131464	3.843965
adoption <-						
price	-.030657	.0593668	-0.52	0.606	-.1470137	.0856997
perception	.3244834	.0971708	3.34	0.001	.1340321	.5149346
satisfaction	.2870248	.0787324	3.65	0.000	.1327121	.4413375
quality	-.0120925	.069943	-0.17	0.863	-.1491782	.1249932
expectation	.0973681	.0801321	1.22	0.224	-.0596879	.2544241
recovery	.0205253	.0634854	0.32	0.746	-.1039038	.1449545
loyalty	-.0504496	.0724537	-0.70	0.486	-.1924563	.0915572
_cons	.9964308	.4216534	2.36	0.018	.1700054	1.822856
var(e.price)	.9677873	.0245426			.9208606	1.017105
var(e.perception)	.8422159	.0588416			.7344362	.9658126
var(e.satisfaction)	.7777177	.0708097			.6506115	.929656
var(e.quality)	.935018	.021068			.894624	.9772359
var(e.expectation)	.9206702	.0337941			.8567615	.9893461
var(e.recovery)	.9582537	.0225194			.9151175	1.003423
var(e.loyalty)	.8734694	.0469379			.7861519	.9704853
var(e.adoption)	.7623274	.0469182			.6756994	.8600616

Source: *Author*

Table 4. 38: Impact of brand awareness on hybrid maize seed adoption by country

Standardized	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Structural						
price <-						
awareness						
Mozambique	-.1818317	.0617136	-2.95	0.003	-.3027881	-.0608753
Zimbabwe	.428846	.0670685	6.39	0.000	.2973941	.560298
_cons						
Mozambique	9.305676	.5962987	15.61	0.000	8.136952	10.4744
Zimbabwe	2.661247	.4626454	5.75	0.000	1.754478	3.568015
perception <-						
awareness						
Mozambique	.0569047	.0540975	1.05	0.293	-.0491244	.1629338
Zimbabwe	.6081013	.1132827	5.37	0.000	.3860713	.8301313
_cons						
Mozambique	8.446711	.6919234	12.21	0.000	7.090566	9.802856
Zimbabwe	1.517657	.7288323	2.08	0.037	.0891723	2.946142
satisfaction <-						
awareness						
Mozambique	.1537649	.0798161	1.93	0.054	-.0026719	.3102016
Zimbabwe	.6794056	.1085327	6.26	0.000	.4666855	.8921258
_cons						
Mozambique	8.226665	1.189854	6.91	0.000	5.894594	10.55874
Zimbabwe	1.948325	.810028	2.41	0.016	.360699	3.535951
quality <-						
awareness						
Mozambique	.1801	.0544988	3.30	0.001	.0732842	.2869157
Zimbabwe	.354687	.0593546	5.98	0.000	.238354	.4710199
_cons						
Mozambique	2.493222	.376792	6.62	0.000	1.754723	3.231721
Zimbabwe	1.621638	.2969603	5.46	0.000	1.039607	2.203669
expectation <-						
awareness						
Mozambique	-.0258448	.064712	-0.40	0.690	-.152678	.1009884
Zimbabwe	.55079	.0970274	5.68	0.000	.3606199	.7409602
_cons						
Mozambique	5.185835	.434825	11.93	0.000	4.333593	6.038076
Zimbabwe	1.855566	.6252546	2.97	0.003	.6300896	3.081042
recovery <-						
awareness						
Mozambique	.3278437	.0653707	5.02	0.000	.1997195	.455968
Zimbabwe	.1474553	.0677179	2.18	0.029	.0147307	.2801798
_cons						
Mozambique	3.026928	.502178	6.03	0.000	2.042677	4.011178
Zimbabwe	2.288743	.3509798	6.52	0.000	1.600835	2.976651
loyalty <-						
awareness						
Mozambique	.0593128	.0993374	0.60	0.550	-.135385	.2540105
Zimbabwe	.6723253	.0550418	12.21	0.000	.5644454	.7802052
_cons						
Mozambique	4.334984	.653593	6.63	0.000	3.053965	5.616003
Zimbabwe	2.013655	.4987787	4.04	0.000	1.036066	2.991243
adoption <-						
price						
Mozambique	.1006614	.1029917	0.98	0.328	-.1011986	.3025213
Zimbabwe	-.108507	.0714654	-1.52	0.129	-.2485765	.0315625
perception						
Mozambique	.2531743	.1059086	2.39	0.017	.0455974	.4607513
Zimbabwe	.2905597	.1751921	1.66	0.097	-.0528104	.6339298
satisfaction						
Mozambique	.3163492	.1180202	2.68	0.007	.0850338	.5476646
Zimbabwe	.3025403	.1066501	2.84	0.005	.0935098	.5115707
quality						
Mozambique	.0682753	.0992453	0.69	0.491	-.1262419	.2627925
Zimbabwe	-.0641488	.1200631	-0.53	0.593	-.2994681	.1711706
expectation						
Mozambique	-.002431	.1055715	-0.02	0.982	-.2093473	.2044854
Zimbabwe	.22911	.1298249	1.76	0.078	-.025342	.4835621
recovery						
Mozambique	-.2175179	.0857842	-2.54	0.011	-.3856518	-.0493841
Zimbabwe	.2156358	.0866271	2.49	0.013	.0458498	.3854218
loyalty						
Mozambique	-.0319952	.090313	-0.35	0.723	-.2090054	.145015
Zimbabwe	-.0377267	.1118145	-0.34	0.736	-.2568791	.1814257
_cons						
Mozambique	-.1304202	1.25166	-0.10	0.917	-2.58363	2.322789
Zimbabwe	1.026041	.481427	2.13	0.033	.0824613	1.96962
var(e.price)						
Mozambique	.9669372	.022443			.9239353	1.011941
Zimbabwe	.8160911	.0575242			.7107872	.9369958
var(e.perception)						
Mozambique	.9967619	.0061568			.9847675	1.008902
Zimbabwe	.6302128	.1377747			.4105829	.9673278
var(e.satisfaction)						
Mozambique	.9763564	.0245458			.9294134	1.02567
Zimbabwe	.538408	.1474754			.3147449	.9210098
var(e.quality)						
Mozambique	.967564	.0196305			.9298439	1.006814
Zimbabwe	.8741972	.0421046			.795449	.9607413
var(e.expectation)						
Mozambique	.999332	.0033449			.9927975	1.00591

Source: *Author*

APPENDIX III: LANGUAGE EDITOR DECLARATION

DECLARATION

I, C Vorster (ID: 710924 0034 084), Language editor and Translator, and member of the South African Translators' Institute (SATI member number 1003172), herewith declare that I did the language editing of the mini-dissertation of mr John L. Makoni (Student nr 24954500) from the North-West University.

Title of the mini-dissertation: Analysing brand awareness pertaining to seed adoption by small-scale farmers

C Vorster

5 Dec 2016

C Vorster | Date