CONFLUENCE OF COMPETITIVE FORCES AND TECHNOLOGY ADOPTION PREDICTORS IN DETERMINING ADVANTAGEOUS PRODUCTS BY FOOD PROCESSING MICRO AND SMALL ENTERPRISES IN KENYA

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DECLARATION

Declaration by the candidate

This thesis is my original work and has not been presented for award of a degree in any other University or for any other award.

______________________________ 15th day of October,2016

Omillo Francis OkumuB301/1945/P/13 **Date**

Declaration by the supervisors

We confirm that the work reported in this thesis was carried out by the candidate under our supervision and has been submitted with our approval as university supervisors.

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DEDICATION

To Father and Mother

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I feel indebted to many people who helped me go through this long but insightful process of learning. You deserve thanks for your support towards completion of this thesis without losing my mental health. This thesis is what it is because of tireless scholarly guidance of Prof.Ng’ang’aS.I andDr. Faith Maina, my supervisors. Special thanks goes to Prof.Ng’ang’a, who believed in me since the start of the course and never gave up on me even when I was drifting away.You are endowed with unique styles of helping and motivating people – I am grateful.Sincere thanks goes to Dr.Maina for the valuable comments regarding my thesis. Thank you for giving me the opportunity to learn from you wonderful academic writing skills. I wish to appreciateKaratina Universityfor offering me a chance to undergo this course, too. I thank the 2013/2014 PhD class members who encouraged me to move on even when the study seemed extremely hard. The respondents who answered all kinds of strange questions, I say thanks. Thank you, Charles Aloo,for hosting me throughout my study period in Central Kenya. I also thank my beloved family: my wonderful parents Carol and Leonida and my lovely wife Mary, my children Laura and Deusdedit for standing with me throughout this journey.

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ABSTRACT

Kenyan food products are underperforming because of inadequate value addition andlow technology uptake in the highly competitive global environment. In this vein the studyinvestigated the influence of bargaining power of buyers, bargaining power of suppliers and rivalry among competitorson agro-food processors to produce advantageous product. It also determined how the agro-food processors' perception of 'easy to use,' 'usefulness' and behaviouralintention to use technology influencedproduction of advantageous product. Thirdly the survey determined the extent to which the confluence of Porter's three forces and Davis' Technology adoption predictors influenced production of advantageous product. Finally the study compared technology adoption propensity in agro processing between urban and rural enterprises. The study's conceptual framework was anchored on a hybrid of Porter's and Davis models to explain the Micro and Small agro-food processors' perceptions on the industry's competitiveness and technologies likelihoods to leverage on efficiency and profitability.Mixed research methods were used to collect data from 132 Micro and Small entrepreneurs manufacturing food in Busia and Nairobi Counties on Likert Scale questionnaires and interview schedules. The Cronbach's alpha found reliability of questionnaires to be 0.97, an excellent internal consistency of the items in instrument**.** Due to weak information management system of agro-food processors in Busia County, snowballing sampling techniques was used. Fisher sampling techniques formula at standard normal deviate of 1.96 was used on Nairobi County Government given its numerous food manufacturing enterprises.Data analysis by Binomial Logistic Regression (Logit) model showed that (1) Michael Porter's three competitive forces significantly influenced advantageous products (*Wald (1) =41.475, p=.000, sig<.05, 2-tailed)* and rivalry from incumbent competitors n=130(98.5%) being the most influential (2) the three of Davis technology adoption predictors had significant influence on production of advantageous product (*Wald(1) = 41.475, p= .000, sig < .05, 2 tailed*) with perceived technology ease of use being inversely related to advantageous product; (3) confluence of the three of Porter's competitive forces and three of Davis predictors significantly influenced the designand production of advantageous product by micro and small agro-food processors(*Wald tests (1) = 41.475, p = .000, sig <0.05, 2 tailed)*; (4) Mann-Whitney U statistics demonstrated that there was no statistically significant difference in technology adoption anxiety among rural and urban agro-food processors*(Mann-Whitney U*=722.2, *p=0.465813, sig≥.05, 2-tailed)*; and (5) capital, repairs, expense on electricity and high costs of production were the biggest challenges in technology adoption among the food processors. The study recommends that stakeholders in agro industry should help the MSEs adopt technology frontiers, economic agglomeration models, entrepreneurial training and innovative financing methodologies that have lowest transaction costs and are MSE-focused. It also recommends that a food and beverage administration authority be established to assist food manufacturers borrowing from France and Philippines models.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

According to the World Trade Report 2013, technology is a critical economic factor affecting international trade and determined fast growth in incomes from 19th to 21st century. It was also confirmed by The World Bank (2007) that technology, among other sets of factors, was a predictor of competitiveness. Recent decades have witnessed a paradigm shift in economic development as a consequence of differences in technology adoption. Industrial revolution set the technological innovation into a radical process which formed the basis of world economy (techno-economy) today and placed countries on different levels of development. No enterprise can claim leadership at marketplace unless it recognizes technology in a world of galloping changes which creates new problems, risks and opportunities(Okpara, 2007).

Schumpeterian and Neo-Schumpeterian studies observed technology as engine of competitiveness that rejuvenated and redefined companies for the new markets(Furtado, 1961). Today, many countries are struggling to define their comparative economic development and advantage by enhancing propensity to accumulate new scientific knowledge and its application to solve practical problems(Cassiolato & Soares, 2014). Brazil, Russia, India, China and South Africa (BRICS) are emerging strongly to be accumulating new scientific knowledge and its application to solve their problems causing a shrink in the distance between developed and developing nations, and causing investment, production and consumption to gradually move to the developing world (Coutinho, 2014). High-tech products are likely to grow quicker at 9% per annum than raw goods growth of 8% at the export market led by china accounting more than half of the market share, followed by Hong Kong, USA, Korea and Singapore due to their technological advantages by the year 2030 (WTO, 2013).The importance of technology in economic transformation, growth and long-run cyclical character of technical change has led governments and firms seek to establish policies and programs that guide and stimulate technology adoption. As recommended by WTO (2013), incorporating and using new knowledge and improving quality in food value chainis critical to enhance resilience of MSES in a g globally competitive landscape.

Many development agencies have desired to put African countries on same growth rate such as the one observed in Asian countries so as to raise living standards of its people who desperately need it(World Bank, 2007). In economies where agriculture is the mainstay, heavy investments have been done by firms and governments to enhance innovative performance in value addition and ensure that products meet the quality and quantity demanded by internal and external markets. The causes of relatively slow speed of growth of Kenya's economy are multifaceted and can be attributed to high production costs, high costs of credit, competition from imported goods, scarcity of exports of high tech goods and slow-down in productivity in manufacturing sector declining to 3.1% from 3.5% between the years 2011 and 2012(Kenya National Bureau of Statistics, 2013). According to the Kenya Economic Survey2013, food industry is on the decline. Kenya's position in the global market is worsened by the competition of substitute food products from European, China and East Asia countries.Kenya seems destined to lose the struggle because it cannot take advantage of the “mechanisms of endogenous growth based on technological learning and innovation”(Annunziata & Martucci, 2008).

The Kenyan economy is in cognizance of this fact and is struggling to recover its position in a model of value-addition and industrializing agriculture with dependency on inventions among MSEs in agro-food processing sector which is the sector that offers the greatest opportunities for Kenya to compete in quality and productivity(GoK, 2007). Since technology increases both competitiveness of companies and workers productivity, the opportunities that technologies would offer agro-food processing MSEs cannot be wished away. The attitude of Micro and Small Enterprises (MSEs) towards technology can improve their market position by developing high-value added, knowledge-intensive and nutritious foods that fulfil both internal and external market demands. Several efforts have been done by international organizations for developing countries such as Kenya to facilitate technology adoption and transfer for farming and post-farming processes so as to realize economic and social development(Regnier, 2009).

In Kenya, these innovation systems targeted Micro, Small and Medium Enterprises (MSME) through National Science and Technology Council, Kenya Industrial Research and Development Institute (KIRDI), Kenya Bureau of Standards (KEBS) and Kenya Institute of Property (KIPPI) though poorly coordinated(Republic of Kenya, 2012). It was also observed that adoption rate among micro and small scale agro-food processors is still low (Nteere, 20120).Rural set ups such as Nyanza and Western Kenya; agro-food processing is very scarce(Mwangi & Mugenda, 2013). Posho mills are the commonest technology used to mill grains and tubers into flour used at home. They are as common as in every village and for ages these food processing enterprises have remained the same. However, they neither add value nor pack products for better markets. Other food technologies are milk dairies which hoard and preserve milk, cold storages to preserve fish and bakeries that bake bread, cakes and snacks. Butcher and butchery shops have the same trend of technology and processes. In sugar belt in western Kenya, micro and small sugar products processors have mushroomed with very little advancement.

1.2 Statement of the Problem

Various economic ingredients and how they are coordinated play critical role in MSE's achieving advantageous products(Muturi, 2015). However, the intersection and interaction of such competitive forces(porters') and technology determinants among micro and small enterprises in food value addition that yield advantageous product still remain a research gap to date (Okpara, 2007; Waldam 2007; Cassiolato&Soares, 2014). Innovative performance that predict advantageous products, according to CassiolatoandSoares (2014), depended on research and development findings and interaction among themselves, with other forces and all other forms by which they acquire, use and diffuse knowledge. In modern economy, technology has proved to offer solution to competition challenges that MSEs face(Chi & Sun, 2015), not as a straight forward process but as a buoyancy and complex amalgam of factors that determine technology acquisition and competitive market landscape(Smith & Keil, 2003).There was some consensus that motivation for technology use for advantageous product development stemmed from a combination of endogenous and exogenous factors, hence the need for expounding and developing a clear understanding of the interrelationships of the internal technological determinants and external competitive industry forces paradigmthat would predict MSEs' advantageous product in a globally competitive market(Badrinarayanan & West, 2010).

This study seeks to understand the relationship between Porter's Competitive forces (Bargaining power of buyers and suppliersand rivalry among existing competitors) and Technology Adoption forces (perceived ease of use, perceived usefulness and behavioural intention to use) and how they influence micro and small entrepreneurs' propensity to accumulate and use new knowledge in value-addition and improving quality in food for profitability and efficiency among MSEs in Kenya. Hence yield a strategic posture matrix that would help researchers and policy makers predict MSEsdesign advantageous products.

1.3 General Objective

Primarily the study investigates a combination of three competitive factors (buyers' bargaining power, suppliers bargaining power and rivalry among existing competitors) and three technology acceptance model predictors' (perceived ease of use, perceived usefulness and behavioural intention to use) influence on production of advantageous products (increased income, meeting market demands anddifferentiated products) among food processing MSEs inBusia and Nairobi, Kenya.

1.3.1 Specific Objectives

In order to yield more relevant results, the study broke the general objective into specific and more focused objectives (Hynes, 2006).

i) Investigate the influence of three of Porter's competitive forces (bargaining power of buyers, bargaining power of suppliers and rivalry among competitors) on agro-food processors to produce advantageous product (increased income, meeting market demandsand differentiated product).

ii) Find out how thethree of Davis predictors (“easy to use,” “usefulness” and behavioral intention to use) influenceproduction of advantageous product (increased income, meeting market demandsand differentiated product).

iii) Determine the extent to which a relationship of three of Porter’s competitive forces and three of Davis predictors (bargaining power of suppliers, buyers, threat of competitors, perceived ease of use, perceived usefulness and intention to use) influence production of advantageous product (increased income, meeting market demandsand differentiated product).

iv) Compare technology adoption in agro processing between urban-based and rural-basedMSEs.

1.4 Research Questionsand Hypothesis

In evidence-based research, it is advised that both research questions and supportive hypothesis be developed out of the objectives(Farrugia, Petrisor, & Bhandari, 2010).

1.4.1 Research Questions

Research question is an anticipatory statement of lessons to be learned at the end of the research program. Questions arose from knowledge deficit with the research area and are driven by the hypothesis rather than data (Farrugia et al., 2010). It enabled the study develop a single and substantiated argument to address the above objectives. The study asked the following questions:

i) To what extent did the three of Porter's competitive forces (bargaining power of buyers, bargaining power of suppliers and rivalry among competitors) influence agro-food processors to produce advantageous product (increased income, meeting market demands and differentiated product)?

ii) To what extent did the three of Davis predictors ("ease of use," "usefulness" and Behavioral intention to use) influence production of advantageous products (increased income, meeting market demands and differentiated product)?

iii) What relationship of Porter's competitive forces and Davis predictors(bargaining power of suppliers, buyers, threat of competitors, perceived ease of use, usefulness and intention to use) influence production of advantageous product (increased income, meeting market demands and differentiated product)?

iv) How is technology adoption by urban-basedMicro and Small agro-food processing enterprises different from rural-based agro-food processing enterprises?

1.4.2 Hypothesis

Hypothesis is a scientifically reasonable prediction framed in if-then sentences in certain logical forms(Saranavel, 1987). In this instance, the hypothetical position is that *if micro and small agrofood processingenterprisescombined Porter's and Davis' forces, then they would quickly embrace right value addition systemsthat produce products thatincreased income, satisfiedmarket(external and internal) demands and unique products*. The hypothesis was tested in a null format.

$H0_1$: The three of Porter's competitive forces (bargaining power of buyers, bargaining power of suppliers and rivalry among competitors) does not significantly influence agro-food processors to produce advantageous product (increasing income, meeting market demands anddifferentiated product).

H_{02}:The three of Davis predictors (“ease of use,” “usefulness” and intention to use) has no significant influence on production of advantageous product (increased income, meeting market demands and differentiated product).

H_{03}:The three of Porter’s competitive forces (bargaining power of suppliers, buyers and threat of competitors) and Davis predictors (perceived ease of use, usefulness and behavioural intention to use) hasno significant influence on the production of advantageous product (increased income, meeting market demands and differentiated products).

H_{04}: There is no significant difference in technology adoption between urban-based and rural-basedagro-food processing MSEs in Kenya.

1.5 Significance of the Study

Overwhelming evidence have proved that stepping up agricultural production and processing was the best way for a country like Kenya to escape the bondage of poverty and hunger as contemplated in the Millennium Development Goals (MDG)(Mwita, 2013). The use of technology is therefore urgently required to increase the productivity so as to meet the increasing demand of food for rapidly growing populations in internal and external market (Karki & Bauer, 2004). Ignoring technology adoption inagricultural value chain is likely to escalate rural poverty.

Agriculture is one of the biggest contributors to Kenya's source of employment for more than half of the rural population and Gross Domestic Product (GDP) growth(GoK, 2015). Many a times, its products are traded at village markets in raw value with minimal primary processing. Hence its pay back to the farmer and the economy is minimal because of weak and traditional technologies that are active at domestic frontiers(Prahalad, 2006). As a country, agriculture has been recognized as a key sector to make the economy grow at double digit. This has been demonstrated through Kenya Vision 2030, by the country's plan to industrialize agriculture and make it competitive and major foreign income earner. Increased value in agriculture by processing before marketing is one of the key projects in grand plan of the Kenya to make the economy grow by 10% and generate additional GDP of KShs. 80-90 billion (GoK, 2007).Technology therefore comes in handy in transforming the sector. Agriculture needs technological solutions to graduate itself from traditional subsistence farming to modern agribusiness to cushion peasant farmers from the exploitation of cartels and greedy middlemen and post harvest losses(Ndemo, 2013). Agro-food processors and fabricators of agro-food processing machines need to first transform their behaviour and attitude; appreciate the presence and make use of it to process their harvest, add value, pack and market their products competitively at the world market.

The perceived usefulness, ease of use and effectiveness are grounded on economic concept of neoclassic of perceived value (utility). The choice of technological utility grounds the study on modern economic thinking modelled with technology. Agro-food MSEs' perceived good and great values beyond production costs persuade them to rationally acquire technology for advantageous production. Some studies have vehemently criticized the model to be unrealistic, inflexible, rational and mathematical orientation to human behaviour. However,Davis' technology predictors have proved to be the most preferred theoretical framework to explain technology adoption and diffusion.

The study is also important because of its focus on product advantage that reflects market-oriented culture which leads to new product success and ultimate superior organization performance(Griffin & Hauser, 1992). A study on 126 Netherlands firms discovered that the market oriented culture prioritized profit and superior customer value which produced a sustainable competitive advantage(Langerak,Hultink & Robben,2004). The study suggested to MSEs in agro-food processing industry in Kenya like it deed to firm in the Netherlands the need for a strategic and technological anchorage in new product development that account for more revenue, superior value for customers and market information processing behaviour(Homburg & Pflesser, 2000).

This study is important because it incorporates technology adoption into competitive strategy; a deficiency observed in Porter's discourse(Senker, 1990). It discussed Porter's ideas on the technological dimensions of perceived usefulness, ease of use and intention to use. Market demand, especially from European Union, on agro-food products invoked need for useful framework that explained relationships between MSE food processors' competitors, suppliers and customers.Understanding Porter's bargaining power of buyers and bargaining power of suppliers is important because of their countervailing forces of competition on opposite sides of the market(Galbraith, 1963); that resulted in buyer-size discounts(NormannRuffle, & Snyder, 2005). Countervailing power was coined by Galbraith to explain how large buyers in concentrated downstream markets extracted price concessions from suppliers(Galbraith, 1952).The countervailing power offset suppliers' increased market power out increased concentration in U.S.A industries. In a competitive environment, firms are checked by other firms not to charge a higher-than-competitive price. The power of a single firm on one side of the market induced other forces on the other side of the market(Sawyer, 1979).

The study is also important because post farming sector forms an important indigenous asset in developing world due to its role in food security, employment creation, income generation and poverty alleviation in most of the developing countries.The focus on micro and small enterprises has been influenced by the transformation of micro-economic policies. These changes in policies have brought a global economic turnaround with a paradigm shift whichemphasized growth of micro and small enterprises. Worldwide, Micro and small scale sector is acknowledged for achieving broader developmental objectives, that is; poverty alleviation, economic development and the promotion of more democratic and pluralist society(Vandenberg, 2006). In Kenya, this has been occasioned by the prime importance MSEs play in generating employment, creating competition and fostering innovation(Ng'ang'a et al., 2014). In 2013, small firms employed 10,511.2 thousand people (82.52%) and in 2012, the sector employed 587.2 thousand people (89.7%) of all new jobs created(GoK, 2013).This significance to the national economy is furtherbeen recognized and documented in various studies(GoK, 1992; GoK, 2005).

The beneficiaries of this study will be the agro-food processors, policy makers, technology stakeholders and extension service providers. Agro-food processors will benefit from the study findings on the areas they needed to improve on in order to make the products advantageous. The policy makers will be able to make informed policies and effective legislative framework that would address both customers' and agro-food processors needs.Understanding the findings of the study will help technology stakeholder fabricate appropriate food innovation systems that would make MSEs in food industry competitive. Finally, the extension service provides would better understand the right strategies and programs to use to enhance technology uptake and making MSEs competitive in the domestic and export market due to the findings of the study.

1.6 Scope of the Study

The research studiedmicro and small agro-processing firms licensed by the county governments ofBusia and Nairobi. The study was conducted between April 2015 and May2016. The study further measured causal and correlation relationships of the competitive factors and predictors of technology adoption in the firms and then tested their significance levels on creating more income, designing unique products and meeting market demands. The study weaves in comparison of rural and urban orientation to industrialisation as a response to contextualisingentrepreneurship research.

1.7 Limitation of the Study

The study findings exclusively concentrated on micro and Small Enterprises in agro-food processing inBusia and Nairobi Counties. The findings may not apply to medium and large enterprises since their capacities are far away apart. The study did not include domestic agro-processing firms, too. It was also limited by deficiencies inherent in survey research designs. According to Babbie (2010), such deficiencies included inadequate logical systematic methods of generalization; controlled conditions of study and effect on subjects due to researcher's presence (placebo).

1.8 Operational Definition of Terms

This section defined the key terms used in the study as shown in table 1.

Table 1.1: List of Terms and Their Definitions

Key term	Definition
Competitive Forces	These are forces that make agro-food industry possess a sustained ability to profitability gain and maintain market share in domestic and foreign markets. They include bargaining powers of suppliers, bargaining power of buyers and rivalry by existing competitors (Porter 1985).
Bargaining powers of suppliers	According to Porter (1985),**Bargaining powers of suppliers** meant strength or weakness of influence the terms and conditions of transacting inputs i.e. labour, parts, raw materials and services to suppliers' favour. In the context of the study, it means the ability of those who provide labour, parts, raw materials and services tobring down prices and ultimately profits of food products.
Bargaining power of buyers	**Bargaining power of buyers** is the effect customers have on the profitability of the enterprise(Porter 1985). The study uses this concept to mean the influence customers' influence on price and profitability of food products produced by Kenyan MSEs.
Threat of existing competitors	**Threat of existing competitors,** according toPorter (1985), meant the intensity of competition and the extent to which the value created in the industry will be dissipated through head-to-head competition. The study uses the term to describe the influence of other agro-food processors on the price and profitability of food products produced by Kenyan MSEs.
Behavioural Intention	Behavioural intention (BI) to use technology means in this study the MSE's evaluative feelings (either positive or negative) about using food processing innovations for realizing a highly advantageous product. As coined by Davis (1989) BI is a product of Perceived ease of use(PEOU)and Perceived Usefulness (PU)
Perceived ease of use and usefulness	**Perceived ease of use** (PEOU)in the study refers to the degree to which an agro-food processor believes that using a particular food innovation system is free of physical and mental effortsand **Perceived Usefulness** (PU) is the degree to which an entrepreneur believes that using a particular innovation would enhance job performance (Davis 1989).
Advantageous products	Innovative output of value addition process characterized by **new unique products**, **increased income** and **meeting the demands of new markets(Author 2016)**.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section critically analysed summarised, classified and compared published knowledge from prior studies and theoretical articles on study variables. Despite giving a solid theoretical foundation to this study, literature review is chosen because it makes existing knowledge known and substantiates the availability of the research problem. It also helps in framing the valid research design and justifying the study as a true contributor to the body of knowledge(Levy & Ellis, 2006). In this chapter, the study discussed the general perspective and state of MSEs in agro-food processing worldwide and Kenya. Technology adoption and diffusion process in social systems, competitive and complementary forces were discussed before criticizing the gaps and summarizing the whole chapter.

2.2 Overview of Agro-food Industry

Agro food industry referred to a unit that adds value to agricultural products (food) by processing into products which are marketable or usable by enhancing shelf-life or by providing the link from farm to the market(The state of Gujarat, 2000). Worldwide technology through agro-processing has added value to agriculture, improved rural incomes, cut down on transport costs of high volume raw materials, created opportunities to use by-products(Shiribwa, 2013), improving food supplies through reduction in qualitative and quantitative farm losses and job creation.Consequently, it reduced rural urban migration, increased self-reliance by reducing imports, foreign exchange earnings through export of finished and semi-finished products and investment opportunities in rural and urban areas.According to FAO (1997), agro-processing is a subsector of manufacturing that add value to agricultural products. Agro-food processing is one of the eleven divisions (beverage, wood, paper, textile, tobacco, wearing apparel, rubber, leather, furniture, footwear and food) under agro-processing.

Agro-food industry anchored on technology has not only made France the best country in Europe and second in the world after USA, but the economic mainstay of the French with over 10,000 firms(97% of the Small and Medium Enterprises), a turnover of 163 billion Euros, employing 412,500 workers and exporting 35 billion Euros worth of processed food(FNAFI, 2011). France has been able to achieve this through heavily investing over 1.5 billion Euros in fostering innovation, technology, science and technology transfer. According to FNAFI (2012), France has established a *savairefare* of 10,000 researchers and technicians and agro-food related research organizations including French National Institute of Agriculture and Research (INRA), French National Centre for Scientific Research (NRS), French Food Safety Agency (AFSSA) among others coordinated by French Association for Technical Coordination in Agro-Food Industry (ACTI). France has also become an attractive location for highly active agro-food foreign firms like coca cola, Heineken, Ferrero etc accounting for 30% of agro-food output.

In Britain, a study was conducted on 8 top food enterprises and was discovered that competitive success in food retailing was due to technology mainstreamed as a business strategy. Technology had leverage on distribution, handling of food, collaboration with suppliers and manufacturing(Senker, 1988). The study also found out that food retailers adopted technology as a competitive strategy and engaged technical expertise to reduce risks that accompanied innovations. The study revealed that their products suffered imitation as soon as they were on the shelves.

According to Regnier (2009), among Least Developed Countries (LDCs), Asian SMEs led in technology-based agro-food processing whereas their African counterparts were still stuck in informal, micro-economic activities and missing link challenges. In southern Asia, processing technologies were appropriate, cheap and easy to maintain. These advances in technology have been enabled by a *network ofspecialized agronomic institutes*. Though agro-food processing firms dominate manufacturing industry in sub-Saharan Africa, studies have shown that agricultural production is at 6% and 4.5% processing is at primary level,(Statitistical, Economic and Social Research and Training Centre for Islam Countries, 2010). The study further showed that the firms contributed value-addition, employment to rural economies.

In South Africa, agro-food industry dominate agro-processing sector with an output of 42.4%; employing 31.3% and 36.6% value addition between the year 2006 and 2010(DAFF, 2013). Apart from Ganola and sunflower, most of agro processing (64-74) % is at primary level. Though there were large firms, South African Agro-processing is largely done by SMEs who couldn’t meet even the local demand due to inadequate finance, skills and government support. To alleviate the above challenges, the South African Department of Agriculture Forestry and Fisheries (DAFF) established an agreement with public sector stakeholders like DTI, and IDC to implement provincial plans. The South African Department of Agriculture Forestry and Fisheries (DAFF) hadalso developed M&E framework jointly with partners to regularly update information and research on the industry.

A study on nano-food small firms found out that world market had a highly competitive entrepreneurial and technological environment(Meigounpoory & Allahyary, 2014). The competitive market is so complex demanding special attention to the subject of technology so as to gain from the emerging business opportunities and survival in the competition arena. Like small fish in a big pond, small firms struggled to survive in a highly challenging, adverse and global scenario of Schumpeterian cyclical waves(Arroio & Scerri, 2014) which heightened clamour and taste for more value added by wealthier consumers and exposed small agro-food firms to a highly competitive and uncertain environment(Albisu,Meza & Laajimi, 2000). Conjoined with weak appropriate technologies, MSEs have failed to meet OECD market regulations that called for sanitary and quality controls as well as standard certifications(UNCTAD, 2001). Further, Nteere (2012) observed that most Kenyan MSEs manifest low productivity, poor quality, and few product varieties hence low competitiveness of their products. Consequently the MSEs have stunted at subsistence; low value adding activities with 70% employing only one staff and hardly graduating to medium and large scale (missing middle), if not dying before their third anniversary(Nteere, 2012).Instead of the small MSEs growing in size, they grew numericallywith higher the risks of failure(Bowen,Morara,& Mureithi, 2009; Ngugi, 2013).

According to Albisu et al., (2000), the unfolding trends have made agro-food firms change strategies for survival. They have shifted from a commodity oriented toa more differentiated and specific geographic origin products models. Studies have found out many models that enabled agro-food firms achieve competitive advantage and produce advantageous agricultural products at the specific geographic origin(Yu,Calzadilla, Lopez, & Villa, 2013).

2.3Competitive Models and Theories for Enterprises in Food Value Addition

Value addition refers to increasing the economic value and consumer appeal of an agricultural product(Suazet, 2009). The process aims at transforming the agricultural commodity into an advantageous product characterized by uniqueness, market orientation and higher income focus. According to Annunziata and Martucci (2008) andGoK (2007), value-addition is contemplated as means to unlock productivity and marketability problems in agriculture and a strategy to make Kenya a competitive, middle income country with improved quality of life of its citizenry by 2030.

Studies in designing advantageous products have revealed that price disadvantage, unfair competition of products from countries with government subsidy and perceived value determined product performance at the market place(Heap, 1989). Though prices played an important role, potential buyers were keen on functionality, image, quality and reliability. According to Heap (1989), sophisticated customers disregarded cheap selling price. Consumer support groups, legislation and bitter experiences influences buyers to disregard cheap products but consider the 'life-cycle cost,' that is purchase cost, operating costs, maintenance costs, consumable costs and other hidden costs. The study found out that establishing 'unique selling position by embracing innovation created novel products that addressed most of the factors. The process of innovation in agro-food processing term is called value addition. In this vein various studies have been advanced to understand value chain models that would deliver globally competitive food products that would improve the quality of life of the entrepreneur by more income.

2.3.1 The Theory of Economic Development

Also called the innovation theory was developed by Joseph Schumpeter. Economic development is a function of creative *destruction* and *new combinations*. The Schumpeterian innovation is an industrial mutation which revolutionizes the market structures by destroying old ones and incessantly creating new ones. Competition drives innovation but attracts a swarm of imitators (rivals) with investment and resultant boom. At a point of destroying original innovator's profit advantage, investment shifts causing the industry to shrink until the next innovation which includes coming up with new quality products new to customers, inexperienced new methods of production, exploring new virgin markets, conquering new suppliers, and organizational reengineering. Being a product of Marxism, Schumpeter confirms that firms in a competitive market could only survive by introducing new and efficient technologies. It states that the larger the barriers to technology adoption, the greater the investment a firm must make to adopt a more advanced technology to achieve advantageous products. Studies have proved that this accounts for USA's balanced growth, post-war Japanese development miracle and the disparities in various economic developments(Parente & Prescott, 1994).

2.3.2 The Porters Model

The drivers of the cyclical wave in the global market according to Porter, Brandenburge and Nalebuff (2004) are threat of entry, intensity of rivalry among existing competitors, pressure from substitute products, bargaining power of buyers, suppliers and complementary factors. The forces have been used as techniques for analyzingattractiveness, competition and profitability in every industry and every market. The five forces are summarized in the figure 2.1 below.

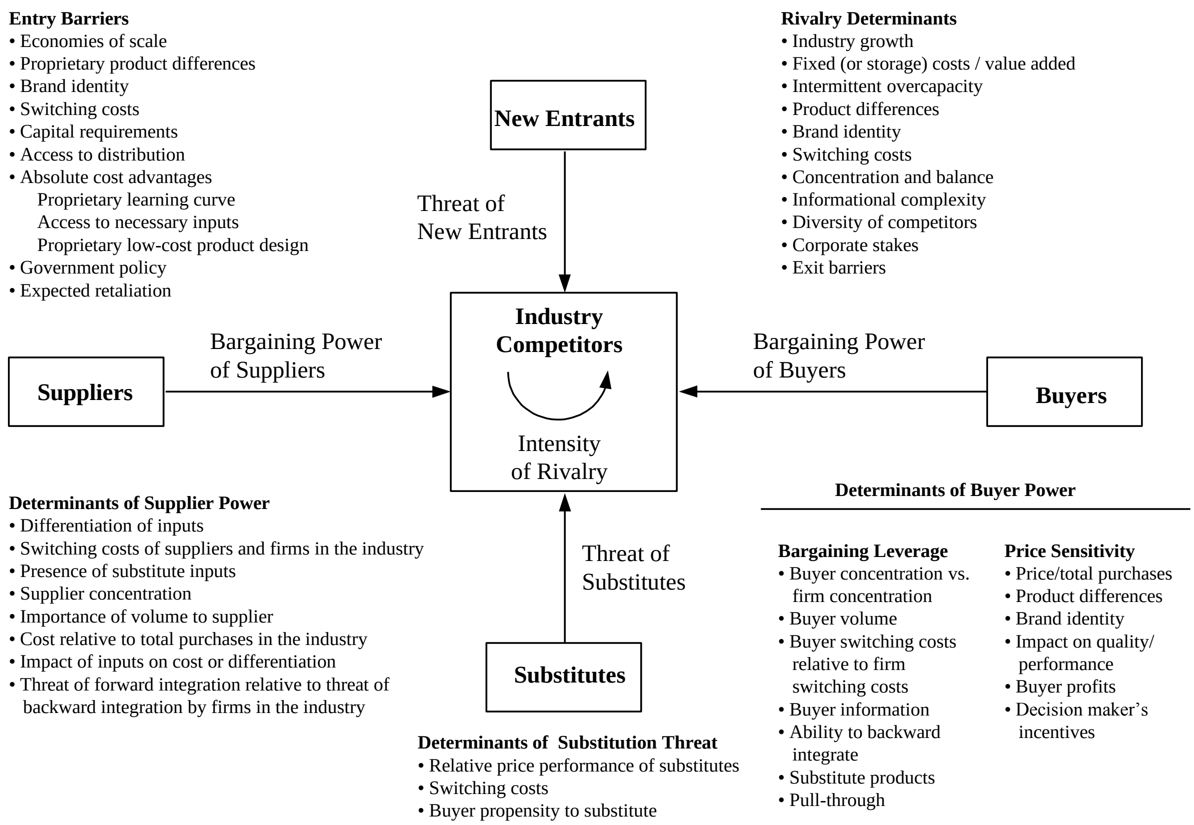


Figure2.1: Porter's Five Force Model
Source: Porter (1985)

The threat of new entries depended on the extent to which the barriers to entry existed. The competition in an industry heightened depending on demand to produce in large scale, product differentiation, large capital requirements, switching and employee retaining costs, access to distribution channels, cost disadvantages independent of scale and government policy framework, cost advantages of existing players due to experience curve effects of operation with fully depreciated assets, brand loyalty of customers, protected intellectual property rights like patents and licenses. Access to raw materials was controlled by existing players. According to Porter (1985), distribution channels were controlled by existing players who had close customer relations andhigh switching costs for customers. In such situations, new entrants could change major determinants of the market environment (e.g. market shares, prices, customer loyalty) at any time as well as the technology to address competition in internal and external market(Porter, 2004).

The Porter's model has been used by so many studies to analyze various industries. Progress,Whilhemia and Tarisai(2013) used this model to study 211 SMEs in Buffalo City. The study found out that technology insignificantly redefined SME competitiveness. A negative insignificant influence of the adoption and deployment of new marketing technologies on Porter's Five Competitive Forces was found. While studying the impact of competition on technology adoption, Copeland and Shapiro (2010) found out that competition was a key driver of the rate at which firms adopted technology.

In Pakistan, competitors' rivalry and buyers' bargaining power were found to be of most significant influence among mobile and telecommunication firms(Munir,Saddozzai, Khattak, & Hashim, 2011). In South Africa, a study on fruit and vegetable sellers at Natalspruit market found out that threat of new entrants, bargaining power of customers and rivalry among street traders had a significantly high impact as opposed to threat of substitutes which had a low impact. The findings on bargaining powers of suppliers were mixed. When suppliers were studied at Johannesburg Fresh Produce Market, the impact was high and when studied as a range of suppliers the impact was low(Ngiba,Dickinson, Whittaker& Beswick, 2009).

Studies by Galbraith (1963) discovered that competitors, customers and suppliers were the three most "*countervailing factors*" affecting the market equilibrium from both sides. In other words rivalry among competitors, bargaining power of suppliers and bargaining power of buyers stand out to be the most relevant in studying competition out of the Porter's five forces; hence the study making them the variables of choice.

However, Porter's model has some major limitations in today's market environment. First is the historical context in which it was developed. In the early eighties, when the model was designed, development was fairly stable and predictable, compared with today's dynamics and complexity in competition. Secondly, the model assumed a classic perfect, static and simple market structure which is a too narrow focus and bears the risk of missing important elements. Thirdly the model was competition based; firms achieved competitive advantages over others, suppliers and customers. The model did not consider strategies like strategic alliances, electronic linking of information systems of all companies along a value chain, virtual enterprise-networks among others. Finally, Senker (1990), observed two other deficiencies in Porter's competitive strategy framework. They included: (1) failure to appreciate the necessity for cumulative in-house technological competence and how each technological competence contributed to its value chain activities; (2) ignoring technology related risks and uncertainties that rose due to undertaking innovation. This study, therefore, filled the gaps in the Porter's model by combining it with technology acceptance model which influence technology usage, a modern engine for fast growing enterprises and economy today.

2.3.3 Porters Supply Chain Theory

Concerning value addition, Porter indirectly recognized value in products to be the buyer's motivation to pay for a price and value added to the product forms a basis for competitive advantage of a firm in the industry. Porter (1985) found that:

> Competitive advantage grows out of value a firm is able to create for its buyers that exceeds the firm's cost of creating it. Value is what buyers are willing to pay, and superior value stems from offering lower prices than competitors for equivalent benefits or providing unique benefits that more than offset a higher price. There are two basic types of competitive advantage: cost leadership and differentiation(P. 3).

The modified industry competitive forces and Value Chain concepts builds an exogenous-based framework that inform strategic investments and decisions. As observed by Porter (1985), value chain activities their systematic interactionsgave MSEs competitive advantage and differentiation. Studies in "value disciplines" have since then evolved to further explain constructs such as product leadership, operational excellence, and customer intimacy(Treacy & Wiersema, 1995). The theory propagates that for a product to be competitive, inputs have to pass through a transformative process of primary production, processing and marketing before reaching the final consumer(Porter, 1990). The process entails organized systems that enable coordination among agents, knowledge systems that combine information, skills and technologies. Finally the process should establish economic mechanisms that select product, technology and provide market access in lieu of cost benefits and consumer orientation in an efficient manner(Trienekens, 1999). According to Trienekens(1999), advantageous product could be achieved if individual firms in the production columns formed alliance or netchains that address consumer values i.e quality and safety.

In additionTrienekens(1999) advanced this theory to include environmental, technological, legal and social dimensions. Environmental dimension relates to managing the chains of production, trade and distribution of foods in an eco-friendly way with keen attention to biodiversity and landscape architecture. On the other hand, technological dimension entails use of technology, logistical systems and ICT to improve quality, performance and innovation for food products. Legal and social dimentions address legislative and agreed upon business practices in conventions and platforms concerning food products. Advantegious products also have to conform with social responsibility i.e people-planet-profit.

Entrepreneurial value chain concepts, as used in this context, referred to innovations that gave agro-food processed products the best fit in the internal and external markets. The innovation constructs are new process, new product and new market(Schumpeter, 1936). Porter’s differentiation then becomes a function of the way a firm's products are processed, developed and marketed to satisfy the buyer's tastes and preferences.Recent times have witnessed rapid change in competition from traditional sources of advantages characterized by price and quality, timing and know-how, creation of strongholds (entry barriers have fallen), and deep pockets to hyper competition described by intensified perfect competition, temporary profits.

2.3.4 Industrial District Model

This is a form of economic agglomeration through which firms with similar business activities in a geographical area better engage, link up and acquire a more adaptable production systems to changing markets(Piore & Sabel, 1984), by sharing knowledge and capabilities, and building upon existent externalities. The externalities that influence cluster formation most include regional distribution of specialized inputs; availability of local specialized labour; and uninterrupted flow of ideas and exchange of knowledge that promote technological spill over and growth(Marshal, 1920). The Industrial District Model was invented in Italy by Becattini to explain how cooperation and competition developed small firms and industries in a defined geographical environment (Becattini, 1987) and interacting with local suppliers and customers. Industrial district referred to a defined region with specialized agro-food firms' concentration. Competitiveness among the firms was determined by their level of networking and economic forces. The model has been used to new strategies that influenced regional development with a manufacturing acumen(Rosenfeld, 1995).

2.3.5 Industrial Cluster Model

It is an economic agglomeration of strongly interdependent firms that are engaged in similar production activities in a particular region founded on knowledge creation, exchange of business information, technological expertise, innovation and increasing returns(Krugman, 1991). It is also defined as a network of strongly interdependent firms in a value adding production chain that share knowledge and customers(Roeland & Hertog, 1999). According to Porter, a cluster is a group of interconnected companies and associate institutions that share a common geography, field and complementarities(Porter, 1998). A cluster is therefore made up of geographically close andrelated economic activities; and availability of co-located end-producers, suppliers, service providers, research laboratories, educational institutions and other specialized institutions. Whether initiated by public bodies (organic) or private firms (planned), clusters are meant to improve the firms' competitiveness by upgrade available skills, increase participants, business development, commercial cooperation, innovation and improvement of business environment(Solvell, 2008).

Recently cluster model has been diffused into agricultural systems to address globalization, high value and efficient production, distribution, packaging innovation. Producers, agribusiness and institutions engaged in the agro industry subsector are therefore concentrated in one area to form agro-based clusters build value networks addressing common challenges, reengineer new agricultural demands and fostering growth in agriculture(Galvez-Nogales, 2010). According to Yu et al., (2013) local and central government have appreciated agro-based clusters as valuable tools for linking agriculture to global value chains and therefore have variedly initiated agriculture-based agglomeration developments that include agribusiness complexes, agro-industrial parks, agri-export zones, export consortia of food and agricultural products, one-village-one-product and sub-national innovation system.

In china flower cluster in Chengong and vegetable clusters in Shouguang have proved to be an effective strategy of modernizing agriculture; scaling up production, industrializing agriculture (Zou & Liu, 2007), developing entrepreneurship among farmers, addressing agro-food consumption demands and market competition and rural development(Zheng

& Cheng, 2006). However the model suffers from lack of distinct regional characteristics which exposes the firms to over competition; lack of agricultural dragon head enterprises with strong market competitiveness and ability to organize other small scale farmers for market-oriented production; low level technological innovations; weak internal organization capability to create internal beneficial business environment(lack of cooperation among actors); difficulties in accessing finance from financial institutions(Cao,Zan, Chu, & Tang, 2010). According to Yu et al., (2013) the government and market systems played critical role in the formation and development of agricultural clusters in China through identifying and planning the distribution of advantageous agricultural products, readjusting crop farming structure, expanding production scale, introducing new technology, improving infrastructure for agricultural production, establishing agricultural “silicon Valley”, public-private collaboration and expanding market system.

2.3.6Product-specific Agro-food Industries Competitiveness

This model was used to study three small and medium agro-food industries that processed flour, pastry and wine in Aragon, Spain. According to Albisu et al., (2000), raw materials and their determinants, external business environment, internal firms’ conditions and product performance combined with cooperation and relationships among firms formed a scheme for competitiveness among agro-food industries as shown in figure 2.2.

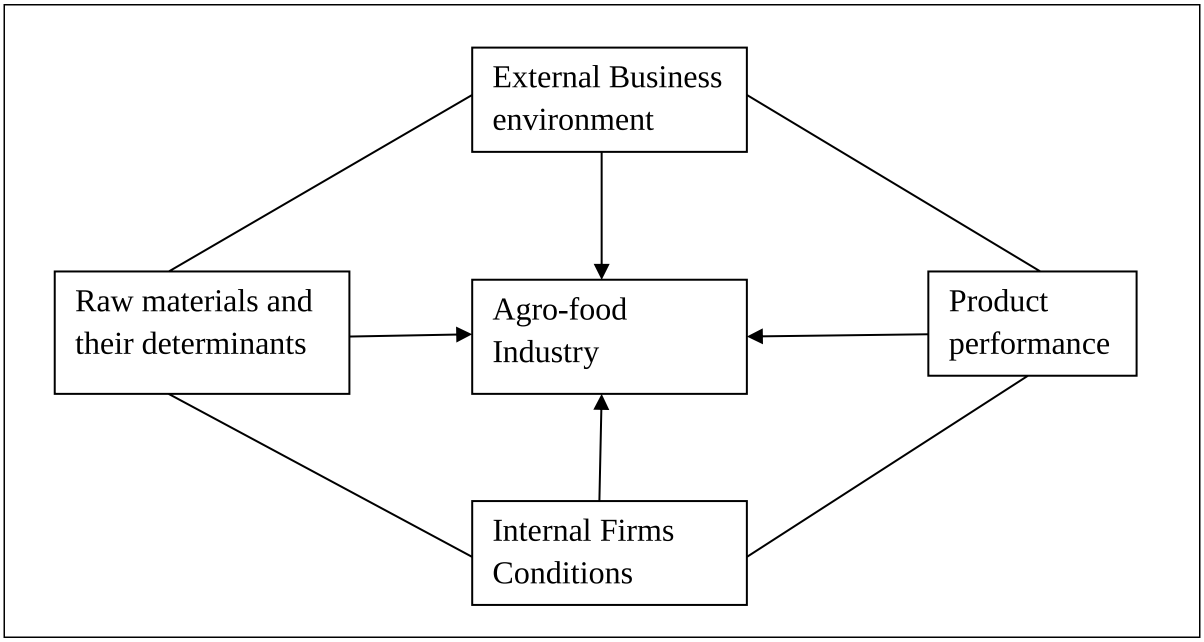


Figure 2.2: Competitive Focus for Agro-food Industries
Source: Albisu et al., (2000)

The figure 2.2 above demonstrates that raw materials and their determinants, external business environment, internal firm's conditions and product performance are predictors of the agro-food industry's ability to gain profitability and market share in domestic and foreign markets. The arrows indicate the direction of influence. Lines with no arrows show weaker linkages. The raw materials and their determinants include physical and human resource productive structures, water precipitation levels and quality. External business environment, on the other hand entails vertical integration and coordination of supply chain connections and competing agro-food industries outside the region. Internal firm's conditions are anchored on the skills of management and technological development that a firm has. Lastly, product performance is the outcome of the entire industry and is measured by its position in the local and international markets. The study found out that the kind of products they sell in the market was the most competitive.

2.3.7 French Filiere (Sub-sector) Approach

The approach analyzed commodity chains in France. According to this approach, a competitive and advantageous product is a function of a system of agents that provide insight into the sequential nature of the interconnected activities through the spatial mapping of the commodity flows(Jensen & Ponte, 2000). This approach suggests focus on actants that form global food value chain. Their effectiveness and efficiency as a system built the whole system resilience for MSEs.

2.4 Technology Adoption and Diffusion Theories and Models

Several theories and models including Roger's innovation theory, concerns-based adoption model, technology acceptance model, the United Theory among others have been advanced to explain and understand the process of knowing, accepting and spreading technology in social systems(Straub, 2009).

2.4.1 Diffusion of Innovations Model

It is also known as Roger's innovation theory. According to Rogers (2003), innovation is a newly perceived idea, practice or project that is created and conveyed through mass media and social process of interpersonal communication.Mass media channels such as TV, Radio or newspaper are effective for first time introduction of the innovation while interpersonal channels serve better at the initial stages of adoption. The theory explained diffusion in five stages which include knowledge, persuasion, decision, implementation and confirmation. The five stages are about uncertainty reduction through information seeking and understanding consequences of an innovation. Also called the innovation-decision process, it is a decision of full use of an innovation as the best course of action available and or rejecting it all together as in figure2.3.

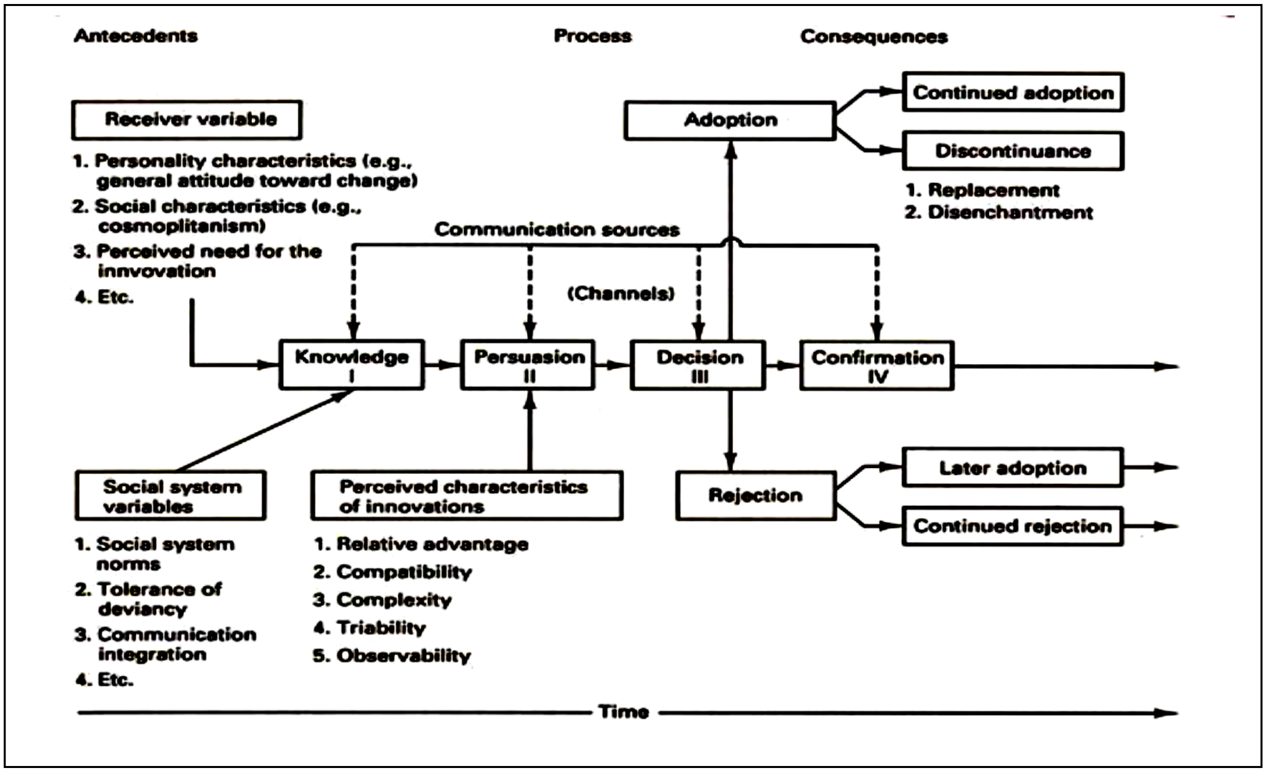


Figure 2.3: Diffusion of Innovations Framework
Source: Rogers (1995)

In attempt to describe how innovations diffuse, Rogers (2003) further observed an S-shaped five stage decision process through which one has to pass before adopting technology figure2.4.

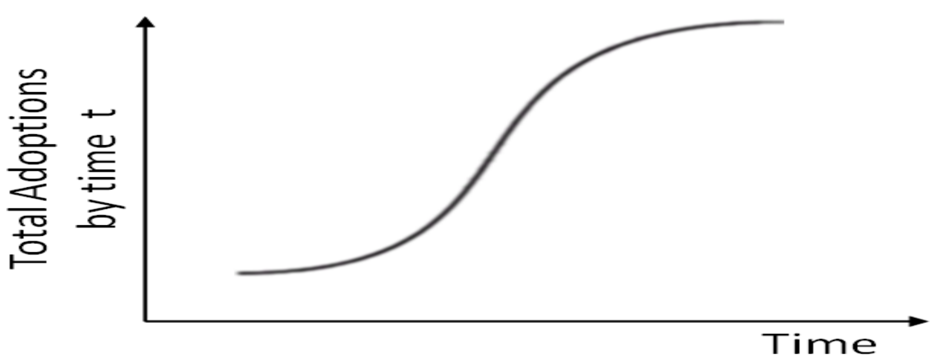


Figure2.4 S-Curve of cumulative Adoptions
Source: Rogers (2003)

The S-curve represents cumulative adoption on y-axis against time on the x-axis. The vertical lines and labels explain the groupings of adopters with top half being cumulative diffusion and bottom half being Gaussian of period addition. At early stage there is a patterned slow growth with an increasing change. Next is a decrease in rate of change until the curve levels off at some saturation level(Kemp & Volpi, 2008). This explains how new technologies take off by individuals being made aware of the new technologies and the way they respond with different propensities to adopt among peers within a given time frame(Grubler, 1998). According to Kempand Volpi (2008), the propensity to adopt technology is a function of both social pressure and individual variety.

The theory has been used for the last 30 years to explain factors that influence technology percolation among individuals in a social system(Bennett & Bennett, 2003). It has also been used to explain both unit level and industry level growth; how technologies move from initial market and spread to other regions against time(Wilson, 2012). Industry level diffusion is the consistent growth of technology installed in a firm in relation to the duration of the growth. Whereas unit level growth is the increase in the unit size of a technology following a lengthy formative phase of experimentation within many smaller scale units. The diffusion of innovations has demonstrated the role of relative advantage, compatibility, complexity, trialability and observability played in determining the relative speed with which an innovation is adopted by members of a social system(Rivera & Rogers, 2006). It has also been used to explain the buyer decision process and the designing advantageous products(Markides & Geroski, 2006). According to Markides and Geroski (2006), only few customers who form the initial market niche rush to buy new products due to technology enthusiasm whearas the mass market are keen on quality and price. They further observed that later majority prefered functionality and performance of the product. A customer would repeatedly buy a product the he percieved to be rich in quality, utility and with fair price.

This theory has been critiqued of its lineal orientation; portraying that diffusion follows an ideal straight forward trajectory from invention to commercialization is unrealistic(Baskerville & Prie-Heje, 2001). Instead there is interplay and continuity between material technology, expertise and practice which raptures into technological change(Dosi, 1988). According to Baskerville andPrie-Heje (2001), technology diffusion is a function of multiple determinants hence multiple trajectories.

2.4.2 Theory of Planned Behavior

The Theory of Planned Behaviour (TPB) states that attitudes, subjective norms and perceived behavioural control account for actual behaviour(Ajzen, 1995). Attitudes are evaluations (positive or negative judgments) on features of the behaviour whereas subjective norms mean perception of how other people may approve or disapprove behaviour. Behavioural control simply means self efficacy or own perception of the ability to perform the behaviour. This theory has been used to explain organization behaviour and human process and inform various technology adoption decisions(Lynne,Rahman, Casey& Hodges, 1995). TPB, for example, helped to explain the students' behavioural intension to enrolfor an online version versus a traditional classroom teaching of experimental psychology course(Robinson & Doverspike, 2006). It demonstrated that attitude and subjective norms directly influenced students' intention to register for an online course. However the theory has been criticized for failing to explain the nature of relation between the determinants and lack of evidence in predicting behaviour with precision in comparison with the limit of behavioural reliability.

2.4.3 Technology Acceptance Model (TAM)

In Technology Acceptance Model literature, technopreneurship intentions are influenced by user's motivations which are purely perceptions of ease or difficulty of performing the technology linked to actual behaviour to use technological innovation(Krueger,Relly& Carsrud, 2000). In 1989, Technology Acceptance Model (TAM) was proposed by Davis to explain the potential user's perceived Ease of Use (EU) and perceived Usefulness (U) and the dependant variable Behavioural Intention (BI). It is a process where perceived ease of use and perceived usefulness determined technology acceptance.

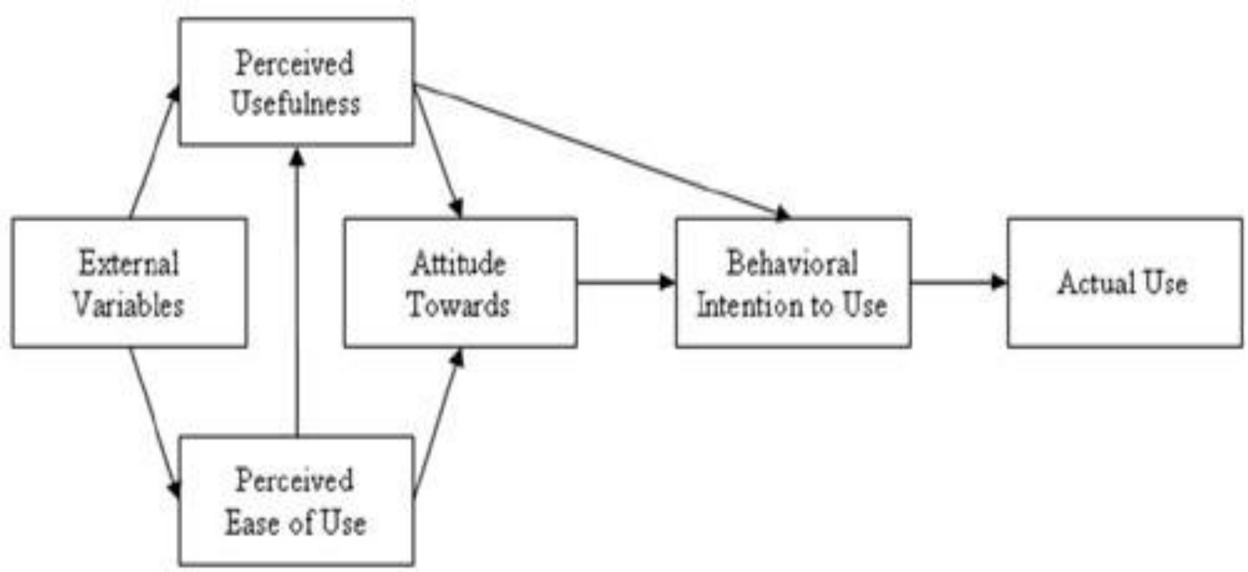


Figure2.5: TAM Model
Source:Davis (1989)

Since then TAM has gained popularity among various researchers to explain and predict system use, especially in ICT use. It was used in a study exploring students' acceptance of e-learning in Jordanian Universities, Korean Universities and Australian universities. In Jordan, TAM was found a useful theoretical model in predicting user's intention and user's perception of technology usefulness as the most important motivators(Al-Adwan,Al-Adwan, & Smedley, 2013). In Korea, 628 students' behavioural intention to use e-leaning were studied using Structural Equation Modelling (SEM) technique with LISREL program(Park, 2009). The Korean students' greatest motivator was found to be self efficacy and subjective norm as second. Almost the same study was done among 72 Australian students. Perceived Ease of Use (PEOU) had the strongest significant influence on Australian attitudes of system use. The study also found out that individual's characteristics significantly influenced the Australian teachers' propensity to include e-portfolio in the curriculum(Shroff,Deneen& Ng, 2011). All the three studies above agreed that TAM was a solid theoretical model that could be applied to any e-learning system contexts.

However TAM has been observed to be saturated and deficient of critical considerations. Self-reported data based on self perceptions instead of real actual use data was preferred by this model, for example. Such subjective measure exposed the model to unreliability(Chuttar, 2009). Secondly, TAM failed to explain reasons for perceiving technology systems useful. This caused revision of the model to include intention or willingness and actual use of technology which were significantly influenced by external factors(Fung, 2013) such as system experience, level of education and age (Burton-Jones & Hubona, 2006). Other external factors discovered include access to credit, education, extension services, high incomes (Karki& Bauer, 2004), education on technology (Gaig & Song, 2008), associations (Uaiene, 2011) internal administration, customer power, learning ability and normative pressures (Wu,Mhajan& Balasubramanian, 2003), pressure from family and friends, competitive pressure (Simpson, 2004), organizational characteristics and innovation awareness (Quaddus & Hofmeyer, 2007), management behaviour and government infrastructures (Cui,Zhang & Huang,2008), coercive factors like a firm making user base and referral champions (Shi,Shambare& Wang, 2008) and normative forces, managerial focus on efficiency and making the organization explained technology adoption among various sectors(Smith, Langlois& Lazau, 2009).Thirdly, poor relationships between Davis constructs, considering behaviour of technology use as terminal goal and excluding pertinent factors like voluntary environment, attitude, knowledge, evaluation and reflection formed weak theoretical foundation of Davis(Bagozzi, 2007).

Given the scepticism by various researchers,revision and extensions of the model have been suggested (Venkatesh & Davis, 1996) if illusions of TAM have to be contained(Benbasat & Barki, 2007). TAM model was discovered to be inadequate (Lapointe, 2006) and unreliable(Gururaj, 2013) especially when not corroborated with other specific exogenous factors. It is on this basis that the study improved the deficiency by combining it with Michael Porter’s competitive model. The study, therefore, was guided by a hybrid of Porter’s model and the Technology Acceptance Model’s (TAM) “perceived ease of use,” “perceived usefulness” and intention to use as determinants of technology acceptance by micro and small scale agro-food processing firms.

2.4.4 Complex Adaptive Systems (CAS)

This is a break away from the linear orientation of diffusion and a hybrid framework to map irregularities in diffusion(Bulte & Joshi, 2007). It was developed to explain multiplicity of factors that shape the process of diffusion; that diffusion has complex emergent attributes. Like a fitter system, diffusion of innovations generates order out of disorder(Rogers,Medina, Rivera,& Wiley, 2005). Uptake rate of technology depend on how innovation systems are made simple and part of the ecosystem. MSEs in agro-food industry could be helped acquire right food processing systems if they were made simple and compatible. The parts that made up the food value chain from the farm to the fork need to be interconnected to each other and the environment. This would subdue resistance from potential socio-cultural threats, common in rural agrarian communities.

2.4.5 The Model of Interessement

The term interessementis a French word meaning interposition. The theory maps out actors and studies how they influenced and imposed ideas upon others as well as describing how each element in turn forms part of another actor-network(Rhodes, 2009).It was used by Michael Callon to describe Actor- network theory and sociological transformation. An actor-network, according to Rhodes (2009), is a series of heterogeneous and interlinked elements (actors/actants) that explained organization of relations.According to this model, diffusion is a function of socio-technological network made up of objects and users, designers and decision and of socio-economic and technical relations. It is a bundle of links which unites the object to all those which handle it.

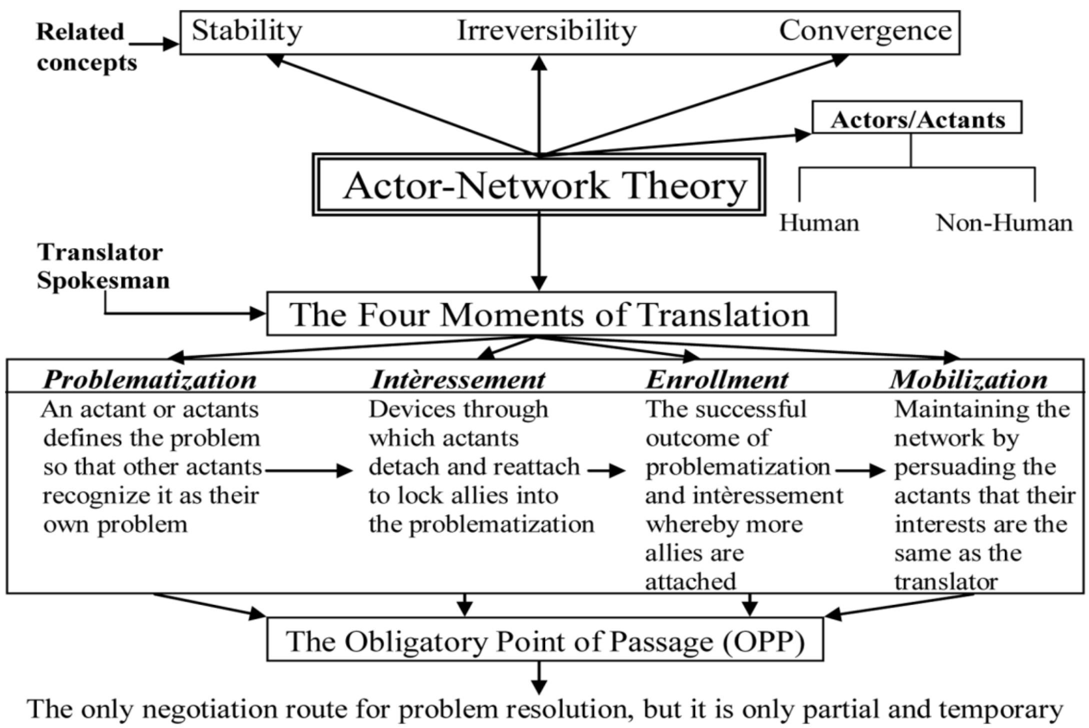


Figure2.6: ANT Key Concepts and Translation Moments
Source: Adapted from (Hassard, Law, and Lee, 1999; Callon, 1991, 1999; Latour, 1987).

According to the figure 2.6 innovation translates spatially and temporarily from its source to many other actors. The translation is a process of four moments which include problematisation, intressement, enrolment and mobilization(Latour, 1987). Problematisation entails indentifying similar actors and approaching them to join the network through alliances; cajoling and frightening. Interessement is a moment of convincing the actors to agree the definitions of the macro-actor, excluding dissenting voices, locking allies and attaching them to the common point of view. Enrolment, on the other hand, aligns purposes of entities, strengthens connections, maintains stability and enrols actors by humans and machines. Finally, mobilization is a moment that socially translates actors into commitment to the problematised cause of action and legitimizes the spokesperson to the associates.

The model of interessement sheds light on how innovation spreads and prospers in a social system. Innovation constantly looks for allies in an environment with vast number of actors who adopt, support and diffuse the innovation(Akrich,Callon & Latour, 2002). Innovation like an advantageous product; features like quality, price and uniqueness would speed up the innovation diffusion and persuade more and more customers like an infectious phenomenon. Each feature of the product attracts attention of different market segments and exacts the interessement process upon agro-food processors, customers, distributors among other actors.

2.4.6 The Viral-Epidemiological Model

Technological innovations diffuse in social systems like an infectious disease(Frey, 2008). Technology spreads when an infected person (adopter) is in contact with non-infected individuals (non-adopter). This theory, however, has been criticized for failing to explain the underlying economic behaviour and theoretical explanations to why other firms adopt technology faster than others. It assumes that all firms are homogeneous.

2.4.7 Game Theoretic Models

According to Brandenburger and Nalebuff(1995), the Game theory explains strategies that emphasize the importance of thinking ahead, thinking of the alternatives, and anticipating the reactions of other players in your "game" or industry. Payoff matrix, extensive form games, and the core of a game are key elements in ensuring innovations in conforming to marketing mix and regulatory obligations. This theory explains that thesuccess of a firm is predicted by competitors' reactions to its moves. By understanding competitor's dynamic, a firm realizes win-win strategies, earn a competitive advantage and change the rules of the game in the firm's favour (Brandenburger & Nalebuff, 1995). Various models have been advanced to discuss technology transfer based on the Game Theory. They include: stock-order effect and Rank effect.

According to the **Stock-Order Effect model** a firm can cause a business game change in its favour by comparing profits without and with adoption of innovations(Myerson, 1991). Under this theory, the present value of adoption is a function of the firm's order of adoption, relative to other firms. Early adopters enjoy first-mover advantages; that is greater profits that late adopters and can influence outcomes of other rival firms(Stoneman, 2001).

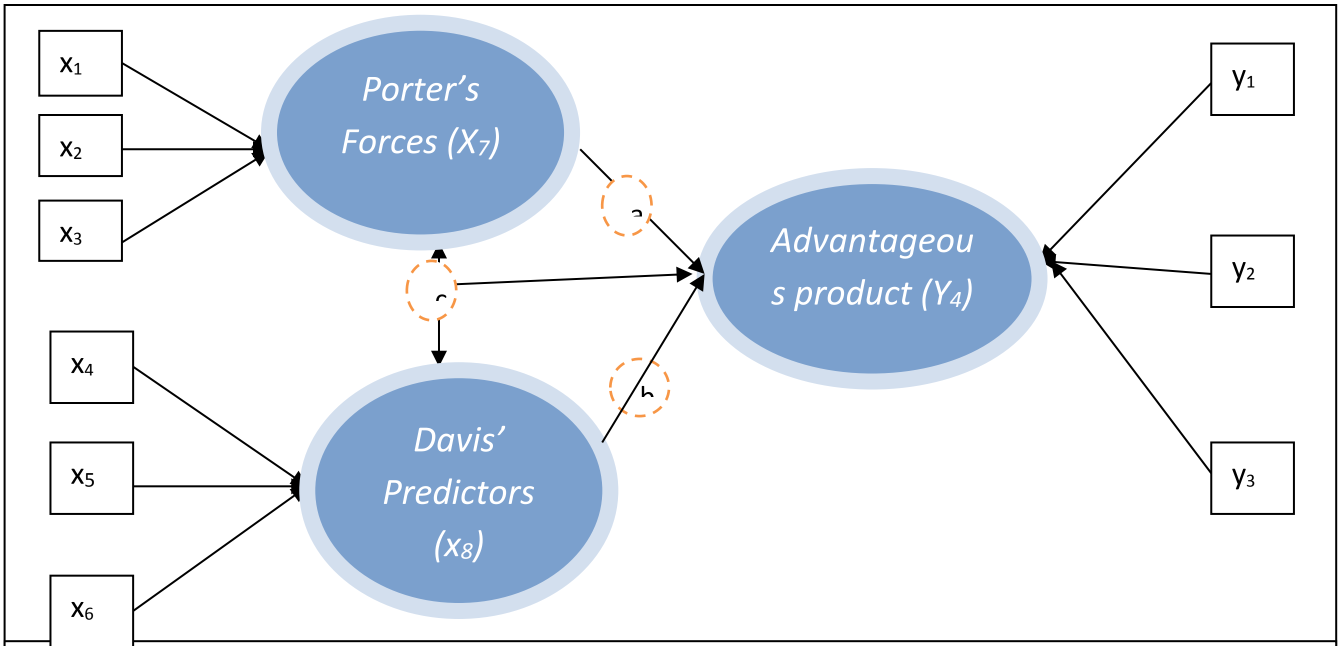
The **Rank Effects Model**, on the other hand, acknowledges that firms are heterogeneous in characteristics. They differ in locations, previous investments, technologies, management decisions, knowledge, market conditions, regulatory environment, organizational type, expectations of future market conditions and the firm's discount rates. The above characteristics influence a firm's adoption rate and benefits(Karshenas & Stoneman, 1993). If the net present value of adoption is positive and more profitable, then adoption rate will be high. According to Frey (2008), the firms with the greatest net benefits will adopt the innovations first.

2.4.8 Cluster or Hubs of Innovation Model

Proponents of this model observed that technology spread due to social links and connections among key influencers in a hub or cluster. The hub is a network of interested parties who are active in shaping the uptake and moderation of the technology(Webster, 2004). It is made up of innovator hub that drive the speed of adoption and follower hub who influenced the market size(Goldenberg,Han, Lehmann, & Hong, 2009). The innovators are the early adopters that influenced "the easily influenced" individuals that drive adoption(Watts & Dodds, 2007).

2.5 Conceptual Framework

Based on the empirical and theoretical reviews the study chose a combination of Porter's and Davis forces to yield advantageous products with more income, unique products and satisfy market(external and internal) demands. The design of advantegious product is explained by functions of the three Porter competitve forces and Davis technology adoption predictors. In a causal relationship statistical model, independent variable that affects a model without being affected by it is called exogenous variable whereas endogenous variable is the dependent variable generated by the statistical model(Lechner, 2008).



Exogenous/independent variables

x_1-buyers' bargaining power; x_2- suppliers bargaining power; x_3 –rivalry of competitors

x_4 – perceived ease of use; x_5 – perceived usefulness; x_6 – intention to use technology

$x_7 – f(x_1,x_2,x_3)$ $x_8 – f(x_4,x_5,x_6)$ $x_9 – f(x_1, x_2,x_3, x_4, x_5, x_6)$

Endogenous/dependant variables

y_1 – increase in income; y_2- meeting market demand; y_3 –product differentiation

$y_4 – f (y_1, y_2, y_3)$

Figure2.7: Conceptual Framework

Source: Adapted from Porter (1985) and Davis (1989) and Suarez (2009)

In Figure 2.7, the source variables also called exogenous variables i.e. bargaining powers of buyers, bargaining power of suppliers and incumbent competitors' rivalry, and perceived ease of use, usefulness and Behavioural intention to use technology and resultant variables also called exogenous portray a chain of causal hypotheses in path forms a, b and c.The figure demonstrateshypothesized network of relations between independent variables (Buyers bargaining power -X_1, bargaining powers of suppliers-

$X_2$and threat of competitors-X_3, perceived technology ease of use-X_4, usefulness-X_5 and Behavioural intention to use-X_6) and dependent variable of advantageous product (increasing Agro-food SMEs income-Y_1, meeting market demands-Y_2,differentiated products-Y_3)derived from value addition. The study compresses exogenous variables X_1,X_2 and X_3 to yields X_7 and the combines X_4,X_5 and X_6 yield X_8. The third combination is of X_7 and X_8 to yield X_9. The interest of the study was to test if there existed significant relationships between the combinations (X_7, X_8, X_9) and the combined endogenous variable Y_4 made up of Y_1, Y_2, and Y_3. This resulted into 3 hypotheses expressed also in three critical paths:

Path a .... $X_7 \longrightarrow Y_4$;

Path b .... $X_8 \longrightarrow Y_4$;

Path c .... $X_9 \longrightarrow Y_4$

The arrows show the direction and intensity of relations. Whereas dotted arrows demonstrate paths with weaker ties, continuous arrows show paths with stronger positive ties. Path a is the relationship between Porters' three competitive forces combined (X_7) andadvantageousproduct (Y_4). Path b is the relationship between Davis technology Adoption predictors combined(X_8) and advantageous product (Y_4). Path c is the relationship between X9=f(X_7, X_8) and advantageous product (Y_4).

2.6 Summary

Agro-food processing is one of the greatest contributors to the world GDP. It is best explored in USA and France and least in sub-Saharan Africa after Asia and America. The cause of difference lies in how each of them has been able to adopt technology. Kenya is in cognizance of this and has identified value addition to leverage agriculture which is its mainstay. This chapter found out agro-processing based on technology earned agricultural sectors greater profitability in a competitive market. Many studies have been done and discovered a litany of factors influencing technology use, but still its uptake is still low. Fierce competition and heightened customers' tastes and preferences have forced enterprises in agro-industry to invest and focus on relationships with customers and suppliers(Vost,Silva& Trienekens, 2007).

This research study sought to sensor weaknesses in popular technology acceptance model and Porter's competitive models which have informed most the studies. Further the chapter has found out suggestions to improve on the models which had been confirmed to have attained the stage of saturation. This study provided a model and conceptual framework of technology adoption founded on competitive and Technology Acceptance Model factors in realization of advantageous products among micro and small enterprises in agro-food industry. The researcher developed a hybrid model from the two to fill the gap between Rogers and Porter as shown in figure 2.1anchored on the conceptual framework in figure 2.7 to achieve advantageous products.

2.7 Research Gap

Although many studies have been done on forces of competitiveness and technology adoption (Smith et al., 2009), there is still a knowledge gap between how these forces relate and their confluence to yield innovative performance. The previous studies only discussed technology adoption and Porter's model differently. This has deteriorated into unbalanced studies that focused on simple models describing characteristics of firm's environment at the expense of rendering organizational and competitive interactions rudimentarily understood(Hunderson & Mitchell, 1997). Other studies on the relationships between technology adoption and strategy in business-to-business structures confirmed that a gap and confusion in literature exists (Pires & Aisbett, 2003) despite competition being the driver of the speed at which technology is accepted by MSEs(Copeland & Shapiro, 2010).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Having discussed the reasons for undertaking the study and research problem, in the previous chapter, research methodology at this juncture explains the type of data to be collected, methods to be used and techniques used in analyzing data. This chapter presents a systematic flow of the entire design of the research process and specific methodologies adopted.The chapter starts with introduction, followed by research philosophy, design, description of research area and sampling. It further details how data was collected, analysed and presented. Finally the chapter considered ethical issues to be adhered to during research.

The aim of research methodology is to explain reasons for undertaking the study, formulation of research problem, type of data collected, work plan of research and methods or formula algorithm to be used in analyzing the data. Research methodology encompasses approaches and perspectives to the research process as a whole with an aim of explaining the why, the what, the where, the how of data collection and analysis(Collis & Hussey, 2003). As described by O'leary, (2004), methodology is a framework associated with a particular set of pragmatic assumptions that can be used to conduct research and the procedures by which researchers describe and predict phenomena.

3.2 Research Philosophy

Theoretical framework entails pragmatic assumptions that underpin the understanding of the research study. According to Guba and Lincoln (1994), paradigm (which is the worldview) comes before research methods because it guides the researcher on choice of the method and the conceptual roots that underpin the study. This study adopts positivist epistemology and interpretive perspective because the nature of data to be collected to answer research questions is about explaining the meaning of the agro-food processing entrepreneurs' perceptions by use of scientific methods.

3.2.1 Positivism Epistemology

Epistemology was defined by Creswel (2009) as a branch of philosophy that investigates the origin, methods and limitations of human knowledge. Positivism was first coined by Auguste Comte as a philosophical paradigm asserting that truth about reality is a function of scientific knowledge that are analytic and synthetic(Neurath, 1973). Positivist worldview objectively studies variables of a social world like of a natural world by applying scientific laws and logical consistency. In other words, Porter's three forces and Davis' technology predictors and their influence on advantageous product are observed empirically, and as variables of a social phenomenon they are measured quantitatively and explained logically(Kura, 2012).

Positivist methodological procedures are used in the study because of their inherent characteristic of prediction and control, empirical verification (*confirmationism*) and '*hypothetico-deductive structures*'(Boland, 2003). They are value free and use causality laws to explain social regularities and patterns. In so far as the study deals with observable variables and data subjected to scientific measures to test hypothesis against knowledge claims (theories) of porter and Davis, positivist research methodology is preferred(Reisch, 2005). However, positivism has been criticized for being inefficient in addressing invisible (latent) with underlying causal mechanisms. According to Neurath(1973) there is no one approach that fit valid understanding of a phenomenon. Multiple research questions demands for multiple research measures, sample designs and analyses that yield convergence on a valid understanding of a phenomena; hence the need for interpretive approach that would capture perceptions and attitudes of entrepreneurs doing agro-food processing.

3.2.2 Interpretive Perspective

Positivism is such broad epistemology. Within it, is theoretical perspective of interpretivism. Interpretive approach, on the other hand, assumes that realities such as ease of use, usefulness and intention to use are social constructs of the mind of agro-food processors and exists as many as individual managers, although many constructions shall be shared(Guba & Lincoln, 1994). This approach is used because it emphasizes on examining attitude to discover embedded meaning and understanding the entrepreneurs' forms of expression to understand their actions and behaviour towards making advantageous products. Interpretive approach believes in reality as what the respondents perceive to be, hence the subjective interrelationship between the researcher, participants and the construction of meaning(Mills, Bonner& Francis, 2006).

3.3 Research Design

Research design entails goals, field layouts, feasibility and type of research plan(Nassiuma, 2000). According to Kothari (2004), research design is a plan outlining collection, measurement and analysis that effectively and efficiently enables research operations with ease.Research design did not only anchor the study on a framework of adequate test of variable relationships and control error variance but structured the enquiry in a logical rather than a logistical one(Kalinger, 1973;Otii, Ng'ang'a& Ondiek,, 2007). It ensured that research questions are validly, objectively, accurately and economically answered; connecting the conceptual research problems to the pertinent and achievable empirical research; and articulating the type of data required methods to be used to collect and analyzed data.

Survey method is preferredfor generating primary data and statistical modelling for analyzing the data. Survey, according to Nassiuma(2000), is the method often used to obtain information on social and behavioural variables and their relationships by way of question asking and observation of behaviour in a given set of a population. A survey is a scientific sampling and questionnaire design to measure characteristics of the population with statistical precision(Malhotra, Hall, Shaw,& Oppenheim, 2002). The survey isalso preferred because of its confirmed excellence in measuring demographic characteristics, social condition, relationships, attitudes (Babbie, 2010); broadness in coverage of subject matter of research(Moser & Kalton, 2009) and enablethe study compare rural and urban firms in technology. Because the study collects data on selected cases of agro-food sector to construct empirical body of knowledge, survey is recommended to be the best alternative(Uwe, 2007). Using survey research, this study selected samples of entrepreneurs doing food value addition in Busia and Nairobi counties and asked questions about their perceptions on technology acceptance and competition. The answers to these questions are regarded as a description identifying the opinions and attitudes of the whole population of agro-food processors from which the samples are taken. Survey research is the best suited to address objectives of the study because of its ability to obtain a representative descriptive perception on variables and generalize the results on the entire population.

Through a statistical process, the study groups variable that vary in the same way together and later aggregated them into a new composite variable. For example Porter's variables: buyers bargaining power, suppliers bargaining power and rivalry of incumbent competitors are grouped together. Davis variables, on the other hand, form another composite variable that influence technology acceptance among small agro-food processors. The design measured 6 independent variables (bargaining power of customers, suppliers and threat of competitors combined with ease of use, usefulness and intention to use technology) against three dependant variable advantageous product (income, meeting local and external markets demands and are differentiated) on the 7 point scale. To analyze the contents of the research findings, the study sums rating scale associated with Rensis Likert (Likert, 1932) which facilitates statistical analysis by logit for Hypothesis 1, 2 and 3. Amos for structural equation modelling of hypothesis 3 and Mann-Whitney U test for objective 4 of the study.

3.3.1 Pilot Study

In order to produce clearest results of the full scale study, a miniature version (pre-study) was necessary(Monette, Sullivan, & Dejong, 2002; Teijlingen & Hundley, 2002). Pilot study helped planfor the major study, test the instruments, hypotheses, and check statistical and analytical procedures (De Vaus, 1993). Likelyrisks and research economy were addressed (Isaac & Michael, 1995).On this strength the study did the pilot in

Kisumu County. Kisumu County is one of the devolved governments established by March 4, 2013. It covers an area of 2085.9km^2 with a population of 968909 people, according to 2009 National Census. The area is divided into 7 sub-counties. They include Kisumu west, Kisumu central, Kisumu East, Seme, Muhoroni, Nyando and Nyakach. The County borders the shores of Lake Victoria with a high potential for the fishing industry. Kano Plains fed by River Nyando provides good fields for rice and sugarcane industry. Other large scale industries in the area include: textile, molasses, fish processing, maize milling and agricultural produce processing.

A purposive technique was used to settle on the three sub-counties (Seme and Nyando being Rural and Kisumu East being town) as sites of study. The criteria used to select the three sites were by virtue of them being in urban or rural areas and are located within Kisumu County. Though some studies recommend a small set of respondents for a pilot study(Neuman, 1997), most scholars have not agreed on the specific number. For example, Monette et al., (2002) recommended a sample size of 20 people, but to be safe the study followed the advice of Isaac andMichael (1995) that an advantageous sample should be between 20 and 30. Snowball sampling was used to come up with 31 firms to be studied. As criticized by Biernacki and Waldorf (1981) this technique is non probabilistic (not representative) but has been preferred for this study. Initially the study had planned to use sampling frame from the Ministry of Agriculture, but in practice there was inadequate listof firms doing agro-food processing compiled, hence a resolve to do a snowball sampling. Also called chain referral or Respondent-Driven sampling, snowball sampling yields a study sample by way of referrals made among people knowing each other and share similar characteristics that are of research interest(Biernacki & Waldorf, 1981). Finding first respondents and rolling off referral chains usually becomes the problem (ibid). In this context the research started off by a sample frame from the Kisumu County Director of Agriculture office. Because the sample frame was unserviceable, the few members on sample frame were asked to identify other members of the population, who in turn were also asked to identify other individuals till a fixed number of interests(Heckathorn, 1997) for the pilot research which was 31 was reached. To start off, it involved a personal contact with the Director and through sub-county agricultural officers the sample frame was developed. Because of difficulty in finding adequate sampling frame the study used snowballing to come up with the sample size as below shown.

Table 3.1: A Summary Table of Sample Size Determination

Study area	Number of firms registered as agro-food processors	Study Population	Sampling method	Sample
Kisumu East	9	14	Snow ball	14
Nyando	7	11	Snow ball	11
Seme	2	6	Snow ball	6
Total	18	31		31

Source: Kisumu County Government, Department of Agriculture Extension Records (2015)

The table 3.1 above shows that 31 firms from Kisumu County were the subject of the study with Kisumu East having the highest number. Each firm's Chief executive officer was contacted for interview using semi-structured questionnaire. The studyfurther questioned 5 key informants, that is; 1 fabricator, 1 expert/consultant from agricultural training institute, 1 from KIRDI and 2 sub-county Agriculture officers. The key informants were gotten by convenience sampling. According to Neville (2007), convenience sampling is a non probability sampling method that chooses participants for interviewing that are conveniently and immediately available. Interview schedules were used in interviewing the key informants. In total there were 36 respondents in the study.After a successful pilot testing the study learnt from the exercise and made the necessary changes as shown in table 3.2.

Table 3.2: Changes Addressed Through the Pilot Study

Focus	Description	Feedback and recommended changes
Research instruments	Focus. There was need to focus on the objectives and the variables of the research	• The questionnaire was redesigned as per variable
	Content: the tool should entail the actual cues that defined advantageous product, porters forces and Davis predictors	• Further literature review was done to find and include defining elements of each variable • Advantageous product section which was missing was included.
	Layout: The layout should be attractive to the respondents and facilitate keying and analysis of data	• The layout was redone for easy answering and avoidance of monotony that would result into mechanical answers
	Questions. The questions should observe the likert scale's key attributes of balance and internal consistency.	• A 7 point scale was adopted because of its merits over the 5 point scale used. • Internal consistency was done using Cronbach alpha giving a result of c 0.9 over the 0.7 threshold proving very high reliability
	Length: it was learnt that the questionnaire was very long	• Unnecessary sections like D&E which could be determined through statistical means were removed from the questionnaire
Data analysis tools	Binomial regression analysis would work with Likert if only the responses are collapsed into two. Mann-Whitney U statistics was the best to compare two groups of the same sample	• The study adopted Mann-Whitney U statistics to analyze hypothesis 4 and collapse likert scale when analyzing objective 1&2. • It also used Amos software instead of Lisrel to do structural equation modeling
Sampling method	It was learnt that information on food value addition firms at county level was inadequate, hence inadequate sampling frame.	Use of snow balling was adopted to cover as many firms as possible.
Study area	It was learnt that piloting cannot be done at the same geographical area where the full study will be carried out.	• Kisumu was the county for pilot instead of siaya, Nairobi and Busia • Because of cost involved it was resolved that Siaya would be dropped and remain with Nairobi and Busia for study.

3.4 Study Area

The research is carried out in Busia andNairobi Counties whose geo-demographic aspects are illustrated in table 3.3.

Table 3.3: Study Area Details

County	Busia	Nairobi
Total surface area (KM^2)	1695.1	696.1
Population	809988	3134265
Administrative units(sub-counties)	7	9
Altitude (meters above sea level)	1500	1798
Latitude	0^0 45’ South to 00^0 27’ 11’ North	-1^0 18’ south to – 1.2921 south
Longitude	34^0 25’ east	36^0 45’ East
Average annual rainfall(mm)	760-2000	786.5

Source: Busia and Nairobi County Development Profiles, 2013

According to table 3.3, the two counties enjoy bimodal rain patterns. Long rains come in March through May and short rains come August through November with annual mean rainfall as shown in the table above. Nairobi is the most densely populated county (smallest surface area with largest population) and a home to 80% of the total industries in Kenya (GoK, 2013).

3.5 Target Population

Population in this study referred not to the population of a county, but rather all possible members of the group investigated which included objects, subjects, phenomena, cases, events or activities specified for the purpose of sampling(Brynard & Hanekom, 2006). It entailed discussions on content, units, extent and time(Kish, 1965). As observed by

Monette et al., (2002),content are common characteristics of the group under study, units are levels of analysis, special coverage is the extent and time is the temporal considerations during the study. In this survey, the population consisted of micro and small enterprises engaged in food value addition inBusia and Nairobi counties in Kenya. For purposes of this study, definition of Micro and Small Enterprises Act 2012 was adopted. The Act defineda micro enterprise as a firm, trade, service, industry or a business activity whose annual turnover did not exceed five hundred thousand shillings; employed less than ten people and with total assets and financial investment of ten million in manufacturing sector and five million in service and farming sector. It further described small enterprise as a firm, trade, service, industry or a business activity whose annual turnover ranged between five hundred and five million shillings; employed between ten and fifty people and with total assets and financial investment of between 10 and 50 million shillings for manufacturing and between 5 and 10 million shillings in service and farming sector(GoK, 2012). The temporal considerations for the survey were between August 2015 and May 2016.

3.6 Sample Design

Sampling, according to Neumann (1997), is a systematic selection process of cases to be included in research. It is the procedural selection of a part of the population on which research could be conducted to ensure that conclusions from the study could be generalized to the entire population(Tubey, 2009). Instead of collecting data from the total elements of the population, the studyzeroed in on sampling due to its proven cost, efficiency and ability to yield results quicker with high precision(Reddy & Acharyulu, 2008). Through sampling the studyinterviewed top management or operations manager from the agro-food processing firms identified for studyas shown in the table 3.2.

3.6.1 Sample Size Determination

Sample size determination is about establishing the right sample size which is a function of purpose of the study, population size, level of precision, the level of confidence or risk, and the degree of variability in the attributes being measured(Miaoulis & Michener, 1976). Using survey research, this study selected samples of Micro and Small Enterprises (MSEs) in Busia and Nairobi, Kenya. Busia was selected by lottery method; that is, out of the 44 ballots representing rural counties, the researcher chose one randomly which came out to be Busia. Nairobi was purposeful chosen because of its numerous and largest harbour of manufacturing enterprises. The MSEs manufactured food products for local and global market. From the records of Nairobi and Busia County Governments, enterprises that met such characteristics of study are 2096 (Nairobi, 2070 MSEs and Busia, 26 MSEs).

For purposes of this study snowballing and fisher formula was applied. Snow balling was preferred for Busia because of the smallness in number of MSEs registered. The fisher formula was preferred for Nairobi County because of the large population and the formula's strength exhibited inexact test; meaning that the significance of the deviation from a null hypothesis was calculated exactly rather than relying on an approximation(Mugenda & Mugenda, 1999).

The formula is $n = Z^2 pqD/d^2$

Where, n = the sample size,

Z= the standard normal deviate (1.96), which corresponds to 95% confidence interval.

P= 100/2070 = 0.05

q = study population (1-p).

d = the degree of accuracy = 0.95

D = heterogeneous population = 2.

Thus n = $(1.96^2$ **x** $0.05 \times 0.95)2/0.5^2 = (0.182476)2/0.25 = 146$

Table 3.4: A Summary of Sample Size Determination

Study area	Number of MSEsregister by other authorities as agro-food processors	Study Population	Sampling method	Sample size
Nairobi City County Government	100	2070	Fisher method *n* $=Z^2pqD/d^2$ $=(1.96^2 \times 0.05 \times 0.95)2/0.5^2$	146
Busia county Government	26	26	Snow balling	42
Total	138	2096		188

The table 3 above shows that 188 firms from Nairobi and Busiawere the subjects of the study with Nairobi having the highest number. Each enterprise's chief executive officer wascontacted for interview using semi-structured questionnaires.

The studyfurther questioned key informants: 10 fabricators, 5 experts/consultants, 5 NGO, 3 government line ministry official and 17 customers who form a total of forty (40) key informant respondents. They were gotten by convenience sampling. According to Neville (2007), it is a non probability sampling method that chooses participants for interviewing that are conveniently and immediately available. Interview schedule was used in interviewing the key informants. In total there were 228 respondents studied.

3.6.2 Sampling Procedure

After determining the size of the sample, establishing a procedure of selecting subjects in this case the agro-food processing firms to be included in the sample, is to follow(Mugenda & Mugenda, 2003). Given the very large size of Nairobi City County and numerous MSEs, the participants in this study were chosen from the list of registered MSEs doing food value addition using random sampling. Random sampling is a probabilistic sampling method that gives each element in the target population equal chance to be studied(Emory, 1980).

In choosing key informers, the study preferred purposive sampling. The technique allowed the researcher to handpick and use MSEs that had the required information with respect to the objectives of the study. According to Tromp (2009), the power of purposive sampling lies in selecting information rich cases for in-depth analysis related to the central issues being studied(Neville, 2007). Accordingly participants were chosen to represent a range of agro-food processing firms. Because of dismal number of value addition enterprises (totalling26MSEs) in Busia due to inadequate information management the study shall adopt snowballing.

For key informers, the study prefers purposive sampling. The technique allows the researcher to handpick individuals that have the required information with respect to the objectives of the study. According to Tromp (2009), the power of purposive sampling lies in selecting information rich cases for in-depth analysis related to the central issues being studied(Neville, 2007).

3.7 Data Collection

Both quantitative and qualitative primary data were collected. The data was gatheredbysemi structured questionnaires and interview schedule administered on sampledentrepreneurs and key stakeholders (key informants), respectively. In-depth interviews were conducted on a one-to-one basis using semi structured questions by researcher and research assistants so as to uncover underlying motivations, prejudices and attitudes that might not be uncovered in other primary data collection techniques(Durgee, 1986). Surveys were used using structured questionnaire tools to elicit specific information regarding respondents' attitudes, intentions, awareness, behaviours and motivations towards competitive forces and predictors of adopting technology in food value addition.

The researcher prepared questionnairesand interview schedules based on the variables of the study. Secondly, he obtained permission from Karatina University and the National Commission for Science, Technology and Innovation (NACOSTI) vide permit number NACOSTI/P/15/7998/5565. The study further contacted influential members of the communities including County Commissioners and County Education and Agriculture Directors. The study organized for accommodation and transport. It engaged and trained interviewers (research assistants) to carry out interviews on the respondents.Enoughtools were reproduced for the survey. The interview questions were administered and analyzed both quantitatively and qualitatively.

3.7.1 Data Collection Instruments

The questionnaires were semi-structured to both allow respondents give their own views in depth and ensure uniformity of responses and easy processing. Part A of the questionnaire contained demographic and firms background information information-seeking questions. Its importance is to describe the respondents and the MSE characteristics. Part B solicited data on dependant variables that is the advantageous product cues of meeting demand requirements, uniqueness and raising revenue. Part C and D explored the two control variables: porter's three forces and the three of Davis' technology predictors respectively. The questionnaire making process was informed by Likert Scale.Though Likert Scale was preferred, other methods like Thurstone'stechniques were available for the measurement of attitude and paired comparison. Likert summated rating techniques were faulted of assuming that intensity of experience was always linear and that social desirability was objective(Otii et al., 2007).However, the study favoured Likert scale because of its strong proven psychological scale and ability to measure gradations in opinion, behaviour and attitude of respondents(Johns, 2010). The study also preferred this method to Thurstone scale because it is less time-consuming and less laborious. It yielded higher-reliability co-efficient with fewer items thanThurstone (Balan, 2013). Other advocates of Likert scale site its ability to measure multiple items, complex and multidimensional values, addressing the 'random' error at the same time (Johns, 2010). The scale is also checkable by Cronbach alpha and competently used to process both descriptive and inferential statistical analyses(Brown, 2011).According to Brown (2011), Likertscale is collapsible into bimodal data, a fundamental requisite for Binary Logit regression, which is the model of analysis. It has been proved to be a recipe for Mann-Whitney U statistic that compared two groups of the same sample; in this context technology adoption propensity between town-based and rural-based MSEs.

To execute the Likert method, the researcher constructed a summated rating scale whereby a large number of statements in the method of equal-appearing intervals and subject all statements indicated a seven point rating system: very satisfied, moderately satisfied; slightly satisfied, neither satisfied nor dissatisfied, slightly dissatisfied, moderately dissatisfied and very dissatisfied assigning values of 7, 6, 5, 4, 3, 2 and 1 respectively. Opinions such as "Not applicable", "Don't know," were placed off the scale. In case of a negatively worded statement, this scoring reversed. According to Johns (2010), likert scale items' data is less accurate if response scale points are below 5 or above 7. In recognition of the same, the study adopted the 7 scale point so as to give a centre point on a bipolar scale with full labelling to enable respondents give higher quality data. During binary regression, where dichotomous data is required, the scales of dependent variables were collapsed into two levels (yes and no).

Secondly an interview schedule was constructed and administered on key informants as respondents.Studies on minimizing interviewer related error showed that any sampling-based survey, such as this, was likely to suffer from sampling errors, inaccurate answering of the questions, procedures of data collection, entry and coding would limit and make the study scientifically unsound(Fowler & Mangione, 1990). To counter the inadequacies, the study employed reliability and validity strategies as below discussed.

3.7.2 Reliability of the Information Obtained

Reliable information creates a strong foundation for making objective recommendations. Reliability means that the scores on a test are consistent or reproducible if subjected to a particular measurement instrument for a given population or sample(Bademci, 2014). According to Progresset al., (2013) reliability refers to reproducibility; that similarity of results can be traced in an independent but comparable measure of the same object or construct. It is a property of score or data at hand and can only be explained in form of stability, equivalence and consistency. The three strategies suggested by Brown (2002) appropriate for each form, include test-retest that estimated stability through administering a test on two occasions and computing a correlation between the two sets of scores. Second is equivalence form which is found by carrying out two forms of a test and examining the correlation between the two sets of scores. Finally is internal consistency reliability, which is the preference for this study(Brown, 2002).

Split-half adjusted method, Kuder-Richardson formulas 20 & 21 and Cronbach alpha are the commonest techniques available totest internal structures i.e. internal consistency reliability(Cronbach, 1951). This study considered Cronbach's coefficient alpha as the best psychometric test for internal consistency because of its objectivity, flexibility and logistical capability to measure the consistency of scores in a set of questions at once and on a single occasion(Brown, 2002;Streiner, 2003). As demonstrated by Cortina (1993), Cronbach alpha applies to both binary-type and large scale data while KR-20 can only handle dichotomously scored data. It is recommended over spilt-half because is an average of likely spilt-half coefficients which suffers the manner of grouping the items. The coefficient alpha also upholds the central tenets of classical test theory that demand high degree of internal consistency (Strainer, 2003). Unlike test-retest method which frustrates respondents by a repeat test, Cronbach's Alpha does not require subjecting the respondents to the same questionnaire twice or having two forms of the test (Brown, 2002). Cronbach alpha addresses itself to internal consistency, that is; the degree of interrelatedness among the items(Cortina, 1993) and where multiple summated scales are used like in this study, it is advised that Cronbach alpha is the best tool for assessing the reliability of scales(Santos, 1999).

Cronbach's alphas was developed by Lee Cronbach in 1951 to measure inter-relatedness of items within the test and reveal the measurement error on the observed scores by squaring the correlation and subtracting it from 1.00 which results into an index ranging between 0 and 1 that explains the ability of an instrument to measure consistently(Tavakol & Dennick, 2011). It measures the internal validity and consistency of items used for each construct by showing how items in a set are closely related(Molla & Bissdoff, 2012). A Cronbach's Alpha that is closer to 1 is preferred because it indicates a good internal consistency of items in the scale(Matkar, 2011; Balan, 2013).

The formula of Cronbach's alpha is given below as;

$$\alpha = rk/[1+(k-1)r]$$

Where α = Greek letter meaning Cronbach's alpha

k = number of items considered

r = the mean of the inter-item correlations

After establishing the formula, the data collected was fed into computer software SPSS version 21 and the following results were realized. Out of 31 processed cases, n=23(74.2%) were found valid. Based on standardised items a Cronbach's alpha reliability statistics of 0.97 was gotten. Studies have defined a score of 0.7 as the adequate, desiredand acceptable(Schmitt, 1996;Nunally & Berstein, 1994; Nunnally, 1978). According to George andMallery (2003), >0.9 is considered excellent, between 0.8 and 0.89 is good, between 0.7 and 0.79 acceptable, between 0.6 and 0.69 questionable, 0.5 and 0.59 poor; and <0.50 is unacceptable(George & Mallery, 2003). The alpha 0.97 is greater than 0.70 showing excellent reliability of the instrument and the scale used for it.

However, anecdotal studies caution that too high alpha (above 0.9) suggested redundancy, i.e. testing the same question but in a different guise (Streiner, 2003). This was addressed by SPSS excluding 8(25.8%) of such cases. Secondly, multidimensionality is often associated by a low alpha level, but high alpha should not be abused to imply unidimensionality or homogeneity (Schmitt, 1996). Factor analysis or confirmatory factor analysis is given as the measure of homogeneity(Thompson, 2004), and that is why the study furthered to employ Confirmatory Factor Analysis using Amos to determine existence of one construct underlying the set of items - unidimensionality or homogeneity(Helms, 2005).

3.7.3 Validity of Research Instruments

Validity refers to whether the instruments measure what they intend to measure(Butter, Chambers & Goldstein,2007). According to Kerlinger (1983), validity is the representativeness or sampling adequacy of the content, the substance and the matter on the topic of study. Validity of the scale was examined by help of content validity through competent judgment. Utmost care was taken in selecting the contents from various literatures; considered expert opinions, discussions and suggestions with statutory bodies about agro-food processing, department officials, functionaries and social scientists. Finally, Logit, Structural Equation Modelling (SEM) using the Amos and Mann-Whitney U statistics tested structural model fitness and hypothesis.

3.7.4 Administration of the Instruments

The questionnaires were administered by the researcher and interviewers. The researcher identified and trained 6 interviewers who helped in the interview survey. Each interviewer was assigned 30 respondents derived from the sample frame and snowballing. The training aimed at moulding interviewers' appearance and demeanours, understanding the questionnaire, accuracy in recording responses and probing to solicit more complete answers to questions. The interviewers asked questions orally and record respondents' responses through face-to-face encounter. After collection of the data, the information wascoded, that is translated answers into numbered categories for tabulation and analyzedusing Statistical Package for Social Scientist (SPSS) computer program (Peil, 1995).

3.8 Data Analysis and Presentation

Data analysis refers to examining what had been collected in a study, making deductions and inferences. It involved uncovering of underlying structures, extracting important variables, detecting any anomalies and testing any underlying assumptions. It is a systematic process that uses logical and statistical techniques to describe and illustrate, condense and recap, and evaluate data into factual information items for dissemination or further treatment(Merrian, 1998).A survey was employed to ensure scientific sampling and questionnaire design to measure characteristics of the population with statistical precision(Malhotra et al., 2002).

3.8.1 Measurement of Variables

Variables were measures through thematic analysis which basically categorizes related topics where major concepts were used (Kombo & Tromp, 2006). The researcher organized, broke data into manageable units, synthesized, searched for patterns, discovered what was important and what was to be learned and decided what to share with others. Data collected for this study was alsoanalyzed through content analysis. Thisinvolved classification the data by hypothesis, variables, measurement methods and data used as shown in table 3.7.

Table 3.7 Variable Measurement Matrix

Hypothesis	Variables	Inquiry and Measurement methods	Data used to measure the variables
Bargaining power of buyers, bargaining power of suppliers and rivalry among competitors did not significantly influence agro-food processors to produce advantageous product.	Demographics	Qualitative and Descriptive	- Respondents Bio data: age, sex, marital status, designation and education level Enterprise - Background: name of enterprise, registration status, age, annual turnover, staff establishment and networks
	Advantageous product	Mixed methods: - Qualitative – descriptive - Quantitative – logistic regression	- perceptions of product increasing income, meeting market demand and being differentiated
	Buyers Bargaining power		- Customers' sensitivity on price, level of awareness, union, purchases for resale, backward integration, ability to reduce selling price, switching costs
	Suppliers bargaining Power		- Intensity of suppliers, suppliers' switching costs, union, forward integration, number of suppliers compared to buyers, uniqueness of supplies
	Rivalry from incumbent competitors		- Intensity of rivals, industry growth rate, intermittent overcapacity, exit barriers, dominance of large firms, difficulty in getting information, uniqueness of competing products, customers brand loyalty, switching costs
Perceived technology "ease of use," "usefulness" and intention to use had no significant influence on production of advantageous product	Perceived technology ease of use (PEU)	Mixed methods: - Qualitative – descriptive - Quantitative – logistic regression	- Perceived difficulty in using food technology, compatibility, harmfulness, period required to learn and cost of repair
	Perceived technology usefulness (PU)		- Level of usefulness, triability, previous experience, competitive advantage, appropriateness, timeliness in production, mass production and functional areas used most.
	Behavioural intention to use technology (BI)		- Level of acceptability, willingness to implement, support, prioritization, managerial awareness and commitment and preparedness
There was no significant difference in technology adoption between urban-based and rural-based agro-food processing MSEs in Kenya.	Technology adoption; rural and urban-based agro-processing firms	- Quantitative – Mann Whitney U statistics	- Technology adoption – data on PEU, PU and BI - Rural based firms – enterprises located in Busia - Urban based firms – enterprises located in Nairobi

3.8.2 Data Analysis

The strategies of data analysis were mixed; an amalgam both qualitative and quantitative approaches that trades off the weakness and strengthens of each other's approach in answering the research questions. After data collection, the studyemployeddescriptive techniques for qualitative and inferential techniques for quantitative for data analysis.A descriptive statistics technique measured central tendencies and dispersion through means, variances, standard deviation, and frequency distributions. Cross tabulation was used in describing and explaining the situation as it was in the value addition enterprises. Independent sample t test was used to compare the means of two different groups of respondents which were close to each other in opinion (near to the median of 4). Inferential statistics employed the regression analysis that predicted models and classification that identifies new or existing classes, Structural Equation Modelling and Mann-Whitney U statistics for comparing two sets of data (town and rural firms).

In this case, the study applied Binomial Logistic Regression (Logit) model in particular, to predict and explain relative impact of each predictor variable in the first three hypotheses. Adoption literature recommendedLogit modelwhere the dependent variables were dichotomous.The models were used to investigate the effects of competitive forces and technology adoption predictors on the choice for or against. However, it does not measure the degree of use(Feder,Just & Zilberman, 1985), but indicatesthe likelihood of Porter's competitive forces and Davis technology predictors influence on advantageous product for agro-food processors, if all other factors were held constant.The Binomial Logistic Regression (Logit) model showsthe strength of the established relationships by determining the Pseudo R^2 which isan analog ofR^2in normal regression, product moment's coefficient of correlation and the coefficient of determination.The equation of Binomial Logistic Regression (Logit) model is expressed as:

$\text{Log}\,[p/(1-p)] = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + \varepsilon$ or

Where:

p	= the probability that the advantageous product is high, p(Y=1)
p/(1-p)	= the "odds ratio"
X_1 - X_6	= independent variables (the Porter's three forces and Davis predictors)
b_0	**=** Coefficient of themodel
b_1-b_6	= Beta Coefficients of determination
ϵ	= Stochastic Error Term

Secondly, Mann-Whitney U test was used to compare the difference between two independent groups (town and rural agro-food processors) in terms of their attitudes and values towards advantageous products cues. Mann-Whitney U test is a non parametric test of the null hypothesis (H_{04}) that 'There is no significant difference in technology adoption between urban and rural agro-food processing firms in Kenya.' Though t-test could be used, the study favoured the Mann-Whitney U test because it is extremely efficient and t-test only works with normal distributions.

3.8.3 Hypothesis Testing and Modeling

Hypothesis testing is a formal and systematic procedure to measure the reasonableness of a claim about a population using sample data(Mason, 1983; Daniel, 1998). Recently it was described as theformulation of a hypothesis to explain some phenomenon that was observed and then comparing the hypothesis with the facts(Christensen, Johnson & Turner, 2014). According to Mason (1983), the procedure had four steps that started by stating the hypothesis in a null format that is presumed true. In the context of the study they are stated as follow:

H_{01}:The three of Porter's competitive forces (bargaining power of buyers, bargaining power of suppliers and rivalry among competitors) do not significantly influence agro-food processors to produce advantageous product (increasing income, meeting market demand and differentiated product).

H_{02}:The three of Davis predictors (perceived "ease of use," "usefulness" and intention to use) have no significant influence on production of advantageous product (increased income,meeting market demands and differentiated product).

H_{03}:No relationship of the three of Porter's competitive forces and three of Davis predictors (bargaining power of buyers,suppliers, threat of competitors, perceived ease of use, usefulness and intention to use) has significant influence on the production of advantageous product (increased income,meeting market demandsand differentiated product).

H_{04}: There is no significant difference in technology adoption between urban and rural agro-food processing firms in Kenya.

The second step was setting the criterion of judging the claims stated above or setting the level of significance.The level of significance or significance level is the permissible value of likelihood above which the null hypothesis is accepted(Gupta & Gupta, 1994). On the other hand, Daniel (1998) defined it as a scientific and an objective way of deciding whether the value stated in the null hypothesis is likely to be true. It minimized the probability of chance factor contributing to the results in the study. Other studies in business and economics have referred to it as a *'level of risk'* of rejecting a true hypothesis(Mason, 1983). According to Gupta and Gupta (1994) and Mason(1983) the level of significance was usually expressed as a probability of error denoted as α which takes $p < 0.01$, $p < 0.05$ or $p < 0.1$ values (meaning thatthe results would have happened by chance less than once in 100 tries, the results would have happened by chance less than five times in 100 tries or meaning thatthe results would have happened by chance less than once times in 10 tries).

This study chose α to be 0.05 or $p < 0.05$ as a criterion of its judgment of the four null hypotheses because of two reasons. First it has been conventional that the 0.05 is the best boundary of statistical significance implying that if something happened by chance is less than 5%, it is significant in behavioural science sense(Peil, 1995). Secondly, Peil (1995) demonstrated that $p < 0.001$would suffice a sample of over 1000 butfor a sample of 100 to 200 $p < 0.5$ was good which is the range sample of the study. According to Mason (1983), when α is at 0.05, it means that there is a 5% chance that a true hypothesis is rejected, hence committing a type I error and the same percentage of risk of accepting a false hypothesis – type II error.

A study on misuse and misinterpretation of statistical significance testing strongly advised that statistical significance was only but a filter, guide and indicator(Daniel, 1998). It merely confirmed that a relationship existed but determined not the strength or form of the relation. Once found, the study proceeded to decide the substantiveness of the significance using the pseudo R^2 and other measures such as Binomial Logistic Regression (Logit) model and Structural Equation Modelling (SEM)provided below to measure the nature of the correlation.

During the third step the study selected a random sample from the population and measured the sample mean. The aim was to determine a subset of agro-food manufacturers that accurately represented the entire population. The representative subset was selected in a random manner whereby each sampling unit in a clearly defined population had an equal and non zero chance of being selected for study(Teddlie & Yu, 2007).The subset was generated from the sample frame or list of population (MSEs) prepared by the county governments of Busia and Nairobi as licensed agro-food manufactures. The constructed lists allowed the study to take hold of the targeted micro and small food manufacturing firms. Because of inadequacy of the number of firms in Busia County list, the study employed snowballing methods. For key informants, samples were drawn by convenience that is; the researcher, using the interview guide, interviewed people with relevant information by virtue of being easily accessible and willing to participate in the study.

The fourth step entailed comparing technology adoption propensity between the two groups of the sample that is urban (Nairobi) and rural (Busia) agro-food processing enterprisesusing Mann-Whitney U test.According to Bluman(2004), the test is appropriate when sample data are not normally distributed and aremeasured on ordinal scale which are met by the sample data being product of snowballing and likert techniques, respectively. The logic behind the Mann-Whitney test is to rank data for rural and urban conditions and see the degree of difference the two ranks portray. Two samples (rural and urban agro-food processing entrepreneurs) are selected and opinions about technology adoption predictors recorded. At $\alpha = 0.05$ test if there is a difference in the propensity it takes enterprises to adopt the food manufacturing technologies. The study followed the following procedure to determine the difference in adoption propensity:

Step1: stating the hypothesis and identifying the claim

H_0: There is no significant difference in technology adoption between urban and rural agro-food processing firms in Kenya.

H_1: There is significant difference in technology adoption between urban and rural agro-food processing firms in Kenya.

Step 2: defining the critical value. Since $\alpha = 0.05$ and the test being two tailed, the study prefers the z values of +1.96 and -1.96.

Step 3: using SPSS compute the test value.

Combining the data from the urban and rural samples, arrange the combined data in order and rank each value. The study further sums the ranks of the group with the smaller sample size.

Step 4: Draw the decision. The decision is to reject or accept the null hypothesis based on the calculated value being greater or smaller than the critical value.

Step 5: Finally the study summarizes the results by stating whether there is enough evidence to support the claim that there is difference in technology adoption propensity between rural and town food manufacturing enterprises.

Modelling is a process of summarizing best knowledge into a system that can predict future events with confidence(Swarbrick, 2012). Modelling helped the study make invisible causal relationships visible and clarified the behaviours of hidden mechanisms(Hoover, 2013). At 95% confidence level, modelling process testedthe constants and coefficients (α, β) of the various variables using Logit regression equations for hypotheses 1, 2 and 3

Logit regression is a nonlinear model that elicits binary (dummy or dichotomous) outcomes with values 0 or 1 for dependant variable of interest(Horowitz & Savin, 2001). For example;

- Y_1 – increase in income from product of MSEs doing agro-food processing. The variable shall take the value of 1if the SME reports increase in income and 0 if not
- Y_2- meeting market demand from products of MSEs doing agro-food processing. The variable shall take the value of 1 if MSEs reported meeting market demand and 0 if not

- Y_3 – differentiated productof MSEs doing agro-food processing. The variable shall take the value of 1 if MSEs reported differentiated products; and 0 if not.
- Y_4 – advantageous product of MSEs doing ago-food processing. The variable shall take the value of 1 if MSEs reported advantageous products (a combination of Y_1, Y_2 and Y_3) and 0 if not.

The logit regression model was favoured by the study because of its ability to estimate the probability of advantageous food product to be 1(Y=1) while taking care of individual risk, biological model with increasing S-shape logistic curve and a threshold demonstrating risk due to exposure and its capacity to handle both continuous and categorical independent variables(Wooldridge, 2010).

The logistic regression equation was therefore derived as follows.

-The probability of being advantageous product= **p** …. (1)

-The Probability of not being advantageous product = **1-p**…. (2)

-Therefore, the **Odds** of advantageous product = **p/ (1-p)** … (3)

-The odds of advantageous product achievement was then transformed into a **Logarithm** to give the **Log of the Odds** of advantageous product which was = **log[p/(1-p)]**… (4)

The equation given by**log [p/ (1-p)]**is the **Logit** (**Y)** of achievement and represents the probability of designing advantageous product which value lied between **0** and **1**. The **Logit function for advantageous product adoption** withthe six independent variables was then specified as follows.

Hypothesis 1 Model

The three of Porter's competitive forces (bargaining power of buyers, bargaining power of suppliers and rivalry among competitors) do not significantly influence agro-food processors to produce advantageous product (increasing income, differentiated product and meeting market demands).

Logit(Y_1) = log [p/ (1-p)] = $\beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \varepsilon$; Logit(Y_2) = log [p/ (1-p)] = $\beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \varepsilon$; and Logit(Y_3) = log [p/ (1-p)] = $\beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \varepsilon$

where;

Logit($Y_{1....}$ Y_3)is the dependent variables i.e. cues of advantageous product [(Y_1)meeting market demand, differentiated products (Y_2) and increased income (Y_3)]

$\beta_0$is the Intercept while the values $\beta_{1.....}\beta_3$represent the Regression Coefficients/ Parameter estimates for the Independent variablesX_1…. X_3 where;

X_1-buyers' bargaining power; X_2- suppliers bargaining power;
X_3 –rivalry of competitors
Y_1 –increased income; Y_2- meeting market demand;
Y_3 – product differentiation ϵ = Stochastic Error Term

Hypothesis 2

The three of Davis predictors ("ease of use," "usefulness" and intention to use) have no significant influence on production of advantageous product (increased income, differentiated product and meeting market demands).

The type of data that was sought under this hypothesis was causal relationships of the psychological perceptions of agro-food processors on technology. The answers from Likert Scale responses were collapsed into either ‘yes’ or ‘no’, ‘true’ or ‘false.’ The study used logit to calculate the predictability of designing advantageous product by agro-food processors by perceptions on technology “ease of use”, “usefulness” and intention to use.

$\mathbf{Logit(Y_4) = log\ [p/\ (1\text{-}p)] = \beta_0 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6} + \varepsilon$ **;** $\mathbf{Logit(Y_5) = log\ [p/\ (1\text{-}p)] = \beta_0 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6} + \varepsilon$ **; and** $\mathbf{Logit(Y_6) = log\ [p/\ (1\text{-}p)] = \beta_0 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6} + \varepsilon$

where;

$\boldsymbol{\beta_0}$is the intercept while the values $\boldsymbol{\beta_4 \ldots \beta_6}$ represent the Regression Coefficients/ Parameter estimates for the Independent variables $\mathbf{X_4 \ldots X_6}$ where;

X_4 – perceived ease of use; X_5 – perceived usefulness;

X_6 – Behavioural intention to use technology

Y_1 – increases income; Y_2-meeting market demand;

Y_3 – product differentiation $\boldsymbol{\epsilon}$ = Stochastic Error Term

The analysis was undertaken using the Statistical Package for the Social Sciences (SPSS) version 20.

Model Fit Testing

Model fit refers to how best data reflects the underlying theory(Yuan, 2005). The model fit testing enabled the study determine the degree to which the sample variance-covariance data fit the structural models through various criteria or indices(Schumacker & Lomax, 2010). Studies observed that different indices reflected different aspects of model fit and a variety of fit indices were preferred, therefore(Hayduk,Cummings, Boadu, Pazderka-Robinson& Boulianne, 2007).In this study hypothesis 1 & 2 were further tested using Likelihood Ratio and Wald chi-square Test. The study tested the significance of the effect of $X_1 \ldots X_6$ on the binary response by use of Wald test and likelihood ratio test. The Wald test compared the maximum likelihood estimate of slopes parameterβ_1 to an estimate of its standard error. The formula **$Z = \beta_1 / s.e.(\beta_1)$.** The likelihood ratio, on the other hand, compared the maximum L_0 of the log-likelihood function. When **$\beta_1 = 0$**(i.e. when p is forced to be identical at all *x* values) to the maximum L_1 of the log-likelihood function for unrestricted β_1. The formula is $G^2 = -2(L_0 - L_1)$.

Hypothesis 3

No relationship of the three of Porter's competitive forces and three of Davis predictors (bargaining power of suppliers, buyers, threat of competitors, perceived ease of use, usefulness and intention to use) has significant influence on the production of advantageous product (increased income, unique product and meeting market demands).

According to Boland(2003) and Reisch (2005), the modern positivist methodological procedures believe in building sound theoretical frameworks and their rigorous testing which Structural equation modelling (SEM) conforms to. SEM technique was handy in analyzing inferential data, hypothesis testing especially where variables have patterned inter-relationships grounded on some established theory(Hoe, 2008). The technique has the flexibility to model relationships among multiple technology predictor and competitive variables, and statistically test a priori theoretical assumptions against empirical data through CFA(Chin, 1998). SEM was also preferred because of its ability to deal with multiple relationships simultaneously while providing statistical efficiency, presenting unobserved concepts in the relationships and explained measurement error in the estimation process (Hair,Anderson, Tatham & Black, 2006).

Unlike logit, SEM tested hypothesis with a linear equation system by weighing individual scale items and investigating how variations in one variable affects variations in one or more variables based on correlation co-efficient (Hoe, 2008). The SEM technique has several approaches of weighing individual scale items which included total aggregation, total disaggregation, partial aggregation and partial disaggregation(Bagozzi & Heatherton, 1994). Partial disaggregation was the most preferred approach because of its practical applications that allowed use of large number of indicators to represent a latent variable(Garver & Mentzer, 1999), its insensitivity to measurement error and capacity to analyze information and holding the components distinct(Bagozzi & Foxall, 1996).

AMOS is a SEM program developed to create structural equation model with confirmatory analysis. It is intended to check distributional assumptions, such as univariate and multivariate normality, input data for missing observations and calculating summary statistics such as covariance and correlations(Lei & Wu, 2007). It consists of a set of linear structural equations with variables that were either observable or latent (theoretical) that were not observed but related to observed variables. In this case, the model demonstrated how increase in income, meeting market demand and differentiation(observable variables) related to Porters competitive forces and TAM predictors (latent variables) and ultimately influenced advantageous products

The model consisted of two parts; the measurement and the structural equation model. The measurement specified how Porter's forces and Davis predictors influenced advantageous product and measure reliability and validity of the observed variable(Diamantopoulos & Sigauw, 2000). The structural equation model specified the causal relationships among the latent variables, described the causal effects, and assigned the explained and unexplained variance. Finally the model estimated the unknown coefficient of the set of linear structural equations. It accommodated models that had latent variables, measurement errors in both Y and X variables, reciprocal causation, simultaneity, and interdependence. This hypothesis was measured using Amos model approach to create a structural equation with confirmatory analysis. The model demonstrated a set of linear structural equations with either observable or theoretical variables (latent).The approach tested hypothesized causal relationships and estimated structural portion of the model using Amos, a computer software program(Bentler, 2002). According to Bentler (2002), once the raw data is keyed in, the software generated the interactions, goodness of fit indices and standardized paths.

Model Fit Testing

To determine how well the model fit the sample datain hypothesis 3, the study adoptedchi-square, Cox and Snell R Square and Nagelkerke R Square and overall percentagebecause scholars advised that more than one test must be observed in determining goodness-of-fit(Bentler & Wu, 2002; Hooper,Coughlan, & Mullen,2008).

The Chi-Square(X^2) test evaluates overall model fit and the magnitude of discrepancy between the sample and fitted covariance matrices. At a significant threshold of 0.05,the model fits the data if the chi-square statistic is not significant and the model fails to fit the data if the chi-square data is significant (Barrett, 2007). Cox and Snell R Square and Nalgerke R squared are Pseudeo R^2 squared and both are used concurrently to enhance the accuracy of each other. Finally the overall percentage is used to correctly predict the model. The closer the prediction is to 100% the better model fits the data.

Standard paths and test for unidimentionality

Apart from goodness-of-fit indices, SEM established causal paths among the variables using statistical significance and standardized path coefficient (between -1 and +1) at α of 0.05 whose Amos output should be > ±1.96 to reject null hypothesis meaning that the structural coefficient is not zero(Bentler, 2002). The technique further examined the strength of variable relationships.

Table 3.9: Standardized Paths of Hypothesized Model

Hypothesis	Causal Path	Standardized path coefficient
H_1 a	Porters' competitive forces → Advantageous product	
H_2 b	Davis Technology Adoption → Predictors Advantageous Product	
H_3 c	Porter and Davis Determinants → Advantageous Product	

At least 0.20 and ideally above 0.30 are recommended bars for standardized paths and to be held meaningful for discussion respectively (Chin, 1998).

After evaluating the model fit, the study tested unidimensionality (existence of one construct underlying a set of items) using principal components(Germain,Droge & Daugherty, 1994). The eigenvalue >1 shall demonstrate unidimensionality or existence of a variable underlying a set of items.

Hypothesis 4

There is no significant difference in technology adoption between urban and rural agro-food processing firms in Kenya.

Under this hypothesis, the study sought ordinal data from Likert scale for comparing agro-processing firms in rural and urban areas. The studyusedMann-Whitney because of its nonparametric capabilities.The method is usable for both small samples by tabulation and large samples above 20 using normal distribution.

To calculate the U statistics, the researcher kicked off by ensuring that the data could be analyzed using a Mann-Whitney U test, that is; data of dependent variable(advantageous product) was ordinal which was realized through likert scale. Secondly, independent variables that Porter's competitive forces and Davis' predictors were categorized into two independent groups (town and rural). Thirdly, that independence of observation existed – there were different participants in each group without any participant being in all the groups. Finally, ensuring that the two variables were not normally distributed e.g. independent variables for town and rural firms came from different locations, though could have the same shape. The median of dependant variable (advantageous product) are compared for variables with the same shape and Mean ranks are compared when the dependent variables had different shape. The formula for calculating the U statistics is as below:

1. *U* is then given by:

$$U_1 = R_1 - \frac{n_1(n_1+1)}{2}$$

Where

n_1 is the sample size for sample 1, and

R_1 is the sum of the ranks in sample 1.

Note that it doesn't matter which of the two samples is considered sample 1. An equally valid formula for *U* is

$$U_2 = R_2 - \frac{n_2(n_2+1)}{2}$$

The smaller value of U_1 and U_2 is the one used when consulting significance tables. The sum of the two values is given by

$$U_1 + U_2 = R_1 - \frac{n_1(n_1+1)}{2} + R_2 - \frac{n_2(n_2+1)}{2}.$$

Knowing that $R_1 + R_2 = N(N + 1)/2$ and $N = n_1 + n_2$, and doing some algebra, we find that the sum is

$$U_1 + U_2 = n_1 n_2.$$

Because U statistics formula is in SPSS, new instead of legacy was used for same shaped dependant variables. Using the data output in SPSS, the researcher analyzed the ordinal data and compared the values of the two groups (town and rural firms) in table 3.11.

Table 3.11: Comparing *U* Statistics across Groups

Ranks				
Variables of technology adoption	The area where business is located	N	Mean Rank	Sum of Ranks
Perceived ease of use	Rural			
	Urban			
Perceived usefulness	Rural			
	Urban			
Behavioural intention to use	Rural			
	Urban			

According to table 3.11, the study compared the mean ranks of variable that only describes technology adoption. They include Perceived Ease of Use (PEU), Perceived Usefulness (PU) and Behavioral Intention (BI) to use technology.

3.8.4 Data Presentation

The statistics was explained by how far data tends to be scattered, spread, dispersed or vary from the mean by measures dispersion (variance, standard deviation and coefficient of variance to compare various groups of data) and closeness of data to the mean by measures of central tendency that is; the mean, median and mode.After data analysis, data was presented in various ways including use of statistics, graphs and a combination of both. The study also presented data by tables, charts and percentages.

3.9 Ethical Considerations

It was advised by Fowler (2009) that survey research needed to pay attention to ethical considerations so as to maximize the benefits and minimize costs as well as avoiding risks to participants. This study observed this condition by subjecting the proposal and data collection tools to Karatina University panel of experts and National Commission for Science, Technology and Innovation (NACOSTI) who scrutinized the details, recommended change on ethical issues and gave guidelines for carrying out the research.

Respect of respondents' volition and handling of their responses with confidentiality was also upheld by the study. Before they agreed to participate, the respondents were informed about the researcher, institution, purpose and benefits of the research. Finally the study observed ethical issues as stipulated in the table 3.12.

Table 3.12: Ethical Considerations

Competence	A researcher should not embark on research involving the use of skills in which they have not been adequately trained. To do so many risks harming the subject, abusing a subject's good will, damaging the reputation of the research organization and may involve wasting time and other resources.
Plagiarism	The use of other people's data or ideas without due acknowledgement and permission where appropriate is unethical.
Falsification of results	The falsification of research results or the misleading reporting of results is clearly unethical

Adapted from (Welman et al., 2005:152)

CHAPTER FOUR

FINDINGS, DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

The methodology in the previous chapter provided for data collection, analysis and presentation. This section describes all appropriate information produced by the research procedures and statistical analyses of the finding. The purpose of this chapter is to analyze, presentand interpret data in form of tables, graphs and figures combined with a brief narrativeand interpret the findings. The structure of this chapterstarts with introduction, followed by background information and analysis of advantageous product in agro-food processing firms in Kenya. The rest of the subsections are guided by the hypotheses.

H_{01}:The three of Porter's competitive forces (bargaining power of buyers, bargaining power of suppliers and rivalry among competitors) did not significantly influence agro-food processors to produce advantageous product (increasing income, differentiated product and meeting market demands).

H_{02}:The three of Davis predictors ("ease of use," "usefulness" and intention to use) had no significant influence on production of advantageous product (increased income, differentiated product and meeting market demands).

H_{03}:No relationship of the three of Porter's competitive forces and three of Davis predictors (bargaining power of suppliers, buyers, threat of competitors, perceived ease of use, usefulness and intention to use) had significant influence on the production of advantageous product (increased income, unique product and meeting market demands).

H_{04}: There was no significant difference in technology adoption between urban and rural agro-food processing firms in Kenya.

Out of the sampled 188 firms, 132 questionnaires were properly filled and returned. This represented 70 percent overall successful response rate which was attributed to use of self-administered questionnaire. This response rate was very good, according toBabbie (1990) who classified response rates of 50% asadequate, 60% good and 70% very good for analysis.

4.2 Background Information

This section addressed respondents' demographic and the firms' characteristics. On one hand respondents demographics included age, sex, marital status, designation and level of education. On the other hand the firms' characteristics were: age, registration status and period of operation, annual sales turnover, staff establishment and networks.

4.2.1 Age of the Respondents

Different age groups think differently and decide differently when adopting and using technology. This study sought to establish the age bracket respondents and found thatmost of the respondents n=73, (55.3%) were above 35 years old, with n=59, (44.7%) who were below35 years old.The findings implied that technology usage and acceptance by older adults was higher meaning that they had higher technology anxiety in realisingadvantageous agro-food products than youths.However, their low self efficacy and age-related challenges are likely to inhibitlearning and operating widely used and current technologies in agro-food processing.

4.2.2 Gender of the Respondents

The study examined gender effects on technology acceptance by Kenyan agro-food processors because of a long-standing cultural traditions and subjective social norms that not only defined gender role but also influenced perceptions of the two sexes on ease of use, usefulness and intention to use current technology for producing advantageous products. The survey results showed that most of the respondents n=87, (65.9%) were male with n=43, (32.6%) were female.

The study noted gender disparity in technology use among food processing entrepreneurs.It is implied that socio-cultural obstacles exist in Kenyan work environment that prevent women and favormale in accepting and making good use of technology available for food value-addition.The observed gender divide also could imply that female were technology averse, under-represented in higher-skilled and highly prestigious positions in the agro-food industry. Women in food manufacturing sector, therefore, must have missed out on their likelihood to improve their productivity and economic emancipation.

4.2.3 Marital status

Women and children in agriculture sector play important roles in production, processing and marketing. According to the findings most of the agro-food processors n=68, (51.5%) were married, n=48, (36.4%) of them were single and very few were widowed (7.6%). It implies that most agro-food processing businesses were family-owned. From the participants' observation field notes, majority of votes in the businesses were held by founders or by spouseparents or heirs. It could also be interpreted that marriage or family formed more positive attitude and response to current entrepreneurial and technological intentions among Kenyan agro-food processors.

4.2.4 Respondents' Designation

An understanding of the respondents' position and stake in the small food manufacturing firms was important because it would give the study a better picture to the process of deciding to acquire and implementing technology for advantageous products. The findings revealed that most of the respondents both owned and managed the food value-addition firms they worked for as shown in figure 4.1.

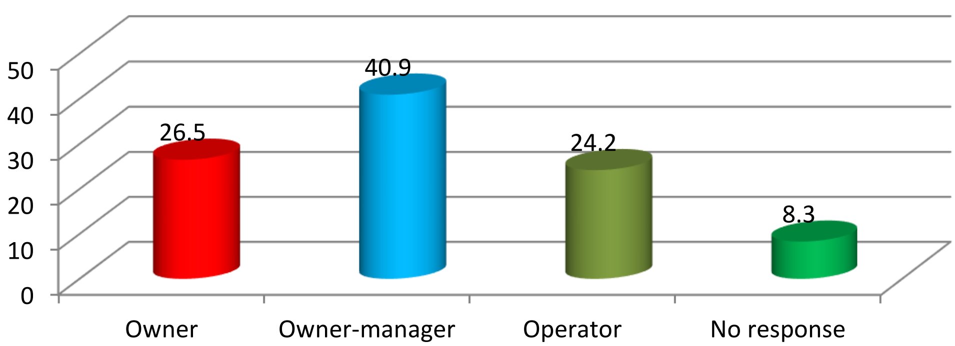


Figure 4.1: Respondents' Designation

Owner-mangers were entrepreneurs charged with duties of starting and running the enterprises. To a large extent they are responsible for both the failure and success of the venture. The results implied that owner-manageradopted technology more than the owners and operators. This could be because ofthe strategic commitment process and the financial justification process that solely lay in the on-hand entrepreneur's domain.

4.2.5 Highest Education Qualification

Behavioral intention to use technology, its perceived usefulness and ease of use depended on the level of firm manager's education. Education levels and type of programs entailed also have positive influence on entrepreneurial intention. The study investigated the respondents' education levels. MSEs in agro-food manufacturing were asked their level of education and found that most of the agro-food processors(34.1%) had secondary education as their highest level of education as shown in figure 4.2.

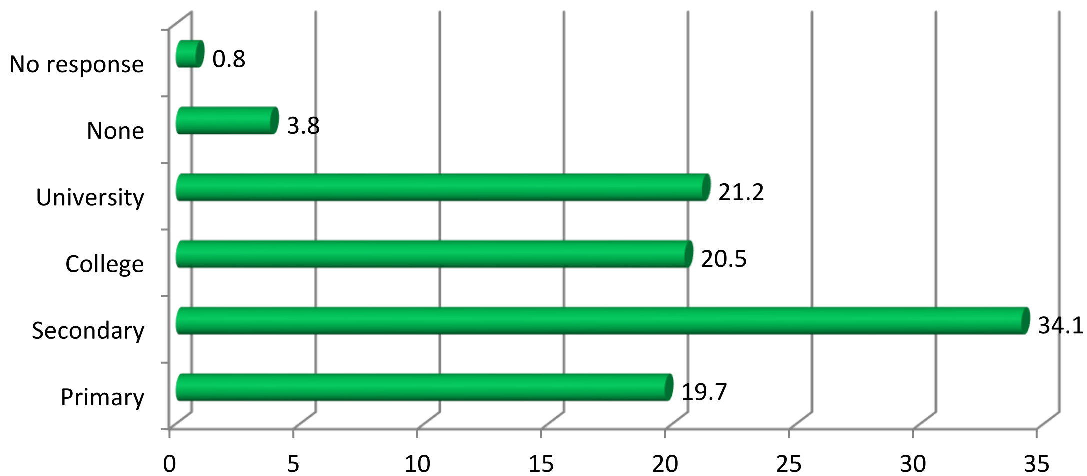


Figure 4.2: Highest Education Qualification of MSEs

Secondary school education in Kenya is part of the basic formal education package given to students usually at early formative age.Entrepreneurship and science or engineering related subjects are inadequate which is likely to inhibit quick up take of modern technologies.

4.2.6The MSEs'Registration Status

The information about firms' registration sought to understand the degree of formality of the firms.The study revealed that a little over 50% of the firms were registered. The numbers of registered and unregistered firms are almost the same.This means that formal economy is equal to the informal economy in the two counties. Though food manufacturing sector makes significant contribution to economic prosperity, from the participants observation there is inadequate attention by Busia and Nairobi County governments to address the MSE unmet needs. A review of official government documents shows a rare mention of the sector in the County Integrated Strategic Development Plans.

4.2.7 MSEs'Age, Size and Networks

The rate at which a firm adopted technology depends on its age, annual sales turnover, staff establishment and networks. The number of years a firm existed, the size and networks defined the firm's newness and associate smallness. The study found out that majority (70%) of the firms had been in operation for less than3 years. It was also revealed thatmost of the firms (65.9%) had annual sales turnover of Kshs0-500,000, permanent staff of between 1-10 employees (78.8%), majority (48.5%) of whom were natives from the county.Trade associations were perceived by most firms n=96, (72.7%) as valuable hence attracting food processor (56.8%) subscribe as members.The distribution of firms' age, size and networksareas are shown in table 4.1.

Table 4.1: Distribution of the Firm's Age, Size and Networks

Question	Reponses	Frequency	Percentage
For how long have you operated as a firm	0-3 years old	70	53.0
	4-7 years old	38	28.8
	8-11 years	11	8.3
	12- 15	4	3.0
	16 years and above	5	3.8
	No response	4	3.0
	Totals	**132**	**100**
Annual turnover	0 to 500000/=	87	65.9
	500001/= to 1 million shillings	38	28.8
	above 1.5 million shillings	2	1.5
	No response	5	3.8
	Total	**132**	**100**
Staff establishment on permanent basis	1-10 people	104	78.8
	11-20 people	16	12.1
	21- 30 people	3	2.3
	31- 40 people	2	1.5
	above 50 people	2	1.5
	No response	5	3.8
	Total	**132**	**100**
What county of origin do your staff belong	Within this county	64	48.5
	outside this county	41	31.1
	both within and outside this country	27	20.5
	Total	**132**	**100**
Are you a member of any association or trade group that addresses consumer values	Yes	75	56.8
	No	57	43.2
	Total	**132**	**100**
Do you think trade associations are of any value to your firm?	Yes	96	72.7
	No	36	27.3
	Total	**132**	**100**

The interpretation from the years of operation statistics is that most of the agro-food processing firms were at tender age. They are yet to come out of teething problems. The fear of death is very high at such an age due to the feebleness. Manufacturing firms operating at a turnover between 0 to 500,000 as indicated in table 4.1, implied a very low cash generation weak and unstable financial structures to warrant R&D investment, diversification and technology acquisition.Staff establishment data portrayed similarly a weak human resource base with inadequate exposure which poorly predisposed them to choosing current technologies for food value addition. Firms such as these are likely to suffer from leadership crisis, individualistic syndrome and inadequate structures to foster innovation. However firms werefound enthusiastic about trade networks/associations. The micro nature of the most of the firms could greatly gain from the collective efficiency that such networks come with as demonstrated in plate 4.1.

11th Community of Practice GAIN Conference at Jacaranda Hotel in Nairobi on 1/3/2016. This is a platform and network of agro-processors, technology fabricators, financiers, and consultants in food industry where sharing of knowledge, market, and exhibitons occur. The picture on the right is a banner of GAIN, the convenors, in the middle is exhibitons of various processed products and on far right are participants listening to conference proceedings.

Plate 4.1: Agro-food Entrepreneurs Networked to Share New Knowledge and Best Practice in Nairobi

4.3 Advantageous Products in Agro-Food Processing MSE in Kenya

Developing advantageous product is considered a critical success factor for micro and small business venture in agro-food processing industry. Advantageous products have superior performance with superior competitive advantage over the rest. Real advantageous products satisfy customer needs more effectively than competitors. This is achieved by designing products that increases the MSEs' income, meet market demand and are unique (have differentiated products).

4.3.1 Increase in the MSEs' Income

The quality of products that increase income make the firms earn positive economic profits. The study examined this variable by measuring the perceptions of the entrepreneurs about the products contribution to the firm's revenue, customer satisfaction, customer attraction, repeat buying, production costs, sales turnover and profit margins as compared to similar products in the market.

Products' Contribution to the Agro-food MSEs' Revenue

Yielding favourable financial returns by businesses to their investors is the primary goal of any enterprise. The study (under this section) examined how the products contributed to this primary goal by asking how they would rate the product's contribution in terms of revenue. According to the (mean=5.90)of 1to 7 scale it was found that majority of respondents n=122(92.4%) agreedthat the products' contribution to their MSEs' revenues werevery high as shown in table 4.2. The study also measured the dispersion of probability distribution and found a coefficient variation of 0.179 meaning that the standard deviation was about 18% of the mean and that the results were homogeneous.

Table 4.2: Products' Contribution to the Agro-food MSEs' Revenue

How would you rate the products' contribution to the firm's revenue	Frequency	Percent	Mean	Std. Deviation
Moderately low	2	1.5	**5.9084**	**1.06302**
Slightly low	2	1.5		
Neither high nor low	5	3.8		
Slightly high	33	25.0		
Moderately high	44	33.3		
Very high	45	34.1		
No response	1	.8		
Total	**132**	**100.0**		

The products were perceived by respondents to significantly contribute to the increase in incomes of the small agro-processing firms in Busia and Nairobi Counties. In other words, they were high dependablefor the livelihoods of the entrepreneurs and the firms' success. If the qualities of lives of the agro-processors have to improve, then much focus has to be on product innovation.

Customers'Satisfaction with the MSE Food Products

Customer satisfaction measured how products supplied by the agro-food processing firms met or surpassed the customer expectations. The mean =6.18 is so close to 7 on a likert scale of 1 to 7. It shows that the respondents believe that the customers are very satisfied. This is supported by n=106, (80.4%) shown as moderately and very satisfied in table 4.3. The study also found a coefficient of variance of 0.13 meaning that the standard deviation was 13% of the mean which implied a high congruence among respondents to the fact that customers were satisfied with the products produced by agro-food processors.

Table 4.3: Customer Satisfaction with the Products

	Frequency	Percent	Mean	Std. Deviation
Slightly dissatisfied	1	.8	**6.1818**	**.80853**
Neither satisfied nor dissatisfied	1	.8		
Slightly satisfied	24	18.2		
Moderately satisfied	53	40.2		
Very satisfied	53	40.2		
Total	**132**	**100.0**		

The perception of respondents implied that customers were very satisfied with the products an indication that they derived benefits from the goods produced by the micro and small processors in the food industry. This is likely to result into repeat customers as evidenced in table 4.4.

The MSE's Food Products Attraction of More Customers

This section sought to determine how agro-food processing enterprises contributed to their business growth through opportunities of customer attraction. The respondents were asked if the product is attracting more customers. According to the study most respondents123(93.2%) agree that the products attracted more customers as shown in table 4.4. A coefficient of variation of 0.1476 was gotten indicating that standard deviation was about 15% of the mean implying that the there was a greater congruency on the fact that the food products attracted more customers.

Table 4.4: Influence of Products on Firm's Income

	Very untrue	Untrue	Somewhat untrue	Neither true nor untrue	Somewhat true	True	Very true	Mean	Stdv
The product is attracting more customers			2(1.5)	7(5.3)	16(12.1)	64(48.5)	43(32.6)	**6.0530**	**.89370**
The product has more repeat-buying than the rest		9(6.8)	4(3)	5(3.8)	32(24.2)	46(34.8)	36(27.3)	**5.5909**	**1.37010**
It costs less to produce the product compared to related once	3(2.3)	26(19.7)	21(15.9)	24(18.2)	18(13.6)	31(23.5)	8(6.1)	**4.1679**	**1.66942**
The product has higher sales volume/turnover than others		6(4.5)	6(4.5)	16(12.1)	29(22)	41(31.1)	33(25)	**5.4656**	**1.35475**

It is evident that the entrepreneurs were optimistic about the future and the enterprises had potential to evolve into more vibrant and successful ventures. The findings also implied an established relationship with key customers that need close coordination with key suppliers with intention of increasing value and decreasing cost in the overall supply chain.

Repeat-buying of Advantageous Products manufactured by MSEs

Economic success of any manufacturing enterprise depends on its ability to maintain long-term relationship with clients who buy its products repeatedly. The repeat buying behavior of customers is important for this study to ascertain the consumption patterns for the products and repeat purchase drivers for the consumers. The MSEs in agro-food industry were asked whether the products had more repeat-buying than the rest.According to table 4.4, it was perceived by majority of respondents as true that products had more repeat buying than others n= 114(86.4%). The study determined a CV=0.245 showing a standard deviation of about 25% of the mean and that there greater consensus on the fact that there were repeat buying among the food processors. It is could be interpreted that the MSEs in agro-food industry experienced some customers buying the products far more frequently than others.

Relative Cost of producing Advantageous Product

Studying cost of production is important for MSE in agro-food processing for decision-making process. The question was posed to respondents to determine whetherit cost less to produce the product compared to related once.At a mean of 4.1679; n=57(43.2%)as shown in table 4.4,it was established that it was neither true nor untrue that costs ofadvantageous production are lesscompared to similar ones. The study found CV =0.4 implying that standard deviation was 40% of the mean which is slightly below average dispersion of responses. Most respondents did not agree on the fact that it was cheaper to produce an advantageous product. Because the mean is close to the middle of the 7 scale point the study did an independent-samples t-test to compare the means between two unrelated groups on the same advantageous product. On average MSEs do not spend a statistically significant different amount on producing advantageous product(4.19 ± 1.68 KSH) than they spend on producing the related ones(3.00 ± .00 KSH),*t(129) = .997, p = .321, sig > .05, 2 tailed.* As shown in independent sample t-test tables 4.47&4.48 in the appendix.It is concluded therefore that the difference of means between production cost for the advantageous products and related products is 0.

Comparative Sales Volume of Advantageous Product

The study also sought to determine the comparative sales volume of agro-food processing firms so as to understand their marketing plans and strategies to turn the sales into profit. Table 4.4demonstrated a mean of 5.4656 on a scale of 7which is highmeaning that most respondents agreed that their products had higher sales volume than others. This is reinforced with n=74(56.1%) as a combined true and very true responses. A coefficient of variation was found to be0.24 showing a very a low dispersion from the mean. Implied in this is that the MSEs were aware of right approaches to reach target customers and managing customer relations. However, right technology could significantly improve their selling efficiency.

The MSEsProduct's profit margin compared to other related products

Strong sales growth is meaningless if firms allow costs to increase disproportionately. Profit margin is earnings as a percentage of sales. This section sought perceptions of entrepreneurs' profit margins in relation to their competitors. The study questioned the agro-food processors perceptions on the product's profit margin levels compared to other related products in the market.The study revealed that n=110(83.3%) and mean=5.51 agree that the products profit margin were above other related products in the market as shown in table 4.5. the coefficient of variation was 0.20 implying a standard deviation being 20% of the mean. This is very low indicating very low dispersion or high consensus in the responses.

Table 4.5: Advantageous Product's Profit Margin Compared to other Products

How good is the product's profit margin compared to other related products in the market?	Frequency	Percent	Mean	Std. Deviation
Slightly below	5	3.8	**5.5191**	**1.11183**
Neither above nor below	16	12.1		
Slightly above	49	37.1		
Moderately above	28	21.2		
Far above	33	25.0		
No response	1	.8		
Total	**132**	**100.0**		

The products' profit margins are above average meaning that the entrepreneurs' perceived their firms doing better than the competitors due to technology. Comparatively profitable firms attract investors. These firms have the potential of attracting foreign direct investment. It could also mean that they used thetechnology and other resources at their disposal efficiently.

4.3.2 The Product Meeting Market demand

Supply and demand is most popular economic analysis model explaining price and other market related phenomena. Market demand being the sum of products consumers are willing and able to buy at a given prices in a given time has becomea primary concern of highly performing firms. This section analyses how firms have adopted a market-oriented culture whereby they design products that would meet both local Kenya Bureau of

Standards (KEBS) and international market standards, rich in nutritive value, well packaged, with quality and quantity required and eco-friendly.

Kenya Bureau of Standards (KEBS) Certification of the Products

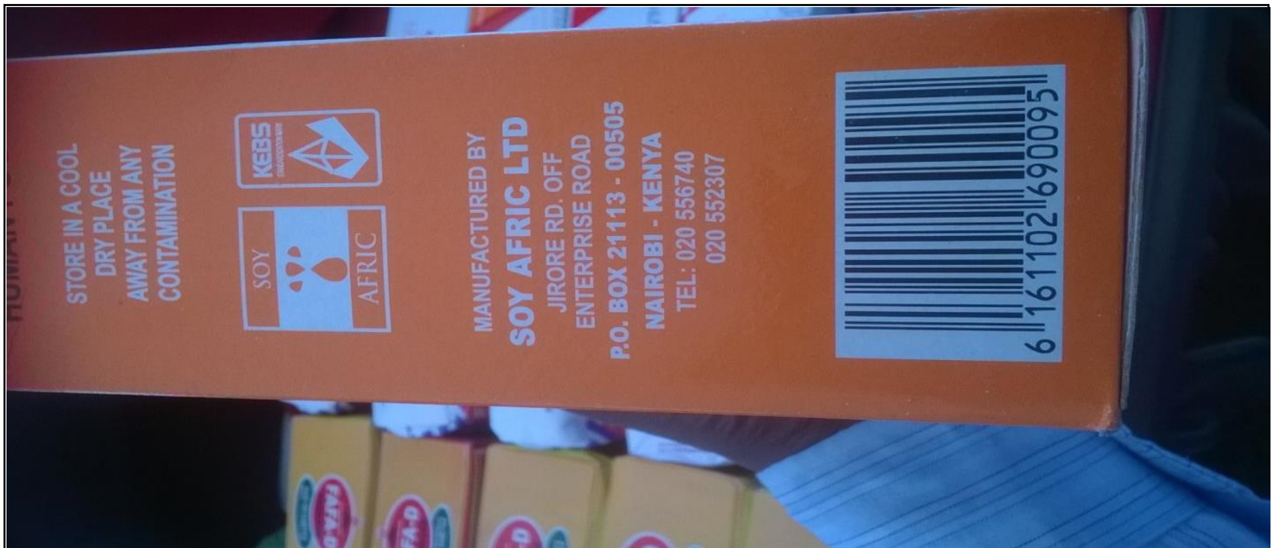
The proliferation and increase in stringency of food safety and agricultural healthstandards are challenges to many agro-food processing firms in Kenya. Kenya Bureau of Standards (KEBS) is an institution that provides internationally accepted standards. It measures and monitor if enterprises and their products conformed to customer needs. The study sought the respondents' perception on KEBS certifying their products. The respondents were asked if the products were licensed by KEBS to be sold within Kenya. The findings are that about half of the respondents n=78(49%) at mean = 4.87 agreed that their products meet KEBS requirements.

A mean-free measure of variability was also done and CV=0.3523 was found showing a low dispersion and high congruence in answer that the products met KEBS requirement. It was found out that with a (mean=4.87) on a seven-scale point most of respondents neither agree nor disagree that the products are licensed as shown in table 4.6. This prompted the study to do an independent sample t-test to ascertain if the difference in the means of MSEs of those who were certified by KEBS and those weren't is 0. The findings demonstrate that on average, those MSEs who had their products certified by KEBS have statistically significantly higher products sold in Kenyan market (4.91 ± 1.69 sales) than those MSEs who were not certified by KEBS(2.00 ± .00 sales), $t(129) = 2.428$, $p = .017$, $sig \leq .05$, *2 tailed*. This implies that there is significant difference in means of sales between MSE's products with KEBS diamond mark and MSEs products without KEBS diamond markas shown in tables 4.47 and 4.48 in the appendix.

Table 4.6: Products Meeting Market Demand

	Strongly Disagree	**Disagree**	**Slightly disagree**	**Neither agree nor disagree**	**Slightly Agree**	**Agree**	**Strongly agree**	**Mean**	**Stdv**
The products are licensed by KeBS to be sold within Kenya	3(2.3)	12(9.1)	18(13.6)	20(15.2)	16(12.1)	37(18)	25(18.9)	**4.8702**	**1.71597**
The products meet international conventions (external markets) demands	14(10.6)	34(25.8)	12(9.1)	33(25)	16(12.1)	12(9.1)	9(6.5)	**3.5769**	**1.75148**
The products have added nutritive value	1(0.8)	3(2.3)	6(4.5)	4(3)	11(8.3)	66(50)	39(29.5)	**5.8846**	**1.21766**
The products' packaging is competitively good	5(3.8)	3(2.3)	7(5.3)	8(6.1)	25(18.9)	50(37.9)	34(25.8)	**5.6850**	**1.22605**
The products meets the market quantity required	1(0.8)	7(5.3)	5(3.8)	15(11.4)	33(25)	34(25.8)	33(25)	**5.3906**	**1.43211**
The products meets the market quality demand	1(0.8)	1(0.8)	5(3.8)	9(6.8)	23(17.4)	50(37.9)	41(31.1)	**5.8154**	**1.18639**
The products and production processes are eco-friendly		3(2.3)	2(1.5)	2(1.5)	24(18.2)	50(37.9)	50(37.9)	**6.0305**	**1.06655**

On either side of the vote it was clear that many firms and products currently do not conform to the standards. According the interviews of KEBS officials as key respondents, the most agro-food MSEs have not been able to be certified because of the financial and hygiene costs involved. One MSE respondents dropped the certification because the enterprise could not meet annual renewal fee of over Kshs. 60,000/= for the two products they were manufacturing.



Soy Afric Ltd Case: Soy Afric Ltd is an MSE manufacturing functional foods in Nairobi. This picture shows a packet of nutrition flour of Soy Afric as a company that has met KEBS standards and has been given a diamond mark to sell in Kenyan market. The company has also acquired bar codes, a unique mark for the product, enabling it to sell currently in Nakumatt, Uchumi and Turskys supermarkets using automated systems.

Plate 4.2: Soy Products Approved by KEBS for the Market

Micro and Small agro-food processors need to improve their products to meet KEBS requirements in order to competitively survive the local markets. This gives opportunity to technology to leverage on efficiency and quality standards advantageous products need.

MSEs Advantageous Products meeting external market demand

The fast changing standards environment at the global market impacts strongly on existing firms and their competitors. On one hand, some firms use high quality and safety standards as a competitive strategy to outdo others. On the other hand, the standards have been used discriminatorily and as a protectionist strategy on international market. This section examined from standards-as-barriers perspective to better understand the strengths and weaknesses of agro-food processing firms in Kenya and turn them into gainers rather than losers in the emerging business and regulatory situation. On enquiring whether the products met international conventions demands the study found a mean of 3.5769 on a scale of 7; n=60(45.5%) as shown in table 4.6.The findings are below average meaning that most respondents perceived the products as not meeting the international standards. The study also sought to measure meeting external market dispersion and found coefficient of variance 0.489 implyingan average consensus and dispersion of sampled data.

A bird's view of Bama market structures

Bama Market Case: Meat carried on human back and hips of butchery wastes at the entrance.

Plate 4.3: Infrastructure, Food Handling & Waste Management at Bama Meat Processing Site

This market is on Jogoo Road in Nairobi. It is known for primary meat processing.Bama market products are examples of products that cannot be licensed to penetrate strict markets like European unions and AGOA, because of unhygienic processes that product pass through. Unless MSEs improve on food handling and environmental issues surrounding their places of work, it stands to be difficult for the food products to meet the international market standards.

Agro-food Product Nutritive Value Determination

Many agro-food processing firms have tables of the nutrient composition on their products to help customers assess the nutritional values in the product that they need. It was important to explore the nutritive values of the products because customers use the values tables to informtheir decision-making processon whether to accept or reject the product. Data collected from the respondents was meant to present the picture of nutrition and health status of products currently produced through the respondents' perceptions.Respondents were asked on whether their products have added nutritive value. The majority of the respondents n=105(79.5%) agree and strongly agreed that the products had added nutritive value with a mean of 5.8846. A measure of nutritive value determination dispersion was carried out and CV=0.20692 was found meaning that standard deviation was about 21% of the mean. This is a very low dispersion implying high congruence in the responses.It also means that the products have a good potential of satisfying the emerging markets demanding for healthier foods. MSEs in food processing have to acquire a fast and efficient technology such as *Microdiet Software* that would analyse nutritional content of many food products at a short time.

Packaging of the products by the Agro-food Manufacturing MSEs

Mature consumer packaged goods exhibits extrinsic value of their products competitively. The extrinsic value is the appearance and general image of the product. How the agro-food product would appear on the shelf would influence the customer behaviour toward either picking it or dropping it. When asked if their products were competitively packaged, most of the respondents n=84(63.7%) in table 4.6 admitted that the products were well packaged (agreed and strongly agreed).This is corroborated by the Mean of 5.685 which is above average on a 7 point scale. A mean-free of measure of variability was carried out and realised 0.2156 as coefficient of variance. In other words standard deviation was about 22% of the mean which is a very low dispersion. Implied by these results is that the MSEs appreciated packaging as a competitive strategy. They have to employ eco-friendly and attractive packet that would meet global market demand that is environmentally conscious. It implies that the agro-processors have to go for hi-tech technologies that can make decomposable and eye-catching packets.

Products meeting the Quantity and Quality required by the market

Whereas quantity refers to the measure of the amount of food product that buyers are willing and able to buy at a certain price, quality is the perceived utility value of the food product. Consumers compare values the products provide and choose to purchase those with greatest utility. On enquiry of the same from the micro and small firms in Kenya, on whether the products met the market quantity required the results were mean of 5.3906; n=100(75.5%) as shown in Table 4.6. This indicates that majority of the MSEs agreed that they produced to the quantity demanded by market. A coefficient of variance as0.26566801 was realised. This is quite low implying a greater consensus over the quantity supplied by MSEs in food processing meeting the market requirements. An independent sample t-test is carried out to compare means of products quantity meeting required market demand between two groups that agree and do not agree. As shown in tables 4.47 and 4.48, the volume required in the market is statistically significantly lower for MSEs who disagree (2.00 ± 00) compared to those who agree (5.44 ± 1.38), $t(126) = 3.523, p = .001, sig \leq .05$, *2 tailed*. The study concludes that the difference between the disagreeing group and the agreeing group is different from 0. The null hypothesis is rejected therefore and the most preferred hypothesis states thatMSEs food products met the market quantity required in the market.

The respondents were also asked if the products met the market quality demand. Majority of the respondents, mean 5.8154, n=114(86.4%) agreed that their products met the quality required in the marketas in Table 4.6. The study also sought to measure dispersion of probability distribution which gave 0.2040 as the coefficient of variance meaning a very low dispersion and high congruence among congruency on the matter in question, most of the respondent agreed that their products met the quantity and quality needs of the market respectively. A gain an independent t-test is done asshown in tables 4.47 and 4.48 to check if the means between the two groups is 0. The results show that the quality required in the market is statistically significantly lower for MSEs who disagree (2.00 ± 1.414) compared to those who agree (5.88 ± 1.09), $t(128) = 4.99, p = .00, sig \leq .05$, *2 tailed*. The study concludes that the difference between the disagreeing group and the agreeing group is different from 0. The interpretation is that the firms appreciated mass production as a way of making the product advantageous in quantitative perspective. Given their smallness, these two attributes of advantageous products could be leveraged by current technologies in food industry to meet contemporary customers who are more enlightened and their food habits tend to align with food that are safe and of high quality.

Agro-food MSEs Production Processes Meeting Eco-friendliness Market Demands

Ecopreneurship has emerged as a new solution to present environmental problems and an alternative to past business strategies that failed to address environmental degradation. An advantageous product, according to ecopreneurship, is an environmentally conscious product whose process of manufacture is designed to reduce carbon footprints, lighter and smaller packaged, convenient to customers and with minimal wastage. The respondents were asked whether their production processes were eco-friendly. In reference to table 4.6, the findings showed that majority of the respondents n=124(94%) and mean of 6.0305 perceived their products to be eco-friendly. A very low coefficient of variance 0.1768 was realised suggesting a standard deviation of about 18% of the mean implying a very high consensus. The findings demonstrated that the innovations in food value addition served two purposes; their business purpose and preservation of the natural resource. However, eco-friendly standards are hard to do and expensive especially to MSEs. The plate below shows how MSEs in agro-food industry keep and break the eco-friendly standards before they come up with the final products.

Plate 4.4: Environment Unconscious Packaging versus Environment Conscious Packaging

According to plate 4.4, a comparative scene of plastic packaging but processing using renewable energy (Sun) and packaging using decomposable boxes but processing using electricity non renewable energy is common among MSEs in agro-food industry. MSEs, therefore, need to keep the process to be eco-friendly to the end if they have to explore the emerging market of eco-friendly products.

The Market Served by the MSE Products

This section sought to classify customers and users of agro-food processed goods in Busia and Nairobi Counties to markets in Kenya, AGOA and East African Community. According to the study most of the respondents sold their products in the Kenyan market and a minimal number 3(2.3%) sold in the AGOA as shown in table 4.7.

Table 4.7: The Market Served by the Products

Market	Frequency	Percent
Kenyan Market (domestic)	123	93.2
AGOA	8	6.1
East African community	3	2.3

Data from Export Processing Zones (EPZ) indicate an increase in domestic sales from KSHS 3,350 million from 2010 to Kshs 3,623 million in 2014. African Growth Opportunity Act (AGOA) which grants manufacturing MSE within eligible Sub-Saharan African countries to sell their value-added products in American market duty free and gives US investors confidence in the partner countries has recorded a notable increase in the value of exports despite reduction in the number of MSEs participating in the trade. The study statistics show a poor participation of the agro-food processing MSEs in this market implying that they are likely to miss out not only on good export incomes but also attracting foreign direct investment, especially on the East African Community market despite its proximity.

4.3.3 Differentiated Products

Among agro-food firms in Busia and Nairobi Counties, the study investigates whether the products were unique through measuring the respondents' perceptions. It enquired on difference of the products from the competitors, the products' unique benefits, protection of product formula, frequency of improvement and type of products processed. The study also sought an understanding on whether the nutritive values were determined, who determined them and if the products were patented.

MSEs Products Differentiated from the Competitors

Preference for variety by customers in food market has caused agro-food processing businesses invests a lot in differentiating their products from those of their rivals. The respondents were asked if the MSEs products were different from the competitors. The survey results showed that n=114(86.4%) with a mean=5.53 which is above average on a 7 point scale indicate that their products are differentiated as illustrated in table 4.8.The study also found a coefficient of variance of 0.184 which suggests a very low dispersion from the mean. It can also be interpreted that the consensus was very strong on the fact that MSEsproducts were differentiated.

Table 4.8: Respondents Perception on Whether MSEsProducts were Differentiated

The products are unique	Frequency	Percent	Mean	Std. Deviation
Untrue	2	1.5	**5.5385**	**1.02037**
Somewhat untrue	2	1.5		
Neither true nor untrue	12	9.1		
Somewhat true	43	32.6		
True	50	37.9		
Very true	21	15.9		
No response	2	1.5		
Total	**132**	**100.0**		

As shown in tables 4.47 and 4.48 in the appendix, an independent sample t test is done compare the means of the MSEs who agree that the products are differentiated and those who disagree. From the findings the products that are not differentiated are statistically significantly lower (2.00 ± 1.41) compared to those that are differentiated (5.5625 ±

1.00), *t(128) = 2.180, p =.031, sig ≤ .05, 2 tailed*. The study concludes that the difference between the disagreeing group and the agreeing group is different from 0. The null hypothesis is rejected therefore and the most preferred hypothesis states that MSEs food products were differentiated.The perceptions of the entrepreneurs on differentiating their products were to a large extent positive.The positive perception of differentiating the products is a pointer to the MSEs desire to innovate, that is designing improved products that no competitor can match. They needed hi-tech technologies to bolster this by either adding something real to their products or advertisingto create a perception among the buyers thattheir products are different.

Production process difference from competitors

The principal of the means justifying the end guided the study to investigate if the firms' processes were unique from the rivals'. The respondents were asked if they perceived their production process as different from the competitors'. Again most respondents n=108(81.8%) accepted that their production processeswere different from that of their competitors (mean=5.36) as shown in table 4.9. The strength of consensus was measured by coefficient of variance (0.1928) which is also very low meaning a strong consensus observed on the fact that production process was different from the competitors.

Table 4.9: Production Process Difference from Competitors

	Frequency	Percent	Mean	Std. Deviation
Similar	2	1.5	**5.3692**	**1.03533**
Slightly similar	3	2.3		
Neither different nor similar	17	12.9		
Slightly different	47	35.6		
Different	45	34.1		
Very Different	16	12.1		
No response	2	1.5		
Total	132	100.0		

The results showed that production process is slightly different from those of competitors producing the same products in the market.The slight difference prompted the study perform an independent sample t test to check if the difference between the means was 0.As shown in tables 4.47 and 4.48 in the appendix, the production processes that were not differentiated from the competitors are statistically significantly lower (3.5 ± 0.707) compared to those who are differentiated from competitors (5.394 ± 1.01), $t(128) = 2.632$, $p = .01$, $sig \leq .05$, *2 tailed*. The study concludes that the difference between the non differentiated production process and the differentiated production processes is different from 0. Based on the rule of thumb of interpreting p-value, the null hypothesis is rejected and the alternative adopted. The study confirms that the MSEs production processes were different from the competitors'. It is extremely complex and costly to integrate such technology in the operations of such small firms.

Uniqueness of products benefits to the customers

This section sought to understand if benefits enjoyed by their customers could be replicated by competitors. Survey results (mean=6.03), n=114(86.3%) showed that the products benefits are inimitableto some extend by the competitors and thus unique. A coefficient of variance of about 100% was realized implying that the responses were very varied or very little consensus was observed among the respondents.

Table 4.10: Uniqueness of Products Benefits to the Customers

How unique are the product benefits to customers	**Frequency**	**Percent**	**Mean**	**Std. Deviation**
Very imitable	1	.8	**6.0308**	**6.35261**
Imitable	1	.8		
Slightly imitable	2	1.5		
Neither inimitable nor imitable	11	8.3		
Slightly inimitable	46	34.8		
Inimitable	52	39.4		
Very inimitable	16	12.1		
No response	2	1.5		
Total	132	100.0		

Implied by statistics in table 4.10 is that the firms, food products had unique flavors, efficiency or comfortsthat the customers could not get in any other substitute products. The study did a different test to verify if the customers were satisfied with differentiated products. The results are as shown in thetables 4.47 and 4.48, on average the benefits enjoyed by the customers of the MSEs is not statistically significantly different (6.07 ±

6.39) compared to those benefits enjoyed by customers of competitor's products (3.5 ± 0.707), *t(128) = 0.566, p =.572, sig > .05, 2 tailed*. The study concludes that the difference between the product benefits enjoyed by the customers of the MSEs and the product benefits enjoyed by the competitor's customers is 0. The null hypothesis is accepted.The lessons learnt from the findings are that MSEs in agro-food industry perception of differentiated product and customer satisfaction were related. This has positive implications for the entrepreneurs' behavioral intention to acquire right technologies as instruments for designing differentiated products that satisfy customers' varied tastes and preferences.At the level of satisfying the customers, their switching costs would be expensive and therefore likely to enjoy loyalty.

Production Formula Protection from the Competitors of Agro-food MSEs

A formula is an expression of an idea or theory on how to get a solution, in this context an advantageous product. Designing a highly performing product is a fruit of rigorous mind's work and research that establishes formula to consistently produce it. In a highly competitive and technology proliferated environment it is useless to develop a highly performing product formula if not protected from competitors. Unprotected formula makes products susceptible to imitations. This study therefore surveyed the firm managers' perception of the same and found that majority n= 63(74.2%) secured (protected and very protected) their formula from the competitors.The mean of 5.0846 being above average also confirmed that the formulas were protected as illustrated in table 4.11.The study also did a 'mean free' measure of variability and found a coefficient of variation of 0.29; that is, standard deviation is about 30% of the mean. The responses were not very varied, meaning that there was considerable consensus among MSE food processors that production formulas were protected.An independent sample t-test is done to compare the means of MSEs who protect the production formula and the MSEs who don't as shown in tables 4.47 and 4.48. The production formulae that are not protected are statistically significantly lower (3.00 ± 1.41) compared to MSE who protect the production formulae (5.12 ± 1.48), *t(128) = 2.004, p =.047, sig ≤ .05, 2 tailed*. The study concludes that the difference between the unprotected production formulae and protected production formulae is different from 0. The null hypothesis is rejected therefore and the most preferred hypothesis states that the MSEs protect their production formulae.

Table 4.11: Production Formula Protection from the Competitors

How protected is your production formula from your competitors	Frequency	Percent	Mean	Std. Deviation
Unprotected	13	.8	**5.0846**	**1.49953**
Slightly unprotected	9	.8		
Neither protected nor unprotected	15	1.5		
Slightly protected	30	8.3		
Protected	43	34.8		
Very protected	20	39.4		
No response	2	1.5		
Total	132	100.0		

The findings imply that most MSE products are as a result of predetermined design of mixing various raw materials and through clear stages of manufacturing developing into a final food. Formula security is the first step towards protecting intellectual property of any firm. It is through the formula that the micro and small agro-food processors in

Kenya could apply and enjoy intellectual property rights granted by government authorities and the results indicate that they have a good start of securing the formulas.

Patenting of the Products

Patenting is a way of granting protection to innovations in the country against competitors. Emergence of the field of intellectual property protection has necessitated this to protect firms' products against imitation. Respondents were asked whether their products were patented. The findings showed that most products n=81, (61.4%) were not patented as shown in figure 4.3.

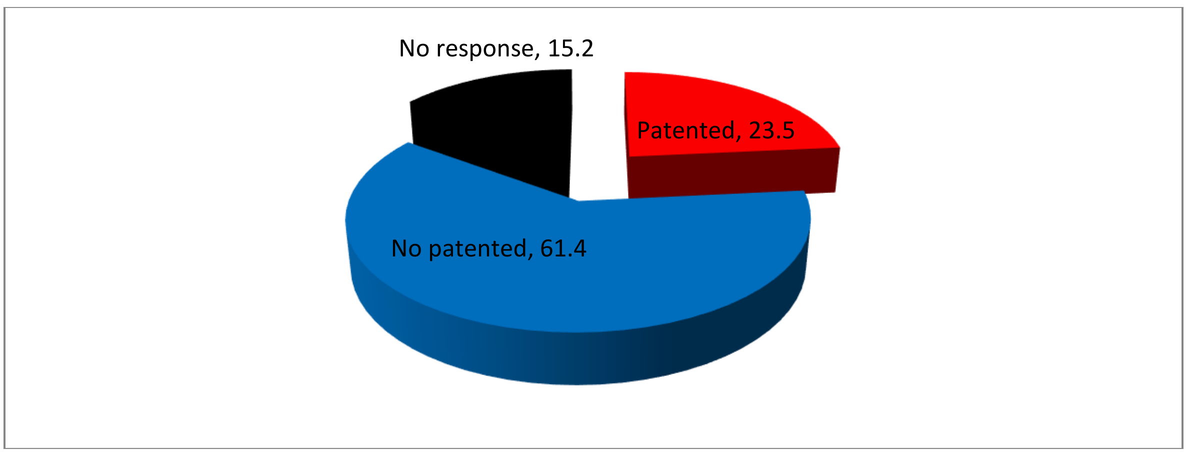


Figure 4.3: MSE Products Patented

It implied that most products had neither copyright nor trademark granted by the government authorities in the countries they operated in. A trademark is a sign, logo, shape or word distinguishing a product from its competitors. According to the results, most MSEs had no trademarks, meaning that they risk losing out on a set of rights granted to outstanding, novel food products. Currently theMSEs intellectual property and innovations were open to competitors' exploitation and counterfeits are riding on goodwill of the MSE's brands.

Frequency of products improvement

It is not enough to make unique products because practical experience has demonstrated that businesses that are not able to improve their products as quickly as their competitors run down. Continual improvement has thus become such an important strategy of keeping firms competitive and meeting new quality management standards by ISO. Prompted by these reasons, the study probedthe micro and small agro-food manufacturers on the frequency by which they improved their products. The highest number of the respondents n=111(91.7%) were of the opinion that the firms frequently improve their products. This is confirmed by the mean=5.680 that is above average on a 7 scale measure that was used as shown in table 4.12.

The study also determined coefficient of variation as 0.17684 which is indicates that the standard deviation is about 18% of the mean. It could also be interpreted that the frequencies of responses on production improvement were less dispersed. An independent sample t-test is done to compare the means of the group who agree and disagree on the frequency of improving the product. The results are as shown in thetables 4.47 and 4.48, on average the frequency to improve the products is statistically significantly different (5.72 ± 0.96) compared to MSEs did not frequently improve the products (2.00 ± 0.00), *$t(127) = 3.878$, $p = .000$, sig $\leq .05$, 2 tailed*. The study concludes that the difference between the means of MSEs who frequently improved their productsand the MSEs who did not frequently improve their products is different from 0. The null hypothesis is rejected. The lessons learnt from the findings are that the differences of means in write between the MSEs who frequently improve the product and those who did not frequently improve the products.

Table 4.12: Frequency of Products Improvement

How frequent do you improve your products	Frequency	Percent	Mean	Std. Deviation
Very rarely	2	1.5	**5.6899**	**1.00622**
Rarely	5	3.8		
Neither frequent nor never	1	.8		
Occasionally	38	28.8		
Frequently	60	45.5		
Very frequent	23	17.4		
No response	3	2.3		
Total	132	100.0		

The interpretation here is that the small and micro agro-processing enterprises have embraced quality-minded philosophy, but quality improvement issues involve complex systems that demand for numerous processes, functions and departments within a firm which might not be an easy task for such small firms. If the MSEs in agro-food processing firms have to survive the effects of globalization and foreign competition, managers of the firms have to embrace quality improvement by involving workflow, customer service, communication, data management and other related functions that are within their reach.

Specific Products Processed

The focus on the specificities of products processed by the food manufacturing firms in Busia and Nairobi counties would inform the study in the designing to provide essential resources and technologies to underpin and support the implementation of specific interventions for specific products.Fresh fruits n=22(16.7%), milk n=16(12.1%) and wheat n=11(8.3%) products were the most preferred products. The least preferred products were sweet potatoes, sunflower and beans which are all n=2(1.5%) as shown in figure 4.4.

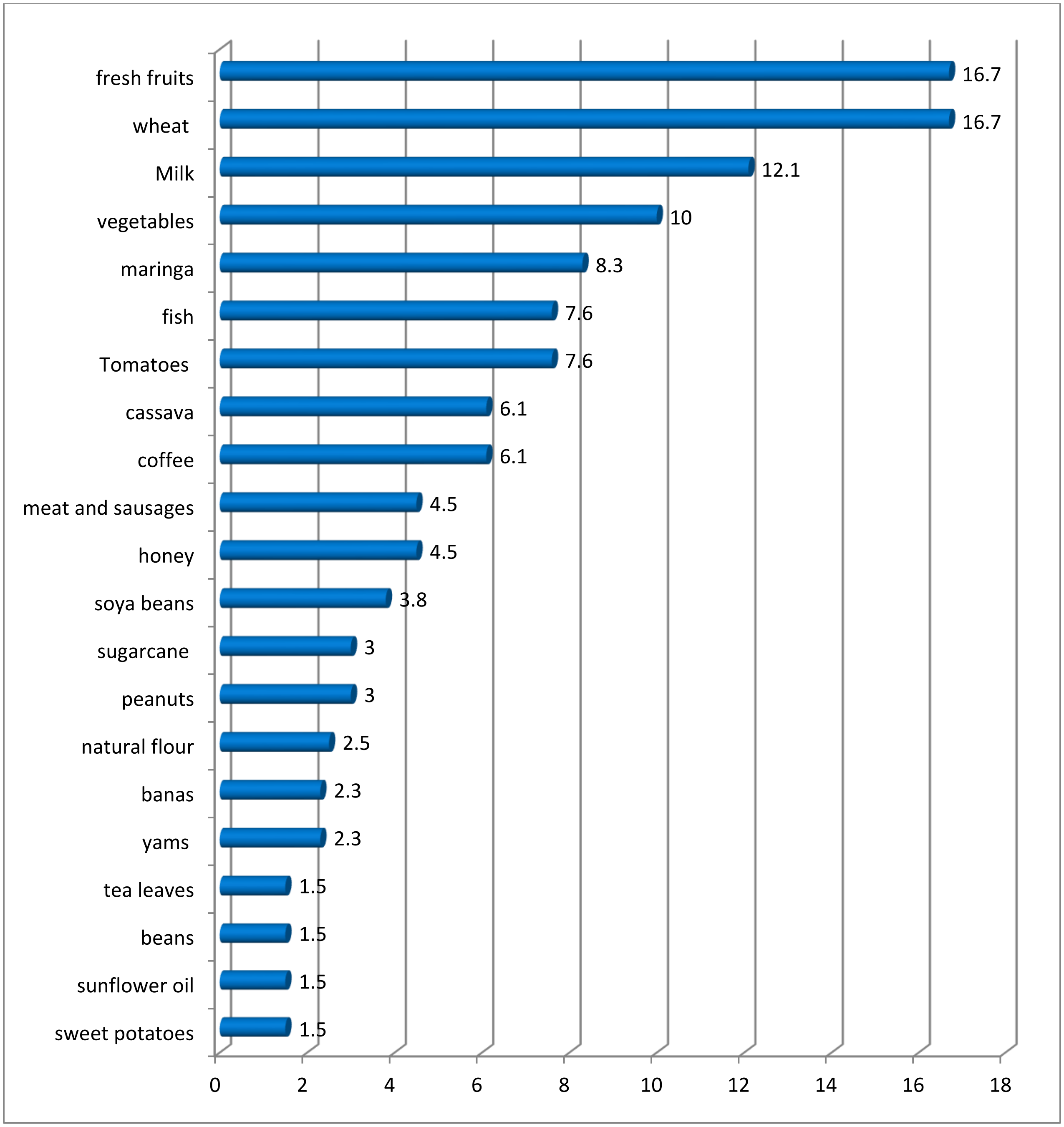


Figure 4.4: Specific Products Processed

The data implies that most MSEs engaged in processing of fresh-cut tropical fruits and vegetables. These are highly perishable products that needed special trade practicesthataddressed shippers–retailers relationship, food safety, volume and refrigeration innovations.

Nutrition value determination

Nutrition value determination is intended to help consumers make a choice on the food products. They inspire food manufacturers to design unique products that are healthier and are of customers' choice. The study therefore sought to know if the products nutrition value had been determined. It was revealed that most of the MSEs in food industry n=88(66.7%) had their products nutrition contents determined.From the participants observation those agro-processors who determined their products placed it nicely at the back of their packs as shown in Plate 4.5.

Plate 4.5: Composite Flour Products for Babies with Established Nutritive Value

Plate 4.5 demonstrates a how entrepreneurs portray nutrition value of their products as a selling strategy.Further the study sought to understand the type of agencies that determined the food nutrition contents for the MSEs. The findings were that most respondents n=88, (66.9%) decline disclose who determined their product nutrients. However for those who disclosed, most of the MSEs n=48(37.1%) their nutrition value was measured by private agencies and least 6.1% were determined by NGOs as shown in figure 4.5.

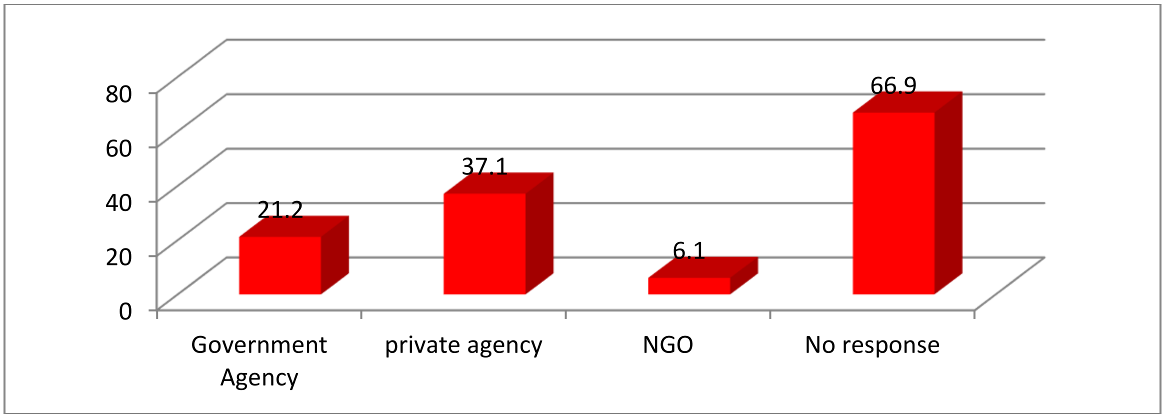


Figure 4.5: Nutrition Value Determination

Alternatively the MSEs held whoever determined the product as a trade secret. Going by those who responded, it is implied that Kenyan governments were doing little in standard management as compared to private sector. Governments as institutions charged with customer protection and promotion of economy through innovation need to wake up on this call. According to the Kenya Agricultural Research and Livestock Organization (KARLO) officer who was a key informant and determinant of food nutritional values of most entrepreneurs in the rural, the MSEs are not paying for the service. The price for nutritional value analysis is high MSE and therefore majority cannot afford paying.

Determination of Advantageous Products

Advantageous product is the dependant variable, whose change is the interest study. It is defined by three desired characteristics in agro-food products in a highly competitive market. The characteristics includethe food product ability to increase the enterprise income, meet market demand and the product being differentiated from other related products. Increase in income is a quality that addresses profitability. Meeting market demand is a quality that addresses product performance; having ability to satisfy the customer's tastes and preference at the market. Differentiation is a cue that addresses product uniqueness and comparative advantage.

The study explained the advantageous products as a whole (**Y_4**) and as partsincrease in income (**Y_1**), meeting market demand (**Y_2**) and differentiated products (**Y_3**). Change in the whole and its parts is controlled by change in the values of independent variables which are Porters competitive forces{buyers' bargaining power (X_1), suppliers bargaining power (X_2) and incumbent rivalry (X_3)} and Davis Technology adoption Predictors {perceived ease of use(X_4), perceived usefulness(X_5) and Behavioural intention to Use Technology(X_6)}. In other words:

Y_4= f{(X_1),(X_2), (X_3), (X_4), (X_5), (X_6)} or **Y_4 = f{X_7, X_8}**

The variable (advantageous product) was measured by ordinal data on a Likert scale of 7 point. Its value is expressed as an index which is derived as a result of each respondent's height score divided by the maximum expected score as demonstrated in tables 4.49 for Y1, 4.50 for Y2 and 4.51 for Y3 in the appendices.The table has 132 entries (rows) indicating 132 respondents and seven columns indicating number of questions enquiring on whether the products increased the firms income, met market demand and were differentiated. Each respondents total score was divided by the maximum possible score 49 (7 questions X 7 points) to get the $\mathbf{Y_{1,2,3\&4}}$ indices. The scale was collapsed into two, which is; 0 and 1. The indices fall between 0 and 1. The reason for collapsing is because the study preferred Logit regression model which is binary in nature. For example, indices that fall on zero (0) side meant that the products did not increase income and indices that fall on1 side meant that the agro-food product demonstrated increased income to the MSE. All values below 0.5 are considered to be 0 and all values above 0.5 are considered 1.

Increase in Agro-food MSEs income (Y_1) was first determined. According to table 4.49, only two respondents (respondents 4 & 58) scored less than 0.5 indices. This implied that over n=130(98.5%) of the respondents agreed that the products increased the MSEs'incomes. Second was meeting market demand (Y_2). Table 4.50shows that seven respondents scored below 0.5 index threshold. It means that n=125(94.7%) of the agro-food manufacturers agreed that the products met the market demands. Third was to determine differentiated products (Y_3). Unlike the above cues, product differentiation section had six questions. It means that the maximum one would score is 42 points (6 questions X 7 points). This divided by what each scores, table 4.51 indicated that majority of the respondents 126(95.4%) accepted that the products were differentiated by scoring the indices above the 0.5 threshold.The study also determined Y_4. This was done by amalgamating the indices of Y_1, Y_2 and Y_3 and dividing them by 3 which is the number of Y variables studied. In other wordsY_4 indices is an average of Y_1,Y_2 and Y_3 indices as shown in Table 4.52. The findings from the table show that n=130(98.5%) of the micro and small agro-food manufacturers agreed that their products were advantageous.

4.4 Influence of three of Porter's Competitive Forces on Advantageous Product

H_{01}:The three of Porter's competitive forces (bargaining power of buyers, bargaining power of suppliers and rivalry among competitors) have no significant influence on agro-food processing MSEs to produce advantageous product (increasing income, meeting market demandsand are differentiated).

Designing of an advantageous product has to be based primarily on the findings of the analysis of agro-food industrial structure. The best known model for analysing structural features of an industry is the five competitive forces by Michael E Porter. In this case, three of the competitive forces were used. Equally, it is in the interest of MSEs in agro-food industry to profitably keep prices of their products above competitive levels. The purpose of this section is to analyse how agro-food processors achieve advantageous products that increase income, meet market demand and are differentiated by managing Porter's buyers bargaining power, bargaining power of suppliers and rivalry among competitors are the Porter's three forces.

4.4.1 Buyers' Bargaining Power Influence on Agro-food MSEs

Buyers bargaining power refers to the ability of customers to obtain favorable terms from the MSEs engaged in agro-food processing than those offered now. The ability is characterized by customers being more powerful than suppliers, sensitive to product prices, informed of the product, unionized, end users, and able to integrate backwards.

Other characteristics of buyer bargaining power include customers' ability to reduce selling price of goods and switching costs.

The Agro-food MSEs Customers' Power in Relation to the Suppliers' Power

Many MSEs in agro-food industry are concerned about the pressure they get from customers. Buyer-supplier relationship is about exchange of value; transfer of value from supplier to the buyer. The buyer is the principal and the supplier is the agent. In this era of business, the relationship is only successful for the agro-food processing MSEs when it is stable, long lasting and delivering mutual economic gains and respect for both supply chain partners. This study therefore was interested in establishing comparative bargaining powers between buyers and suppliers in the micro and small agro-processors. The respondents were asked if the buyers were more powerful than suppliers and the results were that most respondents n=103(68%) agreed that the buyers are more powerful than the suppliers. This is also confirmed with above average mean of 5.1 as shown in table 4.13. Relative variability was also sought by the study and a coefficient of variance of 0.2672 was found. This is interpreted as the standard deviation being about 27% of the mean indicating a less dispersion of the responses from the mean.

Table 4.13: Buyers' Bargaining Power Influence on Agro-food MSEs

	Very untrue	Untrue	Somewhat untrue	Neither true nor untrue	Somewhat true	True	Very true	Mean	Stdv
The buyers are more powerful than supplier	3(2.3)	9(6.8)	2(1.5)	13(9.8)	34(25.8)	58(43.9)	11(8.3)	**5.1846**	**1.38533**
The customers are very sensitive on product prices	1(0.8)		1(0.8)	3(2.3)	14(10.6)	35(26.5)	75(56.8)	**6.3643**	**.95964**
The customers are informed on what they need	1(0.8)	5(3.8)	1(0.8)	5(3.8)	16(12.1)	27(20.5)	67(50.8)	**6.1066**	**1.33489**
The buyers have a customer union and alliances	13(9.8)	28(21.2)	18(13.6)	38(28.8)	8(6.1)	18(13.6)	5(3.8)	**3.5781**	**1.65824**
Most customers buy the products for resale	7(5.3)	20(15.2)	14(10.6)	19(14.4)	20(15.2)	32(24.2)	17(12.6)	**4.4651**	**1.83306**
Most customers have the ability to process their own foods (backward integration)	12(9.1)	23(17.4)	8(6.1)	18(13.6)	22(16.7)	32(24.2)	12(9.1)	**4.2520**	**1.90642**
The buyer has to reduce price profitable below the selling price	2(1.5)	17(12.9)	13(9.8)	27(20.5)	30(22.7)	28(21.2)	10(7.6)	**4.4961**	**1.54239**
It is likely to cost customers to switch suppliers	8(6.1)	8(6.1)	7(5.3)	12(9.1)	24(18.2)	38(28.8)	32(24.2)	**5.1550**	**1.77416**

The findings imply that though customers were more powerful according to the views of the MSE, they also considered highly the suppliers to be of much influence. The supplier-buyer value chain is intertwined and both need much attention if the MSEs have to make more income, survive the market demand, and stand out with differentiated food products.

Agro-food Customers' Sensitivity on Products Price of MSEs

This section focuses on the consciousness customers have on the prices of agro-processed products. Respondents were asked whether their customers were very sensitive on product prices.Unanimously, n=124(93.9%) and a mean of 6.36, the respondents agreed customers were sensitive on product prices. A coefficient of variation was further determined to be 0.15. In other words the standard deviation was only 15% of the mean which is a relatively small dispersion among responses. It implies that consumers are vigilant and want to see value for their money at every product purchase.

Customers' Knowledge on MSEs' Food Products

In a market-oriented economy, it does not matter how an agro-food processor thinks of his innovation, it is the customers' opinion of on the product that matter. The study therefore asked the respondents whether their current and potential customers knew of their product. The finding were n=110, (83.4%) and (mean=6.10) of the respondents showing that it is true that the customers are informed on what they need from the processors of agro-products.The results of coefficient of variation of 0.218shows that there was high congruence because there was less dispersion. Recent trends have shown an increase in availability of sophisticated customers and according to the findings, the customers of the MSEs in agro-food industry are highly informed. This calls for more tactful and strategic skills for the MSEs to understand the customers' point of pain, frustrations and unmet needs and eventually offer customers more efficient and effective products that they currently sell. It means that the agro-food processors must have the capacity to handle vast amount of customers' input and use it build advantageous products.

Customer Alliances Influence on MSE Food Product

Customer alliance refers to food products buyers' unions. When customers are unionized, they yield social benefits which are often used to counter the market power of agro-food manufacturers. The exercise of this power prevents agro-food manufacturers from exploiting their market status as fully as they could if they were faced with un-unionized buyers. This prompted an enquiry into experiences of micro and small agro-food processors with customers' alliances in Busia and Nairobi. Respondents were asked if their buyers had customer union and alliances. According to the results most of the respondents mean=3.57, n=60(44.6%) perceived no customer union and alliances.

The study also determined the strength of congruence of the responses by calculating coefficient of variance which was found to be 0.463. This indicates a much weak congruence among respondents.Because the mean is close to 4, an independent sample t-test is done to compare means of the customersthat are in union and those that are not in union. On average, the mean of customers that are unionized (3.5952 ± 1.66)are not different than those who are not in union (2.50 ± 0.71), $t(126) = 0.926, p = .356, sig > .05$, *2 tailed* as show in tables4.47and 4.48.The difference of means in write between the customers who are unionized and not unionized is 0. It implies that most customers, having no union, had weaker ability to obtain from the agro-food processors more favorable terms than those available under normal expected terms. In other word the small agro-food processors were little threatened by customer unions and had the ability, therefore to profitably maintain prices above competitive levels.

Resale Customers of MSE Food Processors

The study also sought to understand whether the customers of the micro and small agro-food manufacturers bought the products for resale or for home use. The respondents were asked if their customers buy the products for resale. With a mean>4.4 and n=69(52%) most of respondents support that customers bought products for resale. The coefficient of variance was 0.41. It means that the variable was less dispersed and the strength of congruence was slightly above average. It shows that most of the customers for the micro and small agro-food manufacturers were brokers who increase welfare by enhancing locative efficiencies. The firms ought to be ready to produce in large quantities to address stock needs of the retailers and wholesalers (brokers).

Agro-food MSEs' Customers' Ability for Backward Integration

Backward integration is a form of strategy through which MSE customers gained ownerships and increased control over the agro-food processors.This buyer's capability would reduce MSEs in agro-food processingincome and making them less competitive. An enquiry was done to understand whether buyers of agro-products in Busia and Nairobi increased asserted control on suppliers(micro and small agro-food manufacturers) in the food value chain. The respondents were asked if most customers had the ability to process their own foods (backward integration). The findings revealed that most customers mean > 4.2 and n= 66(50%) had ability to process their products hence able to integrate backwards as shown in Plate 4.6. The findings further revealed a coefficient of variation of 0.45. This indicates a slight above average congruence and below average dispersion in the sample data.

BusiaNakumatt Supermarket: Customer Backward Integration

Nakummat, a big buyer of MSEs agro-food products, took complete control over most of value chain stages in the production and marketing of bakery products in Busia as shown in the picture.

Plate 4.6: Backward Integration: A case of BusiaNakumatt Supermarket Bakery Products

The above picture shows Nakumatt Supermarket one of the biggest buyers of SMEs in bakery is integrating backwards buy buying raw materials, baking, packing and putting the bread and cakes on the shelves for sell.Implied in this is that most customers sought to save costs and wanted efficient products. Backward integration is sought to reduce cost, and improve efficiency for the buyers. However, the MSEs processing food were likely to suffer thinner profit margin and higher competitiveness if the customers had not preferred to process their own foods.

The Buyers' Ability to Reduce Agro-food MSEs' Price below the Selling Price

If an agro-food manufacturing SME would be powerful at the market place, it has to have an ability to profitably maintain prices above competitive levels. This ability is often threatened by the buyers' concerted agitation for lower prices.The study wanted to know if the customers had ability to reduce prices of products of SME manufacturers in Kenya. Respondents were asked if the buyers could reduce prices below the selling price. It was revealed by most of agro-food processor mean = 4.4961 and n=68(51.1%) indicate that buyers had ability to reduce price below the profitable selling price. The coefficient of variation of 0.343 was found to support the high congruence and less dispersion as per sampled data. The means are compared using the independent sample t-test as demonstrated in tables 4.47 and 4.48. On average, the mean of buyers who reduce price below selling price (4.496 ± 1.55) was not statistically significantly different from the buyers who did not(4.50 ± .71), $t(125) = -0.004$, $p = 0.997$, $sig > 0.05$, *2 tailed*.It is worth concluding that the difference of means in write between buyers who reduce price profitably below selling price and those that don't reduce price profitably below selling price is 0. The implications are that the buyers had a stronger bargain at the market than the food manufacturers. The MSEs in food manufacturing have to design strategies that would keep prices low and produce efficient products if they had to remain above competitors.

Agro-food MSE's Customers Switching Costs

Customer switching costs are negative psychological, physical and economic experiences buyers face for changing from one business relationship with an agro-processor and to a new business relationship with another. Customer switching costs is a critical determinant in an MSE's ability to acquire, keep customers and realize competitive advantage. The study sought to understand if the customers of micro and small agro-food manufacturers in Kenya incurred such costs. After asking how likely it was to cost customers to switch suppliers, majority of respondents (mean=5.15, n=94(71.2%)agreed that it was likely to cost customers to switch suppliers as shown in table 4.13.The study also found out a very strong congruence and very low dispersion in the sample give CV =0.34. This implies that the MSEs in agro-food manufacturing enjoyed customers' brand loyalty and repeat-buying which are renowned contributors to increased revenue and survival. It also explains that there are few multi-product firms from whose products customers would express choice; a fact that is confirmed by observation and analysis of county documents on agro-food processing firms. The findings also imply that the current market share for the MSEs was huge and that the agro-food processors had a high degree of market power over their repeat-purchasers.The study also used the measure of dispersion to compares variations across characteristics of buyers' bargaining power. The buyers having customer unions and alliances was the most dispersed with CV=46% and customers being very sensitive on product prices the least dispersed (CV=15%).

Determining the value for Buyers Bargaining Power X_1

The value for the Buyers Bargaining Power(X_1) was calculated as shown in table 4.53. The variable was measured by ordinal data on a Likert scale of 7 point. Its value is expressed as an index which is derived as a result of each respondent's height score divided by the maximum expected score as demonstrated in table 4.53 in the appendices. The table have 132 entries (rows) indicating 132 respondents and eight columns indicating number of questions enquiring on whether the products were threatened by buyers bargaining power. Each respondents total score was divided by the maximum possible score 56 (8 questions X 7 points) to get the $\mathbf{X_1}$ indices. The scale was collapsed into two, which is; 0 and 1 because the binary nature Logit regression which is the preferred model of the study. The index that fall on zero (0) side meant that the productwas not threatened by buyers bargaining power and index that fall on1 side meant that the agro-food product encountered threat from the bargaining power of buyers. All values below 0.5 are considered to be 0 and all values above 0.5 are considered 1.The ultimate findings of Table 4.53 show that n=117(88.6%) agreed that buyers bargaining power was strong and threatened the MSE's products.

4.4.2 Suppliers Bargaining Power to the MSEs in Agro-food Manufacturing

It is believed that if small manufacturing enterprises understood and well managed the suppliers, they would not only realize quality and decrease in production costs, but also increased income, products that met market demand and that were differentiated. The main purpose of this section is to understand supply chain strategy and the effect of the suppliers' bargain on micro and small agro-food manufacturers in a competitive environment. The study established a collection of results that jointly achieved the purpose. They include the difference among raw materials offered by various suppliers, perceived suppliers' power, variety of suppliers available, demand of raw material in relation to suppliers' capacity, capacity of suppliers to integrate forward and suppliers' alliances.

Difference in the Inputs Offered by Suppliers of MSE that do Agro-food Processing

Suppliers' contribution to development of new products is critical, positive and direct. In advent of high and varied customer tastes and preferences for various food products, agro-food manufacturing enterprises and suppliers have come under intense pressure to supply different inputs and products to the customers. A MSE that had suppliers with different products had a competitive advantage over others that did not have. The study enquires if the MSEs in manufacturing food in Kenya had different supplier with capacity to deliver variety of inputs.Respondents were asked to indicate if the products offered by suppliers were very different from each other. It was found that most of the respondents mean = 5.687; n=91(68.9%) said that products offered by suppliers were different from each other as shown in table 4.14. A coefficient of variance of 0.195 is gotten. This meant that the variable was not quite dispersed and that there was a very strong congruence among the micro and small entrepreneurs on the fact that suppliers' inputs were heterogeneous.

Table 4.14: Suppliers Bargaining Power to the Firm

	Very untrue	Untrue	Somewhat untrue	Neither true nor untrue	Somewhat true	True	Very true	Mean	Stdv
The products offered by suppliers are very different from each other		10(7.6)	12(9.1)	19(1.4)	39(29.5)	40(30.3)	12(9.1)	**5.6870**	**1.10998**
The suppliers have a strong bargaining power	1(0.8)	2(1.5)	2(1.5)	4(3)	21(15.9)	77(58.3)	25(18.9)	**5.5462**	**1.36462**
The suppliers can easily switch to another firm	1(0.8)	8(6.1)	2(1.5)	9(6.8)	29(22)	50(37.9)	31(23.5)	**5.0076**	**4.64178**
There are few suppliers for buyers to choose from	5(3.8)	11(8.3)	15(11.4)	21(15.9)	26(19.7)	42(31.8)	11(9.1)	**4.9160**	**1.35895**
The firm's demand for inputs less than what the supplier is willing to supply	4(3)	7(5.3)	25(18.9)	29(22)	29(22)	28(21.2)	10(7.6)	**4.8140**	**1.39064**
The suppliers have the ability to start their own food processing plants (forward integration)	4(3)	6(4.5)	10(7.6)	28(21.2)	27(20.5)	50(37.9)	4(3)	**4.6589**	**1.58851**
Suppliers are unionized	8(6.1)	13(9.8)	11(8.3)	22(16.7)	20(15.2)	45(34.1)	1(0.8)	**4.4462**	**1.46304**

Having suppliers with different inputs means that the agro-food processor has the potential to combine various different inputs to come up with unique products that have high performance, that is; able to create wealth for the group, and meet varied market demands.

Perceived suppliers' Power in the market by the Agro-food Processing MSEs

This refers to the power in the hands of input providers to obtain concession from the food manufacturers by threats to impose a cost or withdraw benefits if the MSEs did not grant the concessions. The study tested this by probing respondents if the suppliers had a strong bargaining power. An overwhelming majority of the respondents mean =5.5462; n=123(93.1%) said it was true that suppliers had a strong bargaining power in the market. The study also sought to know the dispersion in this variable and found a CV of 0.246 which is a very low dispersion. Consequently, it suggests a very high congruence in responses sampled. This means that the MSE in agro-food processing are at hostage of the supplies. The suppliers' threat to increase price of inputs is likely to affect the MSEs market prices negatively by increasing cost of production. Consequently this would reduce the profit margins, reduce income and frustrate demand of potential and current buyers.

Switching Costs of Suppliers of Micro and Small Agro-food Processors

The fixed costs a supplier faces when changing the customer (agro-food manufacturer) is the switching costs of suppliers. They affect competitiveness of the firm and ultimate production of an advantageous product since it involves procedural, financial and relational barriers that affect price differentials among competing enterprises. The question was framed to seek an understanding of whether the suppliers could easily switch to another firm. Majority of the respondents with mean=5.0076; n=110(83.4%) agreed that the suppliers could easily switch to another firm. This implies that the market for the agro-food processors was highly competitive and consolidated. It could also be interpreted that suppliers had specialized products and few substitutes were available on the market. It was also found that the variable was highly dispersed (CV=93%) an indication of very little congruency in the sample responses. The unanimity of the responses suggests that suppliers had a stronger bargaining power on the MSE in agro-food manufacturing industry.

Variety of Suppliers for the Agro-food manufacturing MSEs' Choice

The greater the variety of suppliers the lower the suppliers bargaining power. The fewer the variety of suppliers the bigger the bargaining power of the agro-food manufacturers. The question was to solicit the truth on whether there were few suppliers for buyers to choose from. The results show a mean = 4.916 which is above average on a scale of seven and n=79(60.6%) most of the respondents agreed that there were few suppliers for the MSEs to pick from. It can therefore be deduced that the bargaining power of the MSEs was lower than the suppliers'. This puts MSEs at a precarious position where prices of their products are greatly determined by the suppliers' concessions. The profit margins are likely to be low hence reducing income. The study determined the coefficient of variance to be about 28% implying strong congruence and little dispersion among responses in the sample data.

Micro and Small Agro-food Processors' Demand versus the Suppliers' Capacity

Naturally, suppliers would like to charge higher prices. But competition and law of demand tames the suppliers. The study sought to understand the position of the MSEs in matters of demand and supply from the supplier point of view. The respondents were asked if the firms' demand for inputs were less than what the suppliers were willing to supply. The reply from most of the respondents show a mean= 4.8140; n=67(50.8%) demonstrating that the demand of the MSE's products waslow compared to supply. The data shows that the suppliers' bargaining power, on this, is weaker. Because the demand of MSEs is lower, the suppliers' prices will have to be lower, if all other factors were held constant. However, the law of supply and demand would put limit to SMEs. As much the agro-food processors would always prefer to pay lower prices for raw materials than the current one, they are forced by the law of supply and demand to pay highly for raw materials to attract and maintain quality suppliers. The findings also revealed a coefficient of variation of about 29% which implies that the variable was little dispersed and a high congruence in the sampled data was vivid.

Agro-food MSEsSuppliers' Ability to Integrate Forward

When suppliers acquire the agro-food manufacturers by way of purchase or control it is called downstream or forward integration by suppliers. It is a form of diversification from the usual core business meant to achieve greater economies of scale and higher market share. The understanding of the suppliers' ability to integrate forward would help the study determine the suppliers bargaining power in relation to the MSEs in agro-food industry. The question was framed as to whether the suppliers had the ability to start their own food processing plants (forward integration). The results from table 4.14 indicate a mean=4.6589 and n=81(61.7%) showing that most of the respondents found it true that suppliers would integrate downstream. Implied is that the suppliers have a bigger bargain and capacity to buy the micro and small manufacturers. Farmers in Budalang'i in Busia County are an example of suppliers who have come together and pulled resources with the support of World Bank and the Government of Kenya to start a flour and soya beverage processing plant for producing advantageous products for the competitive market as shown in the Plate 4.7.

Budalang'i Small Scale Farmers Marketing Cooperative Society (BUSSFAM) has its soya beverage and composite flour products displayed after processing the products on behalf of farmers at the industry shop and county agricultural show. The cooperative has a member ship of 176 farmers doing staple foods in the area and with capacity of processing 600kg of flour/day.

Plate 4.7:BUSSFAM Cooperative Practicing Forward Integration.

The suppliers posed credible threat to the food manufacturers as either potential or actual competitors. The variability of this characteristic was found at CV=0.34 which is low hence high congruence in sampled respondents.

Suppliers' Union Influence on Agro-food Processing MSEs

The more the suppliers are disentangled the weaker their bargaining power. The more they are consolidated the greater their bargaining power at market place. Most suppliers form unions as a strategy to obtain better prices and enhance competitiveness. It was of importance to study this so as to determine if the threat of suppliers to the MSEs processing food was due to activities of suppliers union. The agro-food processors were asked if their suppliers were unionised. According to table 4.14, most respondents mean>4 and n=66(50.1%) confirmed that the suppliers had unions. Therefore there is likelihood that suppliers had a better bargaining power than the MSEs in agro-food processing at the marketplace. They had credible influence on the prices of their inputs which would culminate into higher cost of production and ultimately higher selling prices, lower profit margin and compromised performance of the MSEs' products. The study also revealed about 33% coefficient of variance which indicated a strong congruence and less dispersion in the sample data.Comparatively, suppliers' ability to switch to other firms had the highest Coefficient of variation (93%) meaning that the responses were highly heterogeneous. The difference in inputs supplied to agro-food processing MSEs was the most homogeneous and least varied with coefficient of variation (20%).

Determination of Value for Suppliers Bargaining Power (X_2)

The value for the suppliers bargaining power(X_2) was calculated as shown in table 4.54. The variable was measured by ordinal data on a Likert scale of 7 point. Its value is expressed as an index which is derived as a result of each respondent's height score divided by the maximum expected score. The table has 132 entries (rows) indicating 132 respondents and seven columns indicating number of questions enquiring on whether the products were threatened by suppliers bargaining power. Each respondents total score was divided by the maximum possible score 49 (7 questions X 7 points) to get the $\mathbf{X_2}$ indices. The scale was collapsed into two, which is; 0 and 1 because of the binary natureof Logit regression which is the preferred model of the study. All values below 0.5 are considered to be 0 and all values above 0.5 are considered 1. The index that fall on zero (0) side meant that the productwas not threatened by suppliers bargaining power and index that fall on1 side meant that the agro-food product encountered threat from the bargaining power of suppliers. After counting the respondents that scored above 0.5(1) in Table 4.54, the findings revealed that n=122(92.4%) agreed that suppliers bargaining power was strong and threatened the MSEs products.

4.4.3 Rivalry from incumbent competitors on the Agro-food Processing MSEs

Rivalry of established competitors is one of the forces that affect significantly the profitability of businesses. Examination of how rivalry influences profitability in ago-food processing industry will help the study understand the structure of the agro-food industry and suggest a position that more profitable and less vulnerable to attack. The study considered various characteristics of rivalry. They included dominance of large firms, customer loyalty, intensity of rivalry, industry product growth rate, complexity of product-related information, switching cost from one product to another, product uniqueness and intermittent overcapacity.

Effect of Dominance of Large Firms to the MSEs' competitiveness

Availability of large enterprises often suppresses and retards the growth of micro and small enterprises. Based on this premise the study ventured to understand whether the agro-food industry was dominated by large firms by asking if large firms were dominant in making similar product. Respondents were asked if large firms were dominant in making similar products. The results from table 4.15showed a mean of 6.0233; n=108(81.8%) indicating that majority of respondents agreed that large firms were dominant in making similar products. Further the study established that the dispersion was so small, about 23% standard deviation from the mean. This shows high homogeneity in the sample data.

Table 4.15: Rivalry from Incumbent Competitors on the Firm

	Very untrue	Untrue	Somewhat untrue	Neither true nor untrue	Somewhat true	True	Very true	Mean	Stdv
Large firms are dominant in making similar product		6(4.5)	5(3.8)	10(7.6)	7(5.3)	32(24.2)	69(52.3)	**6.0233**	**1.41678**
Customer identify with a given brand	1(0.8)	4(3)	7(5.3)	9(6.8)	16(12.1)	47(35.6)	48(36.4)	**5.8244**	**1.30961**
There are very many incumbent competitors	1(0.8)	1(0.8)	694.5)	7(5.3)	25(18.9)	66(50)	25(18.9)	**5.6870**	**1.10998**
The product industry's growth is fast		3(2.3)	4(3)	12(9.1)	27(20.5)	59(44.7)	26(19.7)	**5.6260**	**1.13229**
Information required to develop the best product is complex	1(0.8)	1(10.6)	6(4.5)	9(6.8)	16(12.1)	42(31.8)	43(32.6)	**5.4656**	**1.66548**
It is difficult to switch from this product to another	1(0.8)	12(9.1)	7(5.3)	31(23.5)	17(12.9)	33(25)	30(22.7)	**5.1221**	**1.60299**
The product is different from related products	1(0.8)	10(7.6)	5(3.8)	20(15.2)	52(39.4)	36(27.3)	8(6.1)	**4.9389**	**1.23261**
It is difficult for the firm to shift from the current product to another (exit barriers)	2(1.5)	4(3)	23(17.4)	26(19.7)	17(12.9)	43(32.6)	16(12.1)	**4.8702**	**1.49562**
The product demand is less than supply for relatively short periods(intermittent overcapacity)		11(8.3)	26(19.7)	31(23.5)	29(22)	24(18.2)	10(7.6)	**4.4504**	**1.40993**

This statistics predict that MSEs in agro-food industry are likely to face constraints on labour and other inputs supply, increase in capital cost, congestion on infrastructure, high wages and rent due to dominance of large enterprises. However the small agro-food processors would benefit from positive pullovers of the large firms. This includes improved linkages with suppliers, increased consumer expenditure, knowledge transfer from larger firms to the MSEs and sharing workers.

Customer Loyalty to Products of the SME

A good loyal customer base can do wonders in terms of sustainable increase in income and earning a competitive age against established rivals. Because of the significant benefits that come with the customer loyalty, the study found it worth to have a deeper investigation into the customers' deep held commitments to re-buy or re-patronise food products manufactured by the Micro and Small Enterprise in Busia and Nairobi counties. The respondents were probed on whether the customers identified with a given brand. Table 4.15 indicate a mean=5.8244 and n=111(84.1%) of the respondents (majority) answered that it was true the customers identified with a given brand. It implies that the agro-food processors were likely to have profit increase and unlikely to suffer from heavy potential customer migration. Developing customer loyalty encompasses ensuring product quality, customer satisfaction, trust, commitment, increasing switching costs, improving corporate image, service recovery, management of emotions and communication. This is a tall order for MSEs of such magnitude to bear. The study also found out a low dispersion CV=0.22.

Intensity of Agro-food MSE Rivalry

The purpose of this section is to pin point the scale of threat from established rivals in ago-food processing industry. This could help understand the strength of competition between agro-food processors and make the MSEs aptly prepare for the battle. Whether there were very many incumbent competitors was the question posed to the respondents to test the level of intensity of rivalry in the agro-food industry. The findings of the mean of 5.687 and n=116(87.8%)as per table 4.15 indicate that the majority confirmed that there were very many incumbent competitors.The findings also showed a very low dispersion (CV=0.195) about 20% standard deviation of the mean. The more intense the rivalry is among competitors, the more the profitability is threatened. It also means that the MSEs in agro-food industry experienced a large number and size of the rivals, growth in demand of food products, lower fixed costs and difficult exit barriers.

Growth in MSE Food Product Demand

Recent times have witnessed slower growth in production and more rapid growth in demand towards healthier foods.Customers have more varied tastes and preferences due to increase in incomes and demographic changes. The shift in demand for food product necessarily has impact to competitiveness of the agro-food processors. This prompted the study to investigate the effect of this positive shift in food demand on MSEs manufacturing food products in Kenya.The respondents were faced with question whether it was true that the products industry's growth was fast. According to the results in table 4.15, the mean 5.626, n=112(84.9%) majority of respondent positively confirmed that they experienced growth in food product demand. The study found a very high homogeneity and low dispersion CV= 0.2012(20%) on sample data of this variable. Using the law of demand, the agro-food processors had potential to enjoy increase in food commodity prices and achieve greater profitability given the slower growth in production and rise in demand. However, the MSEs are challenged to addressing this ballooning demand with the available natural resources and technology.

Complexity of Food Product Development Information to MSEs

The growth in demand of food products as confirmed above has come with demand for functional foods. Functional foods are advantageous food products fortified with special constituents that foster optimal health status and reducing risk of diseases among consumers. Their design demands for advanced understanding of the relationship between nutrition and health. It was considered important to find out if the agro-food processors encountered the complexity in information required to make such products. The question on whether information required to develop the best product was complex was posed to the agro-food processors. The table 4.15 revealed that majority of the respondents {mean 5.4656; n=101(76.5%)} found the information complex. The revelation informs that the development and commerce of functional products was rather complex and expensive. Secondly, the micro and small agro-food manufacturers could be having barriers in the development of the functional (advantageous) food products due to special requirements the process demands. In addition it was found that the dispersion of the sample data was as low as 31% standard deviation of the mean implying a very strong congruence in the responses.

Difficulty of Agro-food processing SMEs to Switch from One Product to Another

This section sought to find out if the MSEs encounter exit barriers in making food product. Exit barriers are things that impede an agro-food processor to change from this project to another. The impediments cost profitability and competitiveness of the business. The question was asked to establish whether it was difficult to switch from this product to another. According to table 4.15 the mean of 5.1221 and n=80(60.6%) demonstrated that most of the respondents perceived difficulty in switching from this product to another. It implies that the MSEs experienced some exit barriers or switching costs that could not allow them move from making the current product to another. It could also be interpreted that agro-food processors had more rivalry.It was also discovered that data from the sample was low in dispersion CV =0.2495(25%). It implies high homogeneity and congruency in the sample data of the variable.

The MSE Food Product Difference from Related Ones

Successful food enterprises market their food products by distinguishing them from competing products by incorporating unique attributes such as benefits, price, quality, style, service among others. The unique attributes makes food products desirable and are responsible of the customer's buying behaviour and choice. Differentiation is a competitive strategy in a large-firm-dominated market for small food manufacturers. In the effort to determine the perceived differentiation of the product, the respondents were asked whether the products were different from related products. Majority of the respondents n=96(72.8%) observed to be true that the products were different from the related ones. This is also confirmed by the mean 4.9389 which is above average on a seven scale as shown in table 4.15. The study also disclosed a low dispersion, about 30% coefficient of variance which shows high homogeneity in the sample data. The implications are that the food products by the MSEs were perceived to be unique and differentiated. They were superior to substitute and competing products in the market.Perhaps this is true in local market and comparatively among the MSEs. It is likely to be differentat global and export market. For an enterprise to be proud of a superior product muchtechnical skills, technology and marketing are needed which might be a challenge to MSEs in Kenya.

MSE Experience of Intermittent Overcapacity in Food Product demand and supply

The capacity surplus being generated by the business at a given time is called intermittent overcapacity. Agriculturally-oriented businesses in Kenya are affected by the two rain seasons performance. The better the rains the better the harvest, the greater the supply of raw material and the lower the prices. According to the documentary review, there are two rain seasons in Kenya.Most agri-businesses use these seasonal opportunities to stock enough inputs and cheaply. It was of interest, therefore, to determine if intermittent overcapacity affected the agro-food processors. When asked whether the product demand was less than supply for relatively short periods, most respondents n=63(47.8%) were those who said true as compared to n=37(28%) who said not true and a mean =4.4504 which is above average confirmed to be true that occasionally supply was greater than the demand as illustrated in table 4.15. The implications are that because of seasonal oscillations, most of the firms produced heavily and cheaply during harvesting seasons which are two. Micro and Small agro-food processors need to enhance their post harvest processes and storage capacity to be able to process and stock enough for the year. The study disclosed about 32% coefficient of variance. This shows still a low dispersion and high homogeneity and congruence in the sample data.

Comparatively the most homogeneous and congruent variables are the numerous incumbent competitors and fast growth of agro-food industry. However the sample data on the rivalry showed low dispersion indicating the high congruence in the responses.

Determining Value for Threat of Rivalry from Incumbent Competitors(X_3)

The values for the Rivalry from incumbent competitors (X_3) are as shown in table 4.55. The variable was measured by ordinal data on a Likert scale of 7 point. Its value is expressed as an index which is derived as a result of each respondent's height score divided by the maximum expected score. The table has 132 entries (rows) indicating 132 respondents and nine columns indicating number of questions enquiring on whether the products were threatened by rivalry from existing competitors. Each respondents total score was divided by the maximum possible score 63 (9 questions X 7 points) to get the **X_3** indices. The scale was collapsed into two, which is; 0 and 1 because of the binary natureof Logit regression which is the preferred model of the study. All values below 0.5 are considered to be 0 and all values above 0.5 are considered 1. The index that fall on zero (0) side meant that the productwas not threatened by rivalry from incumbent competitors and index that fall on1 side meant that the agro-food product encountered threat from the incumbent competitors. After counting the respondents that scored above 0.5(1) in Table 4.55 in the appendix, the findings revealed that n=130(98.5%) agreed that rivalry from incumbent competitors was strong and threatened the MSEs'food products.

Determining Value for the combined three of Porters Competitive Forces (X_7)

In the context of the study, Porters competitive forces form exogenous/independents variables that affected the model of designing advantageous products without being affected by it. The variable has three components: buyers bargaining power(X_1), suppliers bargaining power (X_2) and rivalry from incumbent competitors(X_3). A whole of the three components (X_1, X_2, X_3) is what the study refers to Porters competitive forces X_7.

X_7= f{(X_1), (X_2), (X_3)

Before finding the value X_7,the study embarked on calculating X_1, X_2, X_3as tables 4.53, 4.54 and 4.55show. The findings show that n= 117(88.6%) agreed that buyers bargaining power was strong and threatened the MSEs products. Secondly, that n=122(92.4%) were of the opinion that suppliers bargaining power was strongand threatened the agro-food products and n=130(98.5%) agreed that MSEs products experienced rivalry from incumbent competitors. It follows, therefore, that rivalry from the incumbent competitors was perceived to be the greatest predictor on making advantageous product among MSEs in agro-food manufacturing industry.

From the indices of X_1, X_2 and X_3 the study determined X_7 as the mean of X_1, X_2 and X_3indices. The sum of the X_1, X_2 and X_3 were divided by three (the number of components making Porter's competitive forces) to derive the X_7 value as shown in Table 4.56 in the appendix. A count of averaged indices showed that n=125(94.7%) was at 0.5 and above meaning that majority of the agro-food processors believed that a combination of buyers & suppliers bargaining power and existing competitors rivalry influenced the making of advantageous food products.

Relationship between Porters' Forces (X_7) and Advantageous Products Y_4

HO_1: There is no relationship between Advantageous product and Buyers bargaining power, Suppliers bargaining power and Rivalry from incumbent competitors.

A logistic regression was performed to ascertain the effect of buyers bargaining power, suppliers bargaining power and rivalry from incumbent competitors on the likelihood that food manufacturing MSEs designed advantageous products.

$$\log(p/1-p)=b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \varepsilon$$

Where; $\log(p/1-p)$= theprobability of beingAdvantegeousProduct

X_1= Buyers bargaining power

X_2= Suppliers bargaining power

X_3= Rivalry from incumbent competitors

$\text{Log}[p/(1-p)] = \beta_0 + \beta_1$*buyers bargaining power + β_2***suppliers bargaining power** + β_3***Rivalry of incumbent competitors** $+ \varepsilon$

After creating dichotomous dependent variable, the study ran the logistic regression usingSPSS set at confidence level of 95% or P-value of 0.05 significance levels.The study processed 132 cases out of which 129 were positive responses. For every trial we assume there is a probability 97.7% of positive responses.The distribution of R^2 is the Binomial distribution with parameters 132 and 97.7%. Based on this, the study computed corresponding p for each of each advantageous product using coefficient a and b.

Table 4.16: Parameters of Porters Variables in the logit Regression Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	x1	2.819	1.478	3.635	1	.057	16.760
	X2	3.098	1.637	3.582	1	.058	22.160
	X3	1.247	2.164	.332	1	.565	3.478
	Constant	-1.409	1.928	.535	1	.465	.244

a. Variable(s) entered on step 1: x1, X2, X3.

The results shown in the table 4.16 can be fitted in the equation as;

log(p/1-p) =-1.409 + 2.819X_1+ 3.098X_2 +1.247X_3

According to the results in the table buyers bargaining power (p = .057), suppliers bargaining power (p = .058) and rivalry from incumbent competitors (p = .565) did not significantly add to model/prediction. Using the information in variables in the equation table and logit equation, the study predicted the probability of designing advantageous product based on a unit change in each of porters three forces when all other independent variable are kept constant. The results of the regression equation show that if all Porter's competitive forces were rated 0; business performance of MSEs in agro-food manufacturing would be -1.409. However all three of Porter's Competitive forces had a positive relationship with the advantageous product.For instance buyers bargaining power (X_1) - for every one-unit increase in buyers bargaining power score (so, for every additional point on the buyers bargaining power), we expect a 2.819 increase in the log-odds ofadvantageous product, holding all other independent variables constant.Suppliers bargaining power(X_2) - For every one-unit increase in suppliers bargaining power score, we expect a 3.098 increase in the log-odds of Advantageous Product, holding all other independent variables constant.Rivalry of incumbent competitors(X_3) – for every one-unit increase in rivalry from existing competitors score, a 1.247 increase in the log-odds of Advantageous Product is expected, holding other independent variables constant.

Further the study asses the predictive strength of the logistic regression model. The aim is to find out how well the model can predict the advantageous product based on Porters competitive forces. Using SPSS the study used Cox and Snell Pseudo – $R^2_{c\&s}$= 0.87and because $R^2_{c\&s}$cannot reach 1,Nagelkerke modified it by increases the Cox and Snell version to make 1 a possible value for R-squared by dividing$R^2_{c\&s}$by its upper bond. Based on the model, deviance in the advantageous products ranges from 8.7% to 44.7%, depending on whether the Cox & Snell R^2 reference or Nagelkerke R^2 methods, respectively. The model is considered good and fit to predict advantageous food product using buyers bargaining power, suppliers bargaining power and the rivalry among incumbent competitors because the pseudo R^2 are between 0 and 1.

The findings also demonstratedthat *Wald (1) =41.475, p=.000,sig<.05, 2-tailed* is below the permissible value of likelihood above which null hypothesis is accepted. Guided by the rule, the null hypothesis is rejected and alternative accepted:

H_1: there is relationship between the advantageous product and Porter's three competitive forces (bargaining power of buyers, bargaining power of suppliers and rivalry among incumbent competitors).

4.5 The Davis Technology Predictors Influence on Advantageous Products

The purpose of this section is to test the hypothesis:

H_{02}: The three of Davis predictors ("ease of use," "usefulness" and intention to use) had no significant influence on production of advantageous product (increased income, differentiated product and meeting market demands).

Before the testing the hypothesis the study analysed the three components of Davis that is Perceived Ease of Use (PEU) and perceived Usefulness (U) and the Behavioural Intention (BI) to use technology.

4.5.1 Perceived Ease of Use (EU)

Technology is believed to be the solution to improving designing and ultimate performance of advantageous products. But the Kenyan firms' unwillingness to accept and use current and available food processing technologies has persisted hence obstructing their competitiveness and growth at the global market. Perceived ease of use is one of the fundamental determinants of user acceptance. The study explored this determinant by analysing agro-food processors' perceptions on complexity, compatibility, harmfulness, length of learning to operate and cost of repairing the technologies they currently had.

Complexity of Technology Use in Enterprises

Innovations happen through relentless trial and error processes. Complex designs and technologies frustratethe users and ultimately slow down improvement. Focusing on how the agro-food processors perceived complexity of the technologies they currently have, enables the study to predict the firms' likelihood to either improve these technologies or accept better ones. The mean of 5.7634 and n=87(66%) shown in table 4.19demonstratedthat mostMSEs foundthe technology easy to use. The study also compared the mean (5.7) and standard deviation (2.0). It revealed (0.35) 35% of covariance meaning that there was strong consensus among the entrepreneurs it was easy to use technology.

Table 4.19: Complexity of Using Technology by SME in Agro-food Processing

What level of difficult (complexity) do you get in using technology?	**Frequency**	**Percent**	**Mean**	**Std. Deviation**
Very difficult	4	3.0		
Slightly difficult	13	9.8		
Difficult	4	3.0		
Neither difficult nor easy	5	3.8		
Slightly easy	15	11.4		
Easy	45	34.1	**5.7634**	**2.04876**
Very easy	27	20.5		
Don't know	3	2.3		
Not applicable	15	11.4		
No response	1	.8		
Total	**132**	**100.0**		

The perception of technology being simple to use implied that most firms were motivated and are more likely to improve on the current technology to achieve an advantageous product. The answer also connotes that the firm managers were anticipating a more challenging innovation or technology that would make them sustain the cut-throat competition at export market. However participant's observation confirms the same; that most of the machines the MSEs use were simple operating as shown in the plate 4.8:

Composite flour manufacturing machines: disc mill, de-hauler, and chipper

Digital weighing scale and sugarcane-strong for extracting sugarcane juice

Plate 4.8: Types of simple Machines Used by Agro-food Processing MSEs in Kenya

The above pictures are food system innovations used by most agro-food processors in Kenya. They are simple to operate by the MSEs.

Technology Compatibility with the MSEs

Compatibility means consistency with the existing values and experiences. Africa being a continent rich with highly subjective and traditional norms one would expect such inhibitors affecting technology choice in a work environment. The study sought to establish whether, in the opinion of the agro-food processors, technology currently in use was in conflict with such norms inBusia and Nairobi Counties. This would enable to predict if technology was welcome.It was revealed by an average (mean=6.13) that the most entrepreneurs n=95(72%) found technology compatible as shown in table 4.20.Further, the mean (6.13) was divided by standard deviation (1.7) and a coefficient of variance 0.028 (2.8%) was realized which meant that the responses were uniform and there was a greater consensus on compatibility.

Table 4.20: Technology Compatibility with the MSEs

How compatible is the technology with the firm?	Frequency	Percent	Mean	Std. Deviation
completely incompatible	2	1.5	**6.1374**	**1.73986**
Mostly incompatible	5	3.8		
somewhat incompatible	6	4.5		
Neither incompatible nor compatible	4	3.0		
Somewhat compatible	12	9.1		
Mostly compatible	50	37.9		
Completely compatible	33	25.0		
Don’t know	4	3.0		
Not applicable	15	11.4		
No response	1	.8		
Total	**132**	**100.0**		

The revelation implies that the work environment in most micro and small food manufacturers was technology-tolerant. Therefore they would hardly resist better technologies that would deliver high performing products in the market.

Technology harm on Employees

Technology usage for processing an advantageous product is a more clearly defined measure and indicator for technology acceptance among agro-food processing firms. However the fear for injury or bodily harm by the innovation retards the rate of acceptance by the entrepreneurs. The study sought to know the rate at which technology caused harm to the workers and from findings (mean=5.81) and n=93(70.5%) it was rare as shown in table 4.21. A coefficient of variance 0.32 (32%) was gotten by comparing the mean and the standard deviation which confirmed a fair consensus among the small agro-food processors that the risks of operating technology were minimal.

Table 4.21: Technology Harmfulness on Employees

How often do the technology cause harm to the workers in the firm	Frequency	Percent	Mean	Std. Deviation
Often	11	8.3	**5.8168**	**1.84308**
slightly often	7	5.3		
Neither often nor rare	2	1.5		
Slightly rarely	27	20.5		
Rarely	46	34.8		
Never	20	15.2		
Don’t know	2	1.5		
Not applicable	16	12.1		
No response	1	.8		
Total	**132**	**100.0**		

Employees using the technology in food producing firms rarely sustained bodily harm from its contact.The firms’ staffs have good and safe experienceswith the innovation. However it is still a challenge for many firms to put in place workplace safety and health policy and programs because machinery can be damning hazardous. In addition flatoxin can be disastrous if technical preventive services are not employed to keep the food products. Perceived risk plays an important role the end-user’s behavior because MSEs are more often motivated to avoid mistakes than to maximize utility in acquiring technology.

Time requiredlearning to operate technology

The longer the time taken to learn the technology the more complex it becomes. Apart from time, long taken learning an innovation attracts financial costs too. This turns an inhibitor to technology adoption among micro and small firms with fragile financial capacity. An enquiry on the opinion of the respondents over the length of time taken to learn the innovation revealed that most respondents,mean=5.66, n=82(62.1%),took short time to learn to operate the technology as shown in table 4.22.The data dispersion from the mean was determined by comparing the mean (5.6) and the standard deviation (2.0) and was found to be 0.365(36.5%) meaning that there was a strong consensus that agro-food processes took short time to learn operating the machines.

Table 4.22: Time Require to Learn to Operate Technology

How long does it require one to learn to operate the technology in your firm?	Frequency	Percent	Mean	Std. Deviation
Very Long	6	4.5	**5.6692**	**2.07005**
Long	6	4.5		
somewhat long	9	6.8		
Neither long nor short	9	6.8		
somewhat short	22	16.7		
Short	35	26.5		
Very short	25	18.9		
Don't know	1	.8		
Not applicable	17	12.9		
No Response	2	1.5		
Total	132	100.0		

The implications are that the staffs were motivated to learn operating technology and fabricators are advised to come up with innovations that are simple to operate. Though current technology could be perceived to be easy to learn, hi-tech food manufacturing innovations needed heavy investment in human resource development so as to achieve products with advantage in the export market.

Cost of Repairing Broken Down Machines

Today firms are struggling to keep their production costs low, increase efficiency, income and customer satisfaction without increasing product prices. In fact it is the reason why most firms choose going hi-tech. In circumstances where the innovation increasingly becomes fault and inflates maintenance, then the end-user develops fevers towards its adoption. The study sought to establish among the MSE involved in food manufacturing and found out that (mean=4.59) most of respondents n=59(44.7%)disagreed that cost of repair was cheap as compared to n=49(37%) who agreed that cost of repairing machines is cheap. The coefficient of variation (57%) gotten by dividing the standard deviation (2.65) by the mean (4.59) confirmed that the responses were dispersed. In other words the entrepreneurs didn't have strong consensus on cost of repairing the machines. Therefore the study did an independent sample t test and found that on average the of repairing the machine is statistically significantly different (1 ± 0.00) compared to MSEs who found it cheap to repair the machines ($.983 \pm 0.1302$), $t(128) = 1.098$, $p =.027$, $sig \leq .05$, *2 tailed* as shown in table 4.47 and 4.48 in the appendix. The study concludes that the difference between the means of MSEs who found it costly to repair the machines and the MSEs who found it cheaper to repair the machines is different from 0. The null hypothesis is rejected. The lessons learnt from the findings are that the MSEs found it costly to repair the machines as in table 4.23.

Table 4.23: Cost of Repairing Broken Down Machines

In case of breakdown, it is cheap to repair the machines	Frequency	Percent	Mean	Std. Deviation
Strongly disagree	16	12.1	**4.5923**	**2.64340**
Disagree	24	18.2		
Slightly disagree	19	14.4		
Neither agree nor disagree	4	3.0		
Slightly agree	11	8.3		
Agree	23	17.4		
Strongly agree	15	11.4		
Not applicable	18	13.6		
No response	2	1.5		
Total	**132**	**100.0**		

It is clear that the innovations attract high costs of maintenance. These costs are usually pushed down to the customers through high prices of products. Such trade practice cannot much with rival companies with cheaply maintained hi-tech machines.

Determining the Value of perceived Technology Ease of Use

The values for the perceived technology Ease of Use (X_4) are as shown in table 4.57. The variable was measured by ordinal data on a Likert scale of 7 point. Its value is expressed as an index which is derived as a result of each respondent's height score divided by the maximum expected score. The table has 132 entries (rows) indicating 132 respondents and five columns indicating number of questions enquiring on whether the agro-food processors perceived technology as easy to use to make advantageous products. Each respondents total score was divided by the maximum possible score 35 (5 questions X 7 points) to get the $\mathbf{X_3}$ indices. The scale was collapsed into two, which is; 0 and 1 because of the binary natureof Logit regression which is the preferred model of the study. All values below 0.5 are considered to be 0 and all values above 0.5 are considered 1.Score of opinions such as don't know or not applicable are valued at 0.The index that fall on zero (0) side meant that the MSE did not perceive technology as ease to use and index that fall on1 side meant that the agro-food processor perceived technology as ease to use. After counting the respondents that scored above 0.5(1) in Table 4.57, the findings revealed that majority of the respondents n=102 (77.3%) agreed that the MSEs in food production perceived technology as easy to use.

4.5.2 Perceived Technology Usefulness

Just like a customer's perception of product's value plays a pivotal role in the shopping behaviour and ultimate product choice, an agro-food processor's perception of an innovation's usefulness is a critical determinant in a firm's decision process to accept or reject technology. End-user's perception of the current technology as being useful to the firm, triability, experience, relative advantage, relevance, timeliness, mass production and areas of application were the characteristics of perceived technology usefulness studied.

Usefulness of technology to firms

Technology brings a wide range of benefits to agro-food manufacturing firms including increase in productivity and revenues at the same time reducing capital and labour costs. However technology acquisition and final use depends on level of the firms' conviction that indeed it would bring the benefits to them. According to mean=6.35, n=103(78%) most of respondents were convinced that technology was useful to the MSEs activities as shown in table 4.24.In comparison of the mean and standard deviation a coefficient of variance of 0.24 was gotten which meant that there was uniformity among the respondents' responses that technology was perceived to be useful among micro and small firms that processed food in Busia and Nairobi Counties.

Table 4.24: Usefulness of Technology to MSEs

How useful is technology to your firm?	Frequency	Percent	Mean	Std. Deviation
Not at all useful	1	.8	**6.3588**	**1.53957**
Low usefulness	2	1.5		
Slightly useful	5	3.8		
Slightly useful nor useless	1	.8		
Moderately useful	18	13.6		
Very useful	45	34.1		
Extremely useful	40	30.3		
Don't know	2	1.5		
Not applicable	17	12.9		
System	1	.8		
Total	132	100.0		

The benefits and value technology did to the food processing firms as perceived by most firms portray positive firms' potential reception and acceptance of better technologies. Sensitization on other benefits such as operational efficiency, security and high accuracy that hi-tech technology would deliver to the firms need to made to the firms.

Technology Triability before Adoption for Use

The study was also interested in understanding the availability of the technology to the agro-processing firms on a limited basis so that they would test-retest to ascertain its reliability. According to mean=5.42, n=94(80.3%)in table 4.25, most of the respondents agreed that the firms occasionally tried the technology before they adopted it for use in the firm. A covariance coefficient of 0.35 was yielded after dividing the standard deviation by the mean. It implied that though there was a greater agreement, but a considerable number did not agree to the fact that pretest of the technology was done before adoption.

Table 4.25: Technology Triability before Adoption for Use

Triability. How often has the technology been tried out before you adopted it	**Frequency**	**Percent**	**Mean**	**Std. Deviation**
Never tried	8	6.1	**5.4275**	**1.91364**
VERY rarely tried	2	1.5		
rarely tried	12	9.1		
Neither tried nor untried	1	.8		
Occasionally tried	42	31.8		
Frequently tried	40	30.3		
Very frequently tried	12	9.1		
Don’t know	1	.8		
Not applicable	13	9.8		
No response	1	.8		
Total	**132**	**100.0**		

The findings implied that current technology is readily available hence obtaining chance to test and retest. Their adoption choice was therefore out of adequate information and prior experience. For subsequent and better technologies to be successfully accepted and used for advantageous production in Kenya, the fabricators have to make them available and let the end-users feel them prior.

Agro-food SME's Experience with Technology

An end-user's bad experience with a product would not make him hesitate rejecting it even after he had accepted it. The study sought to know the firms experience with technology and from findings most of the respondents'experience mean=6.10, n=100(75.7%)was very good as shown in table 4.26.The mean (6.1) and standard deviation (1.53436) gave rise to coefficient of variance (0.25) meaning that there was a consensus among respondents the firms' encounter with technology was very good.

Table 4.26: MSEs' Experience with Technology

What is the firm's experience with technology	Frequency	Percent	Mean	Std. Deviation
Bad	1	.8	**6.1000**	**1.53436**
Fair	7	5.3		
Neither good nor bad	5	3.8		
Good	30	22.7		
Very good	42	31.8		
Excellent	28	21.2		
Don't know	1	.8		
Not applicable	16	12.1		
No response	2	1.5		
Total	**132**	**100.0**		

The interpretation of the results is that evaluation of the entrepreneurs on the technology so far is good. Therefore they cannot afford dropping technology adoption process because of the achievements they have made on product performance.

Technology influence on SMEs' competitive advantage over competitors

Modern times in the business world are characterized by competitive behavior among actors in an industry. It is about comparing with each other with intention of outdoing the opponent. This section focuses on testing the entrepreneur's perception of technology giving him relative advantage over other food processors. According to most respondents mean=6.60, n=110(83.4%) the technology gave the agro-food processorsrelative advantage over their competitors as shown in table 4.27.In reference to the mean (6.60) and standard deviation (1.18), a coefficient of variance (0.18) was derived indicating that there was a very strong agreement among the respondents that technology bettered their competitive advantage despite minimal dissenting responses.

Table 4.27: Technology Influence on SMEs' Competitive Advantage

Does technology give your firm any competitive advantage over your competitors	**Frequency**	**Percent**	**Mean**	**Std. Deviation**
Neither worse nor better	2	1.5	**6.6031**	**1.18113**
somewhat better	14	10.6		
Better	55	41.7		
much better	41	31.1		
Don't know	1	.8		
Not applicable	18	13.6		
No response	1	.8		
Total	**132**	**100.0**		

The firms' perception that the current innovation is better than the idea it supersedes is a better ground to cultivate and incubate better innovation among the agro-food producers in Kenya. It is also implied that agro-food processors are not accepting technology as an end in itself, but as a strategyand means to knock out their rivals through making better and advantageous product.

Relevance of technology used by the MSEs in Food Processing

Relevance refers to appropriateness of the current technology to the activities and needs of agro-food processing firms being studied. Innovations would not work adequately if choices at the outset were inappropriate. According to agro-food processors in Kenya (mean=6.66), n=104(78.7%) majority of respondents agreed that technology was appropriate as shown in table 4.28.The study analyzed the relationship between the mean (6.66) and standard deviation (1.39983**),** and found that there was high uniformity in responses of variation coefficient (0.2) implying that there was high consensus that technology was right for the firms sampled.

Table 4.28: Relevance of Technology Used by the MSEs

How appropriate is the technology currently used by your firm	**Frequency**	**Percent**	**Mean**	**Std. Deviation**
Very inappropriate	2	1.5	**6.6692**	**1.39983**
Slightly inappropriate	1	.8		
Slightly appropriate	11	8.3		
Appropriate	49	37.1		
Very appropriate	44	33.3		
Don’t know	2	1.5		
Not applicable	21	15.9		
No response	2	1.5		
Total	**132**	**100.0**		

Developing a fresh-cut fruits and vegetable treatment innovation in the cooler climates of the North and directly transferring it to tropical climates in the south, for example, makes it highly unsuitable and compromises its survivability. The participants' observation by visit on the site found that most entrepreneurs had simple and instrumental innovations that made them achieve advantageous products like the one shown in Plate 4.9:

Fresh Sugar Cane Juice Enterprise. This is a family-owned business at Grogon in Nairobi. The simple simple technology is very convenient to operate alongside a busy street and for making a livelihood by manufacturing fresh tropical juice. On the right is the researcher enjoying a glass of the functional product(a concosion of sugarcane, jinger, lemon and aloevera juice).

Plate: 4.9: Relevance of Juice Enterprise to Juakali workers on DrogonStreet

The findings showed that survivability of technology in the firms was high in most of the firms. However, modern fabricator's innovations would equally function adequately among the MSEs if they considered community benefits such as environmental, cultural, economic and spatial factors.

Technology Influence on Timely Processing and Delivery of Products and Services

Effective real-time reaction to market demand is becoming the basis of completion. Faster reaction time for firms dealing with perishable products is an enormous competitive advantage. In regards to agro-food processors in Busia and Nairobi, the study discovered that most MSEs mean=6.46, n=102(77.3%)appreciated that technology influenced timely processing and delivery of products as shown in table 4.28.The mean and standard deviation analysis yielded a coefficient of variance of 0.23 meaning that the responses were highly uniform.

Table 4.28: Technology Influence on Timely Processing and Delivery of Products

Timeliness. The technology enhances timely processing and delivery of products and services	**Frequency**	**Percent**	**Mean**	**Std. Deviation**
Strongly disagree	2	1.5	**6.4688**	**1.46313**
Slightly disagree	2	1.5		
Neither agree nor disagree	2	1.5		
Slightly agree	16	12.1		
Agree	48	36.4		
Strongly agree	38	28.8		
Don’t know	2	1.5		
Not applicable	18	13.6		
No response	4	3.0		
Total	**132**	**100.0**		

On this basis, there is need to support fusion of newest technology to achieve faster reaction time, lower costs, better service and higher customer satisfaction for the agro-processing firms in the region. Innovationwould give the product an advantage over substitutes by better data and workflow management, composite application development and monitoring business activity.

Technology Influence on Mass Production

This is about producing large amount of standardized agro-food products using technology. The aim is to determine the usefulness of technology in being able to achieve economy of scale benefits for MSEs in agro-food industry. The survey found that most respondents mean=6.36, n=105(79.5%)perceived technology as an enabler to producing advantageous products in mass as shown in table 4.29.A coefficient of variance (0.23) was derived to imply that the consensus was very high on the fact that technology boosted the number of products produced.

Table 4.29: Technology Usefulness in Mass Production of Products

Mass production. The technology is useful in mass production	**Frequency**	**Percent**	**Mean**	**Std. Deviation**
Strongly disagree	2	1.5	**6.3692**	**1.48449**
Disagree	1	.8		
Slightly disagree	2	1.5		
Neither agree nor disagree	2	1.5		
Slightly agree	19	14.4		
Agree	47	35.6		
Strongly agree	39	29.5		
Don't know	2	1.5		
Not applicable	16	12.1		
No response	2	1.5		
Total	132	100.0		

Despite the perception by most entrepreneurs, the participants' observation by the researcher revealed that most of the enterprises did craft production; that is they manufactured the food products by hand with or without aid of machines. The craft production was at the community scale and work environment was highly characterized with social interaction, verbal marketing and trainings. It also suffices to note that though the small entrepreneurs were highly inclined towards mass production, they need to embrace an emerging paradigm of mass customization for them to survive the competitive landscape because customer demand is highly heterogeneous.

Functional Areas of the MSEs that Use Technology Most

Production, marketing and finance are the key most departments in a production. In pursuit of determining end-user's perceived technology usefulness, the study needed to understand the section where is was most handy so as to inform manufacturing extension partners on best approach to educate and manage technology usage in the agro-processing firms in Kenya. The study establishedthat technology was most used in productionand least in finance as shown in figure 4.6.

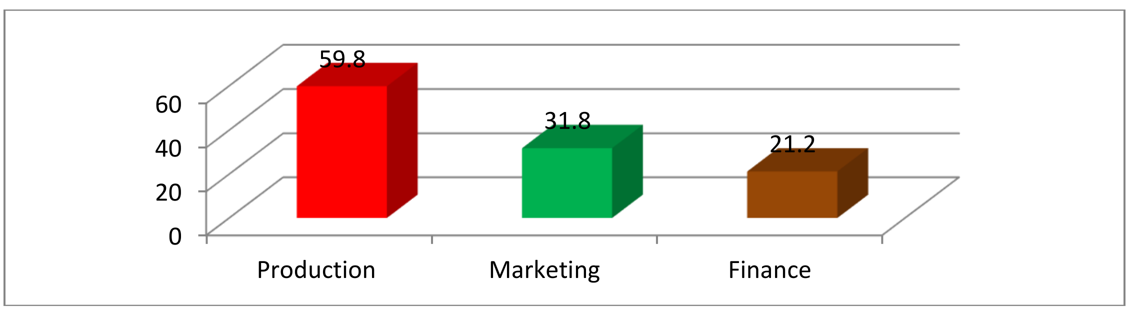


Figure 4.6: Functional Areas of the MSEs that Use Technology Most

This implies that most firms preferred using food technologies for turning inputs into finished products through a series of production processes. The usage would make the workers find the work enjoyable. It would also make the firms carry out the work efficiently and smoothly. However, by perceiving it little useful in finance meant that the preparation and presentation of financial and accounting transactions and forecasting of sales were either done manually or not done at all. The manual way of doing accounts are likely to be inaccurate and inadequate to provide the entrepreneurs and other stakeholders with right financial information. Perhaps perceived sophistication of financial management technologies for food manufacturing firms need be addressed. Equally commitment by management of the firms to allocate resources in innovations that would improve financial management for such firms is required.

Determining the Value of Perceived Usefulness (X_5)

The values for the Perceived Usefulness (X_5) are as shown in table 4.58. The variable was measured by ordinal data on a Likert scale of 7 point. Its value is expressed as an index which is derived as a result of each respondent's height score divided by the maximum expected score. The table has 132 entries (rows) indicating 132 respondents and seven columns indicating number of questions enquiring on whether the agro-food processors perceived technology to be useful in making advantageous products. Each respondents total score was divided by the maximum possible score 49 (7 questions X 7 points) to get the $\mathbf{X_5}$ indices. The scale was collapsed into two, which is; 0 and 1 because of the binary natureof Logit regression which is the preferred model of the study. All values below 0.5 are considered to be 0 and all values above 0.5 are considered 1.Score of opinions such as don't know or not applicable are valued at 0. The index that fall on zero (0) side meant that the MSEs perceived technology not useful and index that fall on1 side meant that the agro-food processors perceived technology to be useful(instrumental) in making advantageous products. After counting the respondents that scored above 0.5(1) in Table 4.58, the findings revealed that majority n=109(82.6%) of the MSEs perceived technology to be useful for manufacturing advantageous food products.

4.5.3 Behavioral Intention (BI) to use Technology

Behavioral intention (BI) to use technology means the firm's evaluative feelings (either positive or negative) about using food processing innovations for realizing a highly competitive product. This research section addressed itself to the ability to predict such firms' acceptance of modern food technologies from measuring their intentions. Acceptability, willingness, support, prioritization, management commitment, preparedness and management awareness were theorized as drivers of behavioral intention.

Acceptability of Technology by the MSE in Agro-food Manufacturing

Technology cannot improve performance of food products they are not accepted and finally used. Acceptance in technology adoption is a cognitive instrumental process that ends with choice for. In effort to establish if this cognitive process and choice for the technology did happen among the firms majority of respondents n=119, (89.5%) and (mean=5.96) agree that technology was acceptable as shown in table 4.30. The mean was compared to the standard deviation which resulted into 0.19 variance coefficient meaning that there was uniformity and very high consensus among the micro and small agro-food processors that technology was welcome.

Table 4.30: Acceptability of Technology by the MSEs

How acceptable is technology in your firm	Frequency	Percent	Mean	Std. Deviation
Totally unacceptable	2	1.5	**5.9695**	**1.15651**
Slightly unacceptable	2	1.5		
neither acceptable nor unacceptable	6	4.5		
Slightly acceptable	24	18.2		
Acceptable	53	40.2		
Perfectly Acceptable	41	31.1		
Don't know	2	1.5		
Not applicable	1	.8		
No response	1	.8		
Total	**132**	**100.0**		

The full length of technology decision-making process must have been done by most firms, according to the findings.However, the five stages starting from awareness, persuasion, decision, implementation and confirmation must be a daunting task for MSE in manufacturing industry especially where hi-tech food technologies are involved. Again technology prospecting for secondary school managers who form the bulk of the sector is likely not to achieve much among the agro-food MSEs in Kenya.

Intention of MSEs to Implement Technology

Intention is the will or the inner motivation that pushes and keeps the entrepreneur's intention burning and yearning for food value addition innovations. Without the inner drive, the process of the firm's adopting technology would be sluggish if not stalling. The study therefore sought to know the firms willingness to implement technology.Fromthe findings (mean=6.74) most respondentsdefinitely willed to use technology for value addition as shown in table 4.31.Most of the agro-food processing MSEs n=125(94.7%)were willing and would definitely use technology for value addition. However the responses were highly dispersed. This is affirmed by a high variance coefficient of 0.93(93%) derived from comparison of the mean and standard deviation.

Table 4.31: Intention to Implement Technology

Intention to implement technology. How willing are you to use technology in your firm for value addition?	Frequency	Percent	Mean	Std. Deviation
Probably will not	1	.8	**6.7481**	**6.24665**
neither will nor will not	1	.8		
Probably will	25	18.9		
will implement	50	37.9		
Definitely will	50	37.9		
Don’t know	2	1.5		
Not applicable	2	1.6		
No response	1	.8		
Total	132	100.0		

The findings imply that most entrepreneurs had intrinsic motivational reinforcement that controlled their behaviors towards technology adoption to solve specific problem of product performance in a highly competitive market. The self-drive is likely a product of interests to subdue competitors and personal enjoyments and pleasures they got from the good experience they had with technologies in their firms as shown in table 4.31. It could also be predicted that with such high will, high-quality learning is likely among workers in the agro-food firms a much needed predisposition for learning hi-tech technologies.

Level of Support to Implement Technology

This part establishes the extent to which actors in agro-food processing industry perceived that technical and organizational infrastructure required to use food processing innovation was available. Support refers to either resources or programs available for agro-food processors reinforcing their intention to achieve product advantage through technology. According to mean=6.13, most of the MSEs n=127(96.1%)had facilitation conditions to use technology for value addition as shown in table 4.32.The study also found out that the responses were quite uniform and closes to the mean by a very small variance coefficient (0.14). It implied that there was very high consensus among the entrepreneurs in favor for technology implementation.

Table 4.32: Level of Support to Implement Technology

Level of support to implement technology. Does your firm support the use technology for value addition	**Frequency**	**Percent**	**Mean**	**Std. Deviation**
Neither oppose nor support	2	1.5		
Somewhat favour	32	24.2		
Favours	46	34.8		
Strongly favour	49	37.1	**6.1374**	**.87498**
Don’t know	1	.8		
Not applicable	1	.8		
No response	1	.8		
Total	132	100.0		

The perception implies the firms' confidence and availability of basic and important infrastructures such as electricity, internet, water and road networks that would make the system ease to run.Small firms are often known to be deficient in requisite knowledge, liquidity and working market for MSEs are requisite for hi-tech technologies. Facilitation conditions are also important for firms with weak technology anxiety and same could be used by firms with stronger technological anxiety to cause social influence that would spirally diffuses much need innovations among actors in food industry.

Technology Adoption Priority by Agro-food Processing MSEs

Prioritization of technology is an enterprise's resolve to put technology integration in its practices first. For small enterprises, prioritization is an imperative if they have to survive and grow. Of course this goes with investment of resources. The respondents were asked whether the agro-food processors gave technology adoption a priority in food value addition. The results gave a variance of coefficient (0.23) which implied that technology adoption was of high priority to micro and small agro-processing firms; a fact that was most uniformly agreed upon. According tables 4.32,mostfirmsm=5.72 and n= 111(84.1%) gavepriority for value addition in the firms.

Table 4.32: Technology Adoption Priority by the Food Manufacturing MSEs

Does the firm gives technology adoption priority for value addition	Frequency	Percent	Mean	Std. Deviation
Not a priority	1	.8	5.7154	1.35392
Low Priority	4	3.0		
Somewhat priority	8	6.1		
neither low nor high priority	4	3.0		
Moderate priority	23	17.4		
High priority	54	40.9		
Essential priority	34	25.8		
Don't know	1	.8		
Not applicable	1	.8		
No response	2	1.5		
Total	**132**	**100.0**		

New MSE technology based agro-food processors are likely to encounter barriers towards commercialization of their innovations even though they highlyprioritizedit. In such tough economic times small agro-food actors need to build alliances to sustain innovativeness and efficiency in the face large firms' threats.

Commitment to Acquiring the Right Technology

Leadership play important role of decision making in matters of technology adoption. Tested if they decisions showed commitment to acquiring technology and the finings n=114 (86.3%) and (mean=2.40) showed that most managerswere dedicated acquiring right technology as shown in table 4.33. The mean and standard deviation yielded a coefficient of variance that was very high (0.73). Although mostMSEs' management were committed to acquiring right technology, data was highly dispersed meaning that there was almost no consensus on the fact that the MSEs' management had commitment acquiring of technology for value addition.

Table 4.33: Commitment to Acquiring the Right Technology

How committed is the firm's management to acquiring right technology	Frequency	Percent	Mean	Std. Deviation
Very dedicated	40	30.3	**2.4046**	**1.75314**
Dedicated	56	42.4		
Somewhat dedicated	18	13.6		
Neither dedicated nor not dedicated	3	2.3		
Undedicated	5	3.8		
Very undedicated	6	4.5		
Don't know	2	1.5		
Not applicable	1	.8		
No response	1	.8		
Total	**132**	**100.0**		

The findings implied that top management behaved in manner likely to suggest that they were committed to technology adoption. They also promoted firms' innovative culture by often communicating and promoting norms, values and structures that facilitate creativity. Equally the management had the ability to allocate adequate resources to automation of agro-food processes. Given that most of the firms were owner-managed as shown in figure 4.1, the firms' commitment to technology acquisition is extrinsically dependant on the personality, capability, skills and motivation of the entrepreneurs in charge.

Technology Preparedness by Food Manufacturing MSEs

Opportunity begets a well prepared mind. In the same vein predisposition of MSEs can be used to predict the behavioral intention to accept or reject food processing innovations. The study therefore sought to understand the level of readiness of the firms and found thatmost MSEs in food processingmean 6.12, n=111(84.1%)were perceivedprepared to adopt technology for value addition.A coefficient of variance of 0.22 was reached implying there was a high consensus among firms that they were ready for technology adoption for producing advantageous products.

Table 4.34: MSEs Technology Preparedness

Technology preparedness. How prepare is the firm to adopt technology for value addition	Frequency	Percent	Mean	Std. Deviation
Very unprepared	1	.8	**6.1298**	**1.36098**
Unprepared	3	2.3		
Somewhat unprepared	3	2.3		
Neither prepared nor unprepared	8	6.1		
Somewhat prepared	15	11.4		
Prepared	35	26.5		
Very prepared	61	46.2		
Don't know	2	1.5		
Not applicable	3	2.3		
No response	1	.8		
Total	**132**	**100.0**		

The implications are that the firms' environment was conducive for technology adoption. It assumed that preparatory works related to hardware and software relevant for food manufacturing systems was in place and government policy and regulatory framework were favorable. The reality is that many MSEs in agro-food industry need to be adequately prepared for newest innovations if they have to make products that would meet export market demands.

Agro-food MSEs' Management Understanding of Technology Adoption

The process of decision making (a key role for management) to accept and use technology starts with awareness stage. The agro-processing MSEs managements' know-how and how-to forms a very critical stage in deciding to accept or reject food innovation systems. In effort to understand these, the study found out that majority of MSEs' management mean 6.16, n=123(93.2%)clearly understood why the MSEs should adopt technology as shown in table 4.35. A coefficient of variance of 0.17 was arrived at after dividing the mean by standard deviation. It implied that the respondents were ina very strong agreement that the management was in cognizance of the importance of technology to the production of advantageous products.

Table 4.35: Agro-food MSEs' Management Understanding of Technology Adoption

The management clearly understands why firms should adopt technology	Frequency	Percent	Mean	Std. Deviation
Strongly disagree	2	1.5	**6.1679**	**1.07527**
Neither agree nor disagree	1	.8		
Slightly agree	24	18.2		
Agree	53	40.2		
Strongly agree	46	34.8		
Don't know	3	2.3		
Not applicable	2	1.5		
No response	1	.8		
Total	**132**	**100.0**		

It can be deduced that the managers of the firms had necessary information to enable them engage the technology and use it properly. Where MSE's management who are mostly owner-mangers don't obtain adequate knowledge of how-to prior to trial rejection and discontinuance of food processing innovations are likely.

Determining the value of Behavioral Intention to Use technology by Agro-food MSEs (X_6)

The values for the Behavioral Intention to Use technology (X_6) are as shown in table 4.59.The variable was measured by ordinal data on a Likert scale of 7 point. Its value is expressed as an index which is derived as a result of each respondent's height score divided by the maximum expected score. The table has 132 entries (rows) indicating 132 respondents and seven columns indicating number of questions enquiring on whether the agro-food processors behaved in manner to suggest they were likely to acquire and use technology to make advantageous products. Each respondents total score was divided by the maximum possible score 49 (7 questions X 7 points) to get the $\mathbf{X_6}$ indices. The scale was collapsed into two, which is; 0 and 1 because of the binary natureof Logit regression which is the preferred model of the study. All values below 0.5 are considered to be 0 and all values above 0.5 are considered 1.Score of opinions such as don't know or not applicable are valued at 0. The index that fall on zero (0) side meant that the MSEs did not intend to use and index that fall on1 side meant that the agro-food processors intended to use the right technologies. After counting the respondents that scored above 0.5(1) in Table 4.59 the findings revealed that almost all n=129(97.7%) of the MSEs intended to acquire and use technology for manufacturing advantageous food products.

Determining Value for the Combined Davis Technology Adoption Predictors (X_8)

In the context of the study, Davis Technology Adoption Predictors(TAM) form part of exogenous/independents variables that affected the model of designing advantageous products without being affected by it. The variable has three components: perceived ease of use (X_4), perceived usefulness (X_5) and behavioral intention to use technology (X_6). A whole of the three components (X_4, X_5, X_6) is what the study refers to Davis Technology predictors X_8.

X_8= f{(X_4), (X_5), (X_6)

Before finding the value X_8,the study embarked on calculating X_4, X_5, X_6as tables 4.57, 4.58and 4.59 show. The findings show that n= 102(77.3%) MSEs perceived technology as ease to use in manufacturing advantageous products. Secondly, that n=109(82.6%) perceived technology to be useful in making the agro-food products and n=129(97.7%) MSEs behaved in a manner likely to suggest that they intended to acquire and use technology for food value-addition. It follows, therefore, that behavioral intention was perceived to be the greatest predictor in technology adoption for making advantageous product among MSEs in agro-food manufacturing industry.

From the indices of X_4, X_5 and X_6 the study determined X_8 as the mean of X_4, X_5 and X_6indices. The sum of the X_4, X_5 and X_6 were divided by three (the number of components making Davis TAM predictors) to derive the X_8 value as shown in Table 4.60. A count of averaged indices showed that n=110(83.3%) was at 0.5 and above implying that majority of the agro-food processors believed that a combination of perception of technology ease of use&usefulness and behavioral intention to use technology influenced the making of advantageous food products.

Relationship between Davis Technology Adoption Predictors (X_s) and Advantageous Products Y_4

The study processed 132 cases out of which 129 were positive responses. For every trial we assume there is a probability 97.7% of positive responses (highly advantageous). Log (p/(1-p)) = 3.761. It turns out that p is the overall probability of being highly advantageous product (= 1). So p=129/132 = .977. The odds are .977/(1-.977) = 42.86 and the log of the odds (logit) is log(42.86) =3.761. In other word, the intercept from the model without predictor variable is the estimated log odds of products being highly advantageous for the whole population of interest. The study also transformed the log of odds back to a probability: p = exp(3.761)/(1+exp(3.761)) = .977, if we like.

Next, the study develops the logit model by fitting the SPSS coefficient outputs in the logit framework and interpreting their effect.In general, the study had three Davis technology adoption predictor variables in a logistic regression model.

$logit(p) = log(p/(1-p))= b_0 + b_4X_4 + b_5X_5 + b_6X_6 + \varepsilon$

Where;logit(p) = log(p/(1-p))= Advantegeousproduct

X_4= Perceived Ease of Use

X_5= Perceived Technology Usefulness

X_6= Behavioural intention (BI) to use technology

Applying such a model to our example dataset, each estimated coefficient is the expected change in the log odds of being an advantageous product for a unit increase in the corresponding predictor variable holding the other predictor variables constant at certain value. Each exponentiated coefficient is the ratio of two odds, or the change in odds in the multiplicative scale for a unit increase in the corresponding technology predictor variable holding other TAM predictor variables at certain value. Here is the case.

logit(p) = log(p/(1-p))= β_0 + β_4***perceived ease of use** + β_5***perceived usefulness** + β_6***behavioural intention o use technology**

Table 4.36: Parameters of Davis Variables in the RegressionEquation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	X4	-.188	2.960	.004	1	.949	.829
	X5	2.067	2.960	.488	1	.485	7.900
	X6	2.677	1.539	3.026	1	.082	14.539
	Constant	.219	1.320	.028	1	.868	1.245

a. Variable(s) entered on step 1: X4, X5, X6.

The model, according to the table above:

logit(p) = .219-.188X_4+ 2.067X_5 + 2.677X_6

This fitted model says that, holding **perceived ease of use, perceived usefulness** and **behavioural intention to use technology** at0 value, MSEs performance in producing food product would be 0.219. According to the results in the table perceived ease of use (*p* =. 949), perceived usefulness (*p* = .485) and intention to use technology (*p* = .082) did not significantly add to model/prediction. Using the information in variables in the equation table, all the Davis technology predictors have positive relationship with advantageous product except perceived ease of use which is negative.A unit increase in **perceived ease of use(X_4)** would lead to -.188 decrease in the log-odds of **advantageous product**, holding all other independent variables constant. **Perceived technology usefulness (X_5) -** For every one-unit increase in Perceived technology usefulness score, we expect a 2.067 increase in the log-odds of **Advantageous Product**, holding all other TAM variables constant. **Behavioural intention to use technology (X_6)** – for every one-unit increase in Behavioural intention to use technology score, a 2.677 increase in the log-odds of **Advantageous Product** is expected, holding other Davis variables constant.

The study also tested the hypothesis using the Wald test. The test showedthat at *Wald(1) = 41.475, p= .000, sig <.05, 2 tailed.*The p value is far below the set level of significance, meaning that the null hypothesis is rejected and the alternative accepted.

H_1: The three of Davis predictors ("ease of use," "usefulness" and intention to use) had significant influence on production of advantageous product (increased income, differentiated product and meeting market demands).

Having tested the hypothesis, the study tested the significance parameters using the pseudo R^2. Because Pseudo R^2 is analogous to the R square for ordinary least square(OLS), test estimates the discrepancy between the model and the sample data and the strength of association between Advantageous food products manufactured by Kenyan MSEs and Davis technology adoption predictors. Because of its tenability with binary logistic regression,theCox & Snell R Square was used asa pseudo $R^2$to explain the position of variance by predictors and model fitting the data.**Nagelkerke R Square measure** is used to adjust $R^2_{C\&S}$to correct the inherent weakness in for not being able to reach a maximum of 1.Based on the model, variation in the advantageous products ranges from (4.6%) to (23.5%), depending on whether the Cox & Snell R^2 reference or Nagelkerke R^2 methods, respectively.To interpret the measure of a model, the rule of thumb is that the pseudo R^2 statistics range from zero (model without predictive value) and 1(model with a perfect fit). Because R^2 statistics lies between .046 and .235, the model is good. The model is significant, meaning that the Davis TAM predictors can determine the advantageous product well.

4.6 Relationship of Confluence of Porters Competitive Forces and Davis TAM Predictors with Advantageous Product (Y_4)

This section measures the effect of bargaining power of suppliers, buyers, threat of competitors, and perceived ease of use, usefulness and Behavioural intention to usetechnology **(**combined) on advantageous product. The hypothesis is stated in null form as*nosignificant relationship exists between the three of Porter's competitive forces and three of Davis predictors (combined)and advantageous product-**Y_4**.*To realize its conclusive end, the study determined the relationships.

4.6.1 Relationship of Porters Forces, Davis Predictors and Advantageous Product

The study first estimates the parameters of relationship by maximum likelihood. From the predicted value probability that the food product will be highly advantageous are p = 129/132 = .9772. The odds are .9772/(1-.9772) =42.86 and the log of the odds (logit) is log (42.86) = 3.761, at 1 degree of freedom. In other words, the intercept from the model with no predictor variables is the estimated log odds ofproducts being highly advantageous for the whole population of interest.

After estimating the parameters, the study develops the model using the logit regression equation and the SPSS version 20 outputs to predict the advantageous product.

$$\mathbf{Log[p/(1-p)] = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6} + \varepsilon \textbf{ or}$$

Where:

p	= the probability that the advantageous product is high, p(Y=1)
p/(1-p)	= the "odds ratio"
X_1	= Buyers bargaining power
X_2	= Suppliers bargaining power
X_3	= Rivalry from incumbent competitors
X_4	= Perceived Ease of Use

X_5 = Perceived Technology Usefulness

X_6 = Behavioural intention (BI) to use technology

Log[p/(1-p)] = β_0 + β_1*buyers bargaining power + β_2***suppliers bargaining power** + β_3***Rivalry of incumbent competitors**+ β_4***perceived ease of use** + β_5***perceived usefulness** + β_6***behavioural intention to use technology** $+ \varepsilon$

Table 4.39a: Parameters of Porters & Davis Variables in the logit Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	X_1	2.551	1.585	2.588	1	.108	12.814
	X_2	2.938	1.714	2.936	1	.087	18.873
	X_3	19.035	40192.977	.000	1	1.000	184914573.801
	X_4	-1.306	4.431	.087	1	.768	.271
	X_5	2.199	4.345	.256	1	.613	9.012
	X_6	-18.404	40192.977	.000	1	1.000	.000
	Constant	-1.275	1.886	.457	1	.499	.279

a. Variable(s) entered on step 1: x1, X2, X3, X4, X5, X6.

The results shown in the table can be fitted in the equation as;

Log [p/(1-p)] = -1.275 + 2.551X_1+ 2.938X_2 +19.035X_3 -1.306X_4+ 2.199X_5-18.404X_6

According to the results in the table buyers bargaining power (p = .108), suppliers bargaining power (p = .087), rivalry from incumbent competitors (p = 1.000), perceived technology ease of use (p = .768), perceived usefulness (p = .613) and behavioural intention to use technology (p = 1.000) did not significantly add to model/prediction. Using the information in variables in the equation table, the study shows that if all competitive and technology predictor variables were rated 0, advantageous product of agro-food processing MSEs would be -1.275. All predictor variables contributed positively to the advantageous product, except perceived ease of use and behavioural intention to use technology. For instance **buyers bargaining power (X_1) -** for every one-unit increase in buyers bargaining power score (so, for every additional point on the buyers bargaining power), we expect a 2.551 increase in the log-odds of **highly advantageous product**, holding all other independent variables constant. **Suppliers bargaining power(X_2) -** For every one-unit increase in suppliers bargaining power score, we expect a 2.938 increase in the log-odds of highly **Advantageous Product**, holding all other independent variables constant. **Rivalry of incumbent competitors(X_3)** – for every one-unit increase in rivalry from existing competitors score, a 19.035 increase in the log-odds of highly **Advantageous Product** is expected, holding other independent variables constant. **Perceived technology ease of use (X_4)-** for every one-unit increase in perceived technology ease of use score (so, for every additional point on the buyers bargaining power), we expect a -1.306 decrease in the log-odds of **highly advantageous product**, holding all other independent variables constant. **Perceived usefulness (X_5)** - For every one-unit increase in perceived technology usefulness score, we expect a 2.199 increase in the log-odds of highly **Advantageous Product**, holding all other independent variables constant. **Behavioural intention to use technology (X_8)** – for every one-unit increase in behavioural intention to use technology score, a -18.404 decrease in the log-odds of highly **Advantageous Product** is expected, holding other independent variables constant.

The hypothesis to be tested is: Ho:*nosignificant relationship exists between the three of Porter's competitive forces and three of Davis predictors (combined)* ***X_9*** *and advantageous product-**Y_4**.*After creating dichotomous dependent variable, the researchers run the logistic regression usingSPSS at confidence level of 95% or P-value of 0.05 significance levels. The findings shows *Wald tests (1) = 41.475, p = .000, sig <0.05, 2 tailed*. The conclusion is drawn as there was statistically significant relationship found between advantageous products and the attitudes of agro-food processors on the Porters three competitive forces and Davis technology adoption predictors. It indicates that the relationship between the advantageous product and the six variables was deliberate. The null hypothesis was rejected and the alternative adopted.

H_1: *significant relationship exists between the three of Porter's competitive forces and three of Davis predictors (combined) X_9 and advantageous product-Y_4*

4.6.2 Model Fit Test Results

After establishingthat significant relationship existed between the three of Porter's competitive forces and three of Davis predictors,the study sought to find out the reasonableness of the claim, that is how best the data reflected the Porters and Davis theories. This was done using chi-square, likelihood ratio and overall correct percentage.

The chi-square approach determined the difference between the observed covariates and the model covariates. The findings showed that *chi-square tests (6) = 12.589, p = .05, sig ≤0.05, 2 tailed.*In this case, model is neither statistically significant nor insignificant because the p value is exactly 0.05. This caused the study carry out likelihood estimates and pseudo R square tests. Next the study usesMaximum likelihood estimation (MLE) to estimate the coefficients of the model. The likelihood function (L) measures the probability of observing the particular set of highly advantageous product values in the sample. The higher the likelihood function, the higher the probability of observing the highly advantageous products in the sample. MLE involves finding the coeffients (***a***, ***B***) that makes -2 times the log of the likelihood function (-2LL) as 16.047. The Cox and Snell was the preferred Pseudo R^2 formula by the study to estimate the proportion of variance in advantageous product explained by Porter's and Davis predictors, the strength of association between the advantageous product and predictor variable and if the model fitted the data based on log-likelihood.Because $R^2_{C\&S}$ cannot reach a maximum of 1 the statisticsfrom the $R^2_{Nagelkerke}$is used adjust for the realization of the maximum value. Based on the model, variation in the highly advantageous products ranges from 9.1% to 46.6%, depending on whether the Cox & Snell R^2 reference or Nagelkerke R^2 methods, respectively. The model fits the data because it has met the requirements of goodness of fit which is between Likelihood Ratio Index (LRI) of 0(model with no predictive value) and 1(model with a perfect fit).

Because $R^2_{C\&S}$ and $R^2_{Nagelkerke}$in logistic regression are faulted to be only analog, mimic and pseudo of the R^2 and therefore have deficiency in giving a true reflection of model fit measure, the study further verified the model test by means of correct percent predictions and found out 99.2%which was close to a hundred. The decision rule guide that the bigger the percentage of the correct prediction the better the model.

1.6.3 Interaction Terms between Competitive forces(X_7) and Technology Predictors(X_8)

The inclusion of significant interaction terms to this regression model could greatly enhance knowledge of relationships among the three of Porter's competitive forces, the Davis Technology Predictors and Advantageous products in the model and allow more hypotheses to be tested. The table 4.39b below demonstrate the regression coefficients of the designing advantageous food products based on the amount of weaving in Porter's three competitive factors(X_7) and whether the advantageous product is partial or full leveraged by Davis Technology Adoption Predictors(X_8).

Table 4.39b: Parameters of Porters & Davis Variables in the logit Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
	X7	3.521	1.365	6.651	1	.010	33.831
Step 1[a]	X8	1.850	1.374	1.812	1	.178	6.361
	Constant	.036	1.049	.001	1	.973	1.036

a. Variable(s) entered on step 1: X7, X8.

Before the interaction term the model would look like:

Advantageous Product = 0.036 + 3.521***Porters Competitive forces** + 1.850***DavisTechnology Predictors**

Once the interaction term is added the model would look like:

Advantageous Product = 0.036 + **3.521*****Porters Competitive forces** + 1.850***DavisTechnology Predictors**+ **2.521*****Rivalry of incumbent competitors*****DavisTechnology Predictors**

Adding the interaction term changed the values of B7 & B8. The effect of Porter's three competitive forces on advantageous product is now **3.521 + 2.521*****DavisTechnology Predictors.** On one hand, MSEs withpartial Davis Technology Adoption Predictors = 0, so the effect of the Porters three competitive forces is **3.521 + 2.521*0 = 3.521.**So for two MSEs with partial technology determinants, an MSE with competitive forces would be expected to design 3.521 better advantageous products than an MSE with less Porters competitive forces. On the other hand MSEs with full Davis Technology Predictors = 1.

The effect of Porter's competitive forces is **3.521 + 2.521*1 = 6.042.** So for two MSEs with full technology adoption predictors, an enterprise with the three of Porter's competitive forces would be expected to yield 6.042 better advantageous products than an MSE with less competitive forces.

4.6.4The Structural Standard Paths and Unidimentionality

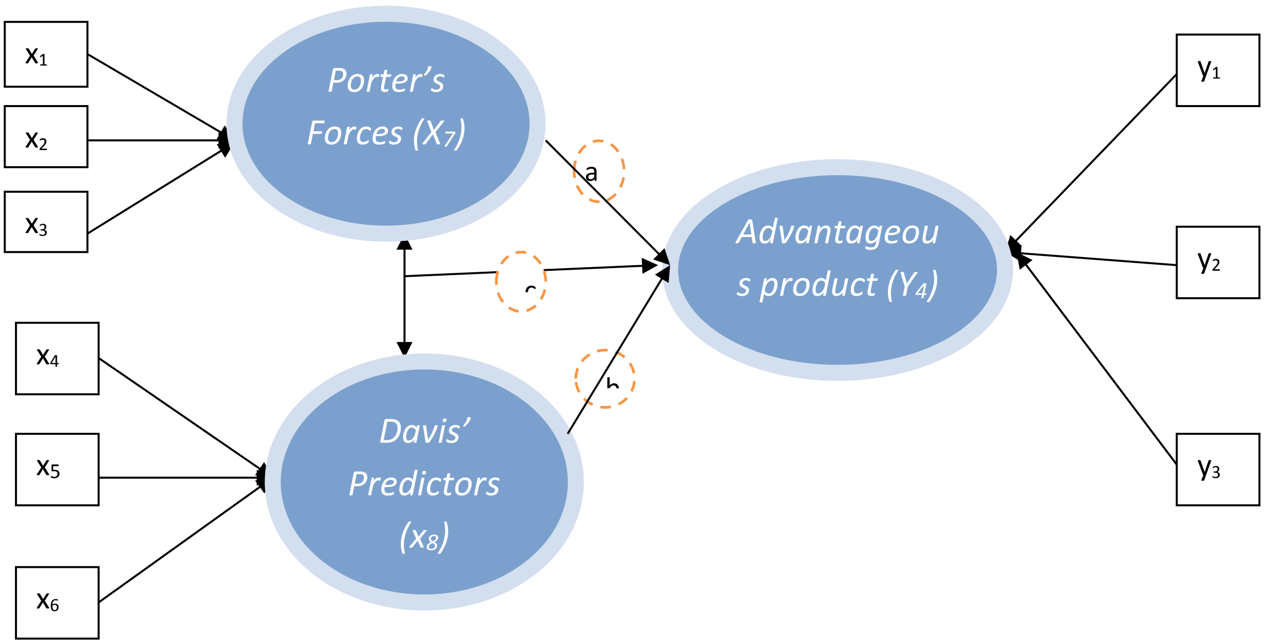
After determining that the relationship between the confluence of competitive forces and Davis technology predictors exists with advantageous product, the study further designed and measures the three critical paths of the confluence using the Amos software as follow:

Path a .... $X_7 \longrightarrow Y_{4;}$

Path b .... $X_8 \longrightarrow Y_{4;}$

Path c .... $X_9 \longrightarrow Y_4$

Path a is the relationship between Porters' three competitive forces combined (X_7) and advantageous product (Y_4). Path b is the relationship between Davis technology Adoption predictors combined(X_8) and advantageous product (Y_4). Path c is the relationship between X9=f($X_{7,}$ X_8) and advantageous product (Y_4). All are as shown in fig. 2.7



Exogenous/independent variables

x_1-buyers' bargaining power;	x_2- suppliers bargaining power;	x_3 –rivalry of competitors
x_4 – perceived ease of use;	x_5 – perceived usefulness;	x_6 – intention to use technology
$x_7 – f(x_1,x_2,x_3)$	$x_8 – f(x_4,x_5,x_6)$	$x_9 – f(x_1, x_2,x_3, x_4, x_5, x_6)$

Endogenous/dependant variables

y_1 – increase in income;	y_2- meeting market demand;	y_3 –product differentiation

Fig. 2.7: Conceptual Framework
Source: Adapted from Porter (1985) and Davis (1989) and Suarez (2009)

The fig. 4.7 shows paths a, b and c and estimates the magnitude and significance of the hypothesised causal connection between Porter's competitive forces, Davis technology adoption predictors and advantageous products. The path coefficients are the standardised regression coefficients (beta weights). The study computes by setting structural equations, in this case

Path a = Advantageous product = **β_7*(buyers bargaining power** + ***suppliers bargaining power** + ***Rivalry of incumbent competitors)** $+ \varepsilon$

Path b = Advantageous product = β_8*(**perceived ease of use** + ***perceived usefulness** + ***behavioural intention to use technology)** $+ \varepsilon$

Path c = Advantageous product = **β_9*(buyers bargaining power** + β_2***suppliers bargaining power** + β_3***Rivalry of incumbent competitors**+ β_4***perceived ease of use** + β_5***perceived usefulness** + β_6***behavioural intention to use technology)** $+ \varepsilon$

After data analysis, the structural equation modelling by use of Amos software, the paths are determined and path coefficients of the variables in the regression model as shown in fig. 4.7a.

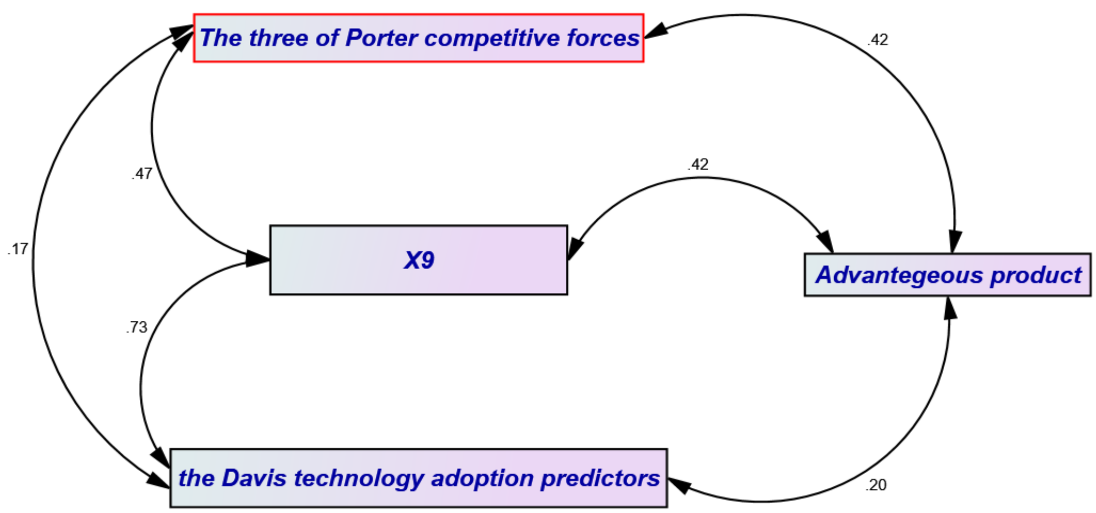


Figure 4.7a:Output Path Diagram of Causal Relationships in the Food MSEs

As shown in figure4.7a the hypothesis that Davis technology adoption predictors influence advantageous product is the least preferred (.20). The most preferred that Porters three forces(x_7) have significant influence on advantageous products (.42). Equally the hypothesis confluence Porters and Davis technology predictors significantly influencing the advantageous products is preferred with the same strength (.42).

Table 4.43: Standardized Paths of Actual Model

Hypothesis/Paths	Causal Path	Standardized path coefficient
H_1 a	Porters' competitive forces ⟶ Advantageous product	0.42
H_2 b	Davis Technology Adoption ⟶ Predictors Advantageous Product	0.20
H_3 c	Porter and Davis Determinants ⟶ Advantageous Product	0.42

At least 0.20 and ideally above 0.30 are recommended bars for standardized paths and to be held meaningful. In this respect Paths a and c are meaningful. This means that, in agro-food processing sector, buyers and suppliers bargaining power combined with rivalry of incumbent competitors had a more meaningful and stronger causal relationship to manufacturing of advantageous food products than technology adoption predictors.

Eigen values were also determined to determine if a variable underlying a set of items existed. The findings showed an eigenvalue of 0.823 demonstrating that there were no variables underlying a set of items.

After establishing the paths, Structural Equation modelling (SEM) was used to analyze the relationship between the constructs and goodness of fit of Porter's Competitive Forces and Davis' (TAM) measurement models combined. SEM model estimations were done using Amos version 21software. The SEM model, based on the Porters and TAM models, included two latent constructs (Porters competitive forces and Davis technology adoption predictors) and six measuring items. The six measuring items were Buyers' bargaining power, suppliers bargaining power, rivalry from incumbent competitors, and perceived technology ease of use (PEU), usefulness (PU) and Behavioural Intention to use (BI).

The initial model having all the two constructs and six items was rejected (x^2 *(9)=52.292, p=0.00<0.05*). Using modification indices it was decided that suppliers bargaining power and BI be removed from the Porter forces and Davis' technology adoption predictors, respectively.

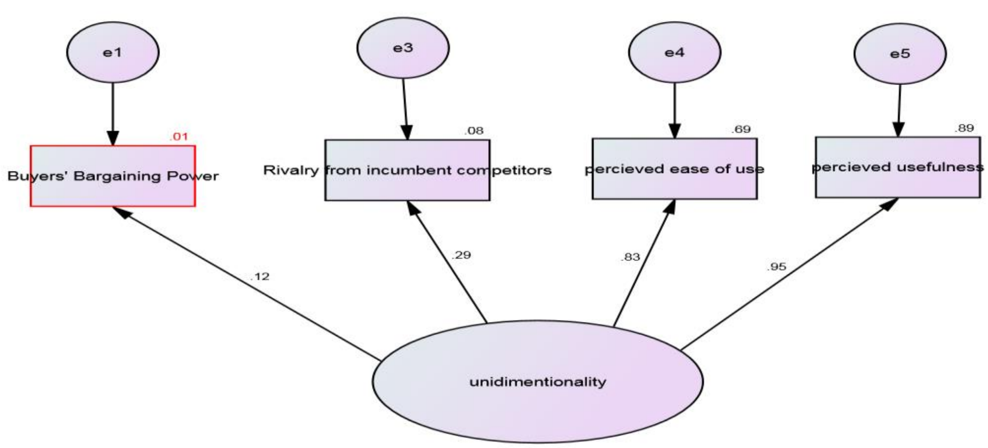


Fig4.7b: The Best Evaluated Model for MSEs to Produce Advantageous Product

Now with four items estimation was done and the model showed a very good fit with sample data as presented in table below.

Table 4.44: Model Evaluation Overall Fit

Fit index	**Value**	**Recommended value**
Chi-square (X^2)	3.658	N/A
Df	2	N/A
p	0.161	>0.05
The Comparative Fit Index (CFI)	0.966	> 0.95
Parsimonious Normed Index (PNFI)	0.311	>0.00
Root Mean Square Error of Approximation(RMSEA)	0.08	≤ 0.08

The results showed that the model had a high predictive power in determining advantageous products among MSEs manufacturing foods in Kenya. The chi-square(X^2) is a product of the difference between the observed covariance and those implied in the model. X^2 – test revealed that the model was adequate ($X^2(2) =3.658$, $p=0.161>0.05$). The Root Mean Square Error of Approximation(RMSEA) demonstrated that the model with optimal chosen parameter estimates fitted well the population covariance matrix at 0.08 value index. Finally, CFI (0.966) and PNFI (0.311) supported the findings that the model fitted the data adequately. The estimations of the model found out that all parameters were significant apart from suppliers bargaining power and the behavioural intention to use technology.

4.7 Comparative Analysis of Technology Adoption Propensity between Rural and Urban Agro-food Processing MSEs in Kenya

H_{04}: There was no significant difference in technology adoption between urban and rural agro-food manufacturing

Section D of the survey contained twenty questions (D1-D20) that asked selected agro-food processors to indicate their perceptions regarding technology perceived ease of use, usefulness and behavioural intention to use technology for food value addition. The sample was disaggregated by county to address the fact that there is no wide variance in the propensity to adopt agro-food processing technology between two independent groups-town-based MSEs and rural-based MSEs. Mann-Whitney U test was used to test: (1) if variances in the median are as a result of technology adoption predictors, (2) if one selected group sample stochastically dominates the other group and (3) test if the rural and urban samples are from the same population of agro-food processing industry because they have the same distribution.

The procedure is as follows:

Step1: the hypothesis was stated and the claim identified as below:

H_0: There is no significant difference in technology adoption between urban and rural agro-food processing enterprises in Kenya.

H_1: There is significant difference in technology adoption between urban and rural agro-food processing enterprises in Kenya.

Step 2: the study set the critical value at $\alpha = 0.05$ and the test being two tailed, the study preferred the z values of +1.96 and -1.96.

Step 3: Using SPSS the scores were ranked from lowest to highest in both rural and town groups, the ranks of the score for each group was were added up and the sum of the ranks for each group are used to drive the statistical comparison.

Combining the data from the urban and rural samples, arrange the combined data in order and rank each value. The study further sums the ranks of the group with the smaller sample size.

Table 4.45: SPSS Output of Mann-Whitney U & Wilcoxon W Test Statistics

	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)	Exact Sig. [2*(1-tailed Sig.)]
What level of difficult (complexity) do you get in using technology?	485.000	675.000	-3.890	.000	
How compatible is the technology with the firm?	710.000	900.000	-2.404	.016	
How often do the technology cause harm to the workers in the firm?	1052.000	7380.000	-.081	.936	
How long does it require one to learn to operate the technology in your firm?	835.500	1025.500	-1.469	.142	
In case of breakdown, it is cheap to repair the machines	683.000	854.000	-2.215	.027	
How useful is technology to your firm?	1036.000	7364.000	-.190	.849	
Triability. How often has the technology been tried out before you adopted it?	1059.000	7387.000	-.034	.973	
What is the firm's experience with technology?	573.000	744.000	-3.021	.003	
Does technology give your firm any competitive advantage over your competitors?	1012.500	1202.500	-.356	.721	
How appropriate is the technology currently used by your firm?	837.500	1008.500	-1.210	.226	
Timeliness. The technology enhances timely processing and delivery of products and services.	1019.500	1209.500	-.112	.911	
Mass production. The technology is useful in mass production	926.000	1116.000	-.883	.377	
Which of the following functional areas of the firm do you use technology most?-Production	252.000	2880.000	-3.000	.003	
Which of the following functional areas of the firm do you use technology most?-Marketing	122.500	752.500	.000	1.000	1.000[b]
Which of the following functional areas of the firm do you use technology most?-Finance	48.000	348.000	.000	1.000	1.000[b]
Level of Acceptability. How acceptable is technology in your firm?	904.000	7232.000	-1.104	.269	
Average	722.2188	2629.90	-1.248	0.465813	

Step 4: Draw the decision. The decision is to reject or accept the null hypothesis based on the calculated value being greater or smaller than the critical value. Results as shownin tables 4.44 and 4.45 may be reported as *"a statistically not significant group difference (Mann-Whitney U*=722.2, *p=0.465813, sig≥.05, 2-tailed)"*.

Step 5: Finally the study summarizes the results by stating whether there is no enough evidence to support the claim that there is difference in technology adoption propensity between rural and town food manufacturing enterprises.

H_0: There is no significant difference in technology adoption between urban and rural agro-food processing firms in Kenya

However the study specifically discovered significant group differences in the perceptions of technology complexity, use in production function, experiences compatibility and cost of repair in case of breakdown as part of key characteristics that defined technology adoption propensity:

- Level of complexity (*Mann-Whitney U=485.000, p=0.000, sig<.05, 2-tailed).*
- Used in production function (*Mann-Whitney U=252.000, p=0.003, sig<.05, 2-tailed).*
- Experience with technology (*Mann-Whitney U=573.000, p=0.003, sig<.05, 2-tailed).*
- Level of compatibility (*Mann-Whitney U=710.000, p=0.016, sig<.05, 2-tailed).*

- Cost of maintenance/repairs (*Mann-Whitney U=683.000, p=0.027, sig<.05, 2-tailed).*

4.8 Challenges the MSE in Agro-food Processing Face in Adopting Technology

Barriers prevent MSEs in agro-food manufacturing to successfully adopt technology and enjoy the benefits that come with it. The benefits in this context include producing food products that are highly profitable, satisfying varied customer tastes and products that are imitable. Respondents were asked, in the order of severity, to list five challenges they faced in adopting technology for agro-food processing. According to the study it was revealed that most MSEsn=90, (68.2%) face inadequacy of capital to acquire technology which is expensive. Other challenges in the order of priority are lack of skilled personnel, costly repair of machines, lack of electricity and high production cost.From site visits and participants observation, electricity contributed to high costs of production among the agro-food processors. The least severe challenge is price fluctuations of technologies as shown in the table 4.46.

Table 4.46: Challenges MSEs Face in Adopting Technology

Challenges	Frequency	Percent
Inadequate capital to support productions-adapting technology is costly	90	68.2
Lack of skilled personnel-it requires skilled personnel	59	44.7
Machines breakdowns is costly to repair	35	26.5
Lack of electricity power	33	25.0
High cost of production	28	21.2
It takes time to learn and put into practice	28	21.2
Frequent changes in technology makes adoption hard	19	14.4
Infrastructure hinders transportation of goods and services	18	13.6
Causes unemployment of people	16	12.1
Some are environmental hazards and may cause death if not handled well-bio degradation	13	9.8
Inadequate market for products	12	9.1
Insecurity for production process	12	9.1
Lack of transport	9	6.8
Lack of permanent space	8	6.1
Too many taxes and levies	6	4.5
Lack of value addition machines	6	4.5
Government policies like licenses doesn’t favor production	5	3.8
Competition of same products from neighboring countries	5	3.8
Lack of storage	4	3.0
Lack of permanent employees	4	3.0
Poor communication networks and cell network	3	2.3
Lack of raw materials	3	2.3
More brokers to enhance prices	2	1.5
Difficulty in accessing packaging materials	2	1.5
Attitude being negative	2	1.5
Changes in weather	2	1.5
Lack of information on processing regarding the sector	1	.8
Price fluctuation	1	.8

The findings imply that financial and human capital affected most the MSE, followed by costly repairs of the food innovation systems. According to the participants’ observation, the repairs are due to very old and obsolete technologies whose spare parts are rear in the market. The low price inflation has been explained by KBS staff (key informant) as due to reduction in Producer Price Index (PPI) of food products especially in tea and sugar. These results have also been clearly demonstrated in figure 4.8.

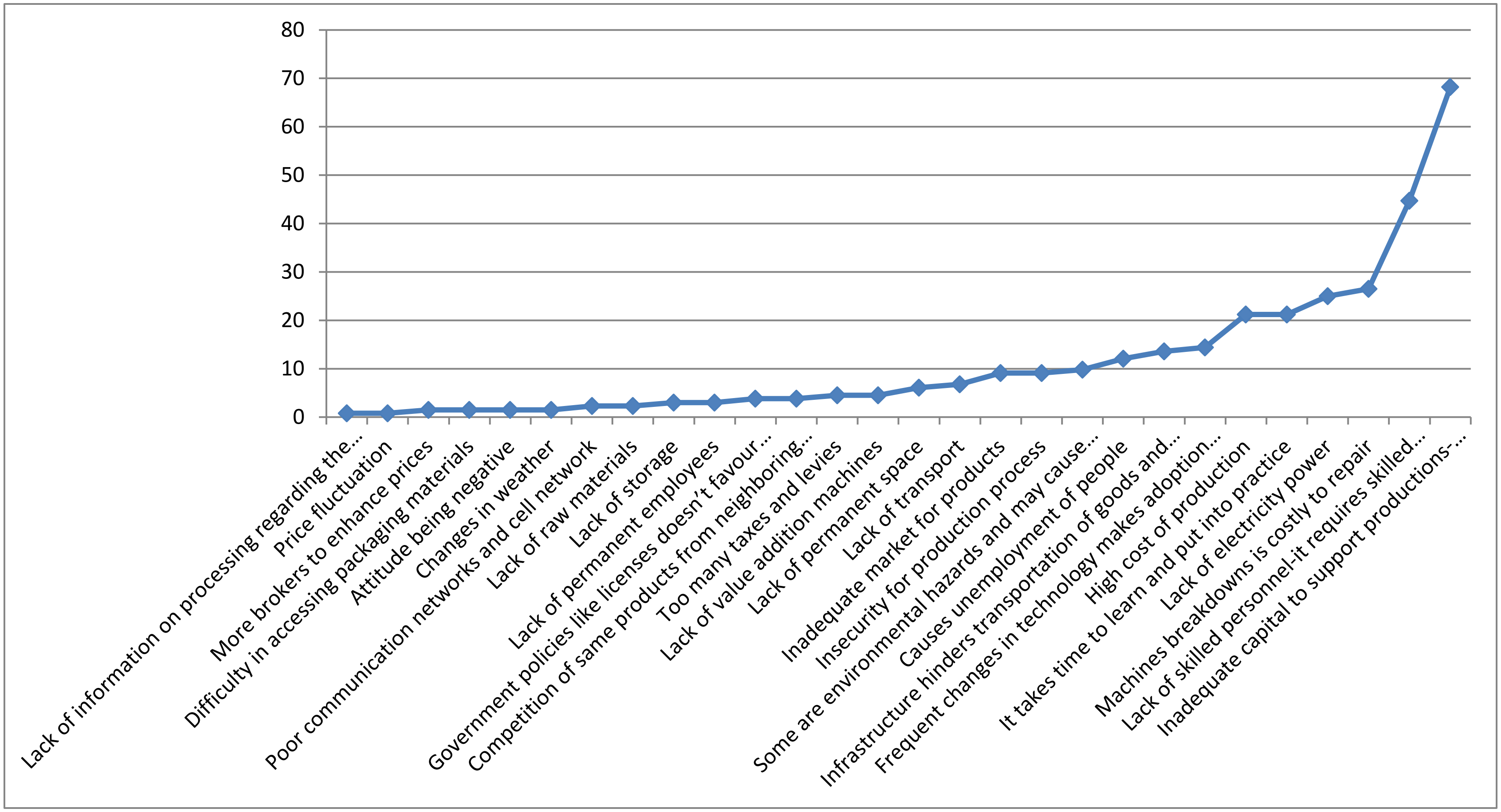


Figure 4.8: Ranked Challenges Hindering MSEs to Adopt Technology for Food Value-Addition

From the findings, it is implied that lack of capital that is; financial and human capital were the most severe inhibitors to MSE agro-food processors to acquire and drive competitive advantage from technology. They also suffered infrastructural challenges such as electricity. This calls collaborative efforts to address the challenges.

CHAPTER FIVE

DISCUSSIONS, SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The previous chapter analyzed and interpreted data obtained from the survey. This chapter discusses the findings, draw conclusions and make recommendations as per the study on a combination of three competitive factors (buyers' bargaining power, suppliers bargaining power and rivalry among existing competitors) and three technology acceptance model predictors (perceived ease of use, perceived usefulness and behavioural intention to use technology) influence on production of advantageous products (increased income, meeting market demands and differentiated products) among food processing MSEs in Kenya.The discussions of the results are logically organised around the hypotheses of the study followed by conclusions, recommendations and suggestions for further studies.

5.2 Discussion of the Findings

This section state answers to the questions, explains how answers are supported by results and how the answers fit within the existing knowledge.The section is made up of the answers on background information, advantageous product, Porters' three forces influence on advantageous product, Technology Adoption Predictors influence on advantageous product and the combination of the forces and predictors influence on advantageous products among MSEs in agro-food manufacturing. The discussion also entails the answers to difference in technology adoption between rural and urban MSEs and challenges that inhibit technology adoption among micro and small agro-food processors.

5.2.1 Background Information

Demographically, the study discovered that food value addition enterprises in Kenya are dominated by older adults. Age has been discovered to be a critical determinant of behaviour towards technopreneurship.The survey shows that technology usage and acceptance among older adults was higher (55.3%), a fact contradicting findings of many studies which found technology-anxiety to be higher among youths(De Koning & Gelderblom, 2006). A similar study on 356 German firms also confirmed a contrary opinion that younger people adopted technology faster than older adults(Meyer, 2008). According to Lazear (1998), the low self efficacy and age-related challenges facing the older adults are likely to inhibit their learning and operating widely used and current technologies in agro-food processing.The lower uptake agro-food manufacturing among youths could be better explained from entrepreneurial point of view rather than technology point of view. According to a recent survey on young and adult entrepreneurs in Swaziland, entrepreneurial skills shortage and high costs were the inhibitors that brought the asymmetric uptake of food value-addition activities and that training youths would be more effective than subsidies in improving youth participation in agro-food processing(Brixiova,Ncube & Bicaba, 2014).

Social exclusion is also evident. A gender divide is demonstrated by the survey findings that about 70% of the agro-food manufacturers are married men, a trend unique to patriarchal cultures with gender asymmetry unfavourable to women. Like empirically evidenced in twelve European countries, cultural norms influenced innovation(Falk, 2008). Culture influenced leadership which moderate organizational innovation and technology adoption(Elenkov & Maney, 2005). A Ghanaian study on gender's effect on adoption of agricultural innovations exonerated inherent characteristics of technology as an inhibitor causing women slow uptake of technology and held accessing key inputs that land, labour and extension contacts by women whose access are culturally determined to be the obstacles (Morris & Doss, 1999).

Evidence from gender studies show that African women are not technology averse, rather restrictive cultural practices, discriminatory laws and highly segmented labour market eliminate them from exploring their productive potential(African Development Bank, 2015). Women form the largest population and workforce in agricultural value chain but don't reap equivalent benefits due to efficiency and equity challenges in the agricultural systems (Francis, 1988). The observed gender divide also could imply that female were under-represented in higher-skilled and highly prestigious positions in the agro-food industry. Women in food manufacturing sector, therefore, must have missed out on their likelihood to improve their productivity and economic emancipation. A review on current practices and knowledge revealed that access to assets, gender education differentials and nature of economic activities are the biggest contributors to the inequalities in the industry(Choles & Mitchell, 2011).

However the economic viability and sustainability of agro-food industry rests on embracing technologies that address the process, functions and the environment in the value chain(USAID, 2007). Based on TAM, Venkateshand Morris (2000) advises that women participation in agro-food manufacturing could be enhanced by fabricating technologies that demonstrated ease of use as opposed to their men counterparts whose behavioural intention favoured instrumentality or perceived usefulness. Doing away with gender inequality in food value chain would raise the productive potential of 12 million Kenyans, delivering a huge boost to the country's economic development potential.

It can be seen from the survey findings that over 51% of the MSEs in agro-food processing are managed by married couples. Rapid growth of family-owned enterprises has been explained by recent rationalisation in large enterprises and inability of formal sector to create new jobs(Visser & Chiloane-Tsoka, 2014). Today family-owned enterprises are the majority of business all over the world(Drucker, 1995). According to Moretti (2004) marriage plays an important role in plant-level production functions because it enhances educational spillover and productivity. This agrees with study findings in United States of America on entrepreneurship among married couples that observed positive interdependence of enterprise ownership and knowledge transfers(Parker, 2005). In family-owned enterprises, marriage is a supplier of human, social, financial and physical capital for agricultural value chain activities(Danes,Lee, Stafford,& Heck,2008). A study byAfrican Development Bank (2015) also shows that women and children in agriculture sector form 70% of workers and play important roles in production, processing and marketing of agro-food products.

These types of businesses were also characterized by a two or more family member controlling over 15% ownership, strategically influencing them, having family concerns and dreaming to continue across generations(Poza, 2014). However, they were likely to suffer from insularity, succession, family conflict and governance(Nicholson, 2003), cash flow and control, skilled labour, market conditions and government regulatory framework(Visser & Chiloane-Tsoka, 2014). For such MSEs to survive and prosper, Danes et al., (2008) advices that they must embrace innovation and a continuing entrepreneurial culture as part of the family values(Spinelli & Adams, 2012).

The study also found that most of MSEs in agro-food manufacturing (40.9%) were owner-managers from the responses to question about designation.According to Stokes and Wilson (2010), owner-managers face enormous range of issues including planning, implementation, production, human resource, marketing and financesthat sometimes demand to be dealt with simultaneously which may result in overlooking obvious but most significant strategy that has critical impact(Mbugua,Mbugua, Wangoi, Ogada& Kariuki, 2013). Further Mbugua et al., (2013) proved that under such circumstances owners/managers determined technology adoption. Their entrepreneurial attributes, that is; propensity to take risks, motive of going into self employment, managerial abilities to raise capital and perception of new markets determined growth of the MSEs were critical (Hisrich, Peters & Shepherd, 2010).

Technology adoption decisions where owners themselves are managers have been explained by theories of organizational decision-making and reasoned action indicating that collective innovation-decisions were realized through team consensus led by charismatic(Hitt,Ireland, Camp& Sexton,2001) or opinion leadership (Rogers, 2003). In the framework of firm decision-making, it is the key decision maker, such as the owner/manager who drives the process complemented by culture, resources and strategy. The theory of reasoned action further explained that individual behaviour is a function of attitude and that a firm's innovation adoption has its genesis in individual decision making process and adoption(Fishbein & Azjen, 1975). Governments committed to improve value addition for competitive market need to target owner-mangers with technology awareness and team building skills that will enhance proper decision making towards embracing appropriate technologies for agricultural value chains.

According to the survey findings most of the respondents34.1% were secondary school graduates. The education system at this stage is characterised by formality, conformism and anti-entrepreneurial tendencies(Kirby, 2003), and is deficient of the requisite entrepreneurial and technological skillsfor MSEs to competitively design advantageous products.However it is at this level that most agro-food processors contaminate the food value addition innovations according to the viral-epidemiological model (Frey, 2008). It is at this node that planners and extension officers in agro-food industry need to perceive formal education a critical determinant of the owner/mangers' behavioral intention to use technology, perception of usefulness and ease of use (Riddell & Song, 2012).

Career socialisation theory, according to Clausen (1968) predicted that education and training among other factors determined ones choice of career because it inculcated certain values, behavioural intentions and world perspectives in the recipient(Clausen, 1968). Entrepreneurial career such as food value addition, therefore, is determined by entrepreneurial education programs that socialises recipients in opportunity identification, starting own enterprises and role modelling(Paterman & Kennedy, 2003). A study in Malaysia among 746 students discovered that at an early and formative stage, young people needed to be trained in risk taking and entrepreneurial intention alongside formal education(Hassan & Wafa, 2012). In USA, youth's academic skills, initiative, attitude and motivation were improved by entrepreneurial studies (Mariotti, 1995). Given the findings, propensity of youth towards agro-food manufacturing can be enhanced if secondary school education curriculum enabled parents and students participate in entrepreneurial role modeling, remarking and supporting entrepreneurial attitudes. The study also considered the micro and small agro-food enterprises characteristicswhich include registration status, age, period of operation, annual sales turnover, staff establishment and networks as key characteristics of MSEs manufacturing functional food products.

The study observed inadequate attention by Busia and Nairobi County Governments to address the MSEs' prosperity. It revealed that slightly over 50% of the firms were registered, though they contributed to the county revenue baskets, despite food manufacturing sector making significant contribution to economic growth through providing jobs, lower labour productivity and value-addition(Deakins & Freel, 2012). Registration was used to establish informality or formality of the MSEs in agro-food industry. This means that formal economy is equal to the informal economy in the two counties. Evidence from China show that unregistered MSEs had lower growth rate and increased illegality(Ayyagari,Demirguc-Kunt & Maksimovic, 2010). The unregistered agro-food enterprises are likely to experience poor access to finance and land, crime, theft, disorder and corruption(International Finance Corporation, 2013). Informal agro-food sector also means informal employment to the citizenry; unstable and contract-less employment that is void of social security(ILO, 2012). As observed by Chen (2007), most MSEs are informal due to the exorbitant costs of complying with regulations (Chen, 2007). Because of the residual and complementary role the informal agro-food enterprises play in rejuvenating the economy and creating employment, it is of paramount important for the public, private and multilateral stakeholders to rethink and incentivise the informal businesses into formal sector

The survey on 132 MSEs in Busia and Nairobi, found out that (61.3%) of the firms had been in operation for less than3 years, predicting a high failure rate. Age of an enterprise has a lot to say about its resilience to competition vagrancies and sustainability. Like many other studies, a study on factor affecting performance of small and micro enterprises in Kiambu, revealed that MSE die at a very high rate within the first two years(Kamunge,Njeru& Tirimba, 2014). Most of the firms are susceptible to liability of newness, that is; they had survived hardly three years. Liability of newness explains that younger firms are more susceptible to failure than older firms. Many studies informed byJovanomic's Learning Effect Model (1982), found decreased growth rate among MSEs with age and size. The passive learning model explains that younger firms enter the market with less information than older ones about their true efficiency and managerial abilities(Staines, 2005). In Ethiopia, a study was done among manufacturing enterprises and discovered that endurance of businesses increased with age and size and growth rate decreased (Mengiste, 1998). In addition, the study predicted greater efficiency among older and larger enterprises than Micro and Small Enterprises. Therefore it is more likely have more failures rate among younger and smaller enterprises than older MSEs.

The sampled data also revealed thatmost of the firms (65.9%) had annual sales turnover of Kshs0-500,000, permanent staff of between 1-10 employees (78.8%), majority (48.5%) of whom were natives from the county; a clear indication that they were Micro and Small enterprises as per the definition of the SME Act in Kenya. According to DeakinsandFreel (2012) most enterprises in the economy are MSEs. From theJovanomic's Learning Effect Model, Mangiste (1998) argues that the smallness of an enterprise was a liability of its efficiency and endurance. In ccomparison with large businesses, MSEs have been found to be more innovative due to their flexibility and responsiveness to change, able to overcome resource constraints and produce value-added products with minimal labour costs (Deakins&Freel, 2012). However, they are not capital intensive with limited capacity to diversify their financial risks, develop own ideas through their own internal research and enjoy economies of scale(Stokes,Wilson& Mador,2010). A similar study in Kenya, supports the high failure prediction of the MSEs in agro-food processing by finding that MSE's size and failure are inversely related, with smaller MSEs facing higher failure risks than larger ones(K'Obonyo, 1999).

The survey revealed that most MSEs n=75, (56.8%) were members of trade associations. About 73% of the MSEs perceived value in the networks implying network concept worked for them. As described by Latour (1987), innovation spatially and temporarily diffuses from its source to many other actors ina social system. Where actors are not networked the process would be hampered. According to Krugman(1991) and Roeland and Hertog (1999) such enterprises networks supplied knowledge, facilitated exchange of business information, technological expertise, innovation and increased returns and shared customers.

5.2.2 Agro-Food Products Processed by MSEs in Kenya were Perceived Advantageous

In the context of the study an advantageous product has three key features: increase in income, meeting market demand and being differentiated. From the sampled data, over 98% of the respondents agreed that the products increased the MSEs' incomes, n=125(94.7%) agreed that the products met the market demands and n=126(95.4%) accepted that the products were differentiated. An advantageous product is a food product that has superior performance, superior competitive advantage and market oriented. According to Siro,Kapolna, Kapolna, and Lugasi(2008), it is also known as functional foods. It possesses nutritional, psychological and at the same time economic advantage to the consumers and the enterprise. These findings are challenged by antecedent studies which observed that the MSEs lacked competitiveness which inhibited their participation in global trade(UNCTAD, 2002). This challenge on lack of competitive is further reinforced by observations that though food manufacturing is dominant in sub-Saharan Africa it was at primary level which risked stiff competition at the global and competitive food market (Regnier, 2009; Statitistical, Economic and Social Research and Training Centre for Islam Countries, 2010). The MSEs in agrofood industry need to work on their supply-side constraints and buyer side by adopting market-oriented culture whose building blocks are market research on customer values, strategic and technological anxiety in the development of profitable, customer-satisfying and competitively unique products (Griffin & Hauser, 1992; Langerak et al., 2004; Homburg & Pflesser, 2000).

5.2.3 Porter's Competitive Forces Influence on Advantageous Product by MSE

The study findingsshow*Wald (1) =41.475, p=.000, sig<.05, 2-tailed.* The p value =.000 is below 0.05 the permissible value of likelihood above which null hypothesis is accepted. The implications are that *Bargaining Power of Buyers, Suppliers and Rivalry from Incumbent Competitors significantly influenced Advantageous Product by MSE in Food Manufacturing*. As advised by Siu and Kirby (1998), the results were gotten from Michael Porters framework enriched by qualitative research methods such as survey and interviews to provide the MSE specificities of the agro-food processing operations and perceptions(Siu & Kirby, 1998).The survey on 132 MSE in Busia and Nairobi Counties found out thatrivalry from incumbent competitors had the highest score n=130(98.5%) therefore the greatest influence.Second is the supplier bargaining power n=122(92.4%) and lastly the buyers' bargaining power n= 117(88.6%). The MSE competitiveness in food manufacturing industry is determined by how they perceived and managed bargaining powers of buyers, suppliers and rivalry from existing competitors. The manner in which an agro-food processing MSE combined the three of Porters' forces (buyers bargaining power, suppliers bargaining power and rivalry form incumbent competitors) distinguished it from its competitors and secured it a unique position in the market. The ultimate success of an enterprise is defined by creating and sustaining competitive advantage crucial for designing excellent food product(advantageous product) that is valued by buyers and inimitable by rivals(Krolo & Sustic, 2007).

Rivalry from incumbent competitors is the greatest headache to the micro and small enterprises in agro-food processing industry in Kenya. It defined by dominance of large firms, customer loyalty, intensity of rivalry, industry product growth rate, complexity of product-related information, switching cost from one product to another, product uniqueness and intermittent overcapacity. All other two factors held at constant, every one-unit increase in rivalry from existing competitors scores increases the log-odds of advantageous product by1.247. This is a benchmark condition where, according to Bykowsky,Kwasnica and Sharky (2002), MSEs in agro-food industry have large numbers of identical competitors – other firms that command same willingness-to-pay on the part of the buyers and the same opportunity cost on part of suppliers. This also confirms why numerous incumbent competitors is the most homogeneous and congruent variable in the study findings.

Although consumption of the agro-foods is high, the industry is fragmented with very many enterprises with market leaders that is large firmsn=108(81.8%) sharing the larger pie. This is in agreement with Kamunge et al., (2014), who found out that rivalry in Kenya was from both peers and large corporations in niche markets previously thought to be a reserve for MSEs. The study findings are similar to Croatian case where profit of a small bakery was minimised due to intensified rivalry from companies with similar market share, products and big bakeries dominancy in employing large numbers of works and enjoying economies of scale(Renko,Sustic& Butigan, 2010).One way of dealing with rivalry is by building collective efficiency though production cluster or industrial districts(Nganga, Onyango & Kerre, 2011). Establishment of Clusters model would help agro-food processing MSEs a achieve economy of scale, visibility and a certain pull on suppliers, buyers and providers of infrastructure(Zeng, 2008). Another strategy is creating vertical linkages by connecting MSEs with buyers and suppliers along global food value chain. Through global value chain, the agro-food processors acquired external linkages that introduce them into global markets and new power relations(Reeg, 2013). Providing entrepreneurial training for MSEs in agro-food industry is another way of handling rivalry by developing competencies that are needed to win in the agro-food market (Ndirangu & Mukulu, 2014). Training would increase the MSEs' capacity to formulate and implement competitive strategies like high quality customer service and change management(Armstrong, 2009).

Other factors that influence the advantageous food product are suppliers bargaining power and Buyers bargaining power.Studies on Porter's bargaining power of buyers and bargaining power of suppliers have demonstrated countervailing forces of competition on opposite sides of the market (Galbraith, 1952). The surveyed agro-food MSEs perceived the willingness–to-pay-off the suppliers as the most important value creation ingredient than the opportunity cost of the supplier; a fact that is in tandem with a value-based business strategy. According to this strategy, an agro-food MSE can only strike a favourable asymmetry between self and other firms if it emphasized the importance of suppliers who would determine costs and ultimately the profit for meeting the buyers' needs (Brandenburger & Stuart, 1996). The findings are also supported by previous studies (Normann et al., 2005; Galbraith, 1963) that offsetting suppliers bargaining power increased market power and resulted in buyer-size discounts which moderated businesses not to go beyond a higher-than-competitive price.

On the other hand managing buyers is equally important. A similar study in USA, also confirmed that increase in concentration among buyers reduced economic efficiency of an enterprise (Bykowsky et al., 2002). However a study in India observed, otherwise, that recent urbanisation and unprecedented flux in consumerism in agro-food market and propagated for buyer driven model that makes agro-food processors sensitive to quality, safety, consumer assurance, lower prices and reliability of supply(Vorley,Lundy, MacGregor& Baker, 2008). In support of the buyer driven model, Zeithmal (1999) described it as means to the end because the buyer perception of price, quality and value of the food product were critical in predicting the customer's shopping decisions.

5.2.4 Davis Technology Adoption Predictors' Influence on advantageous Product

According to the study findings the computed *Wald (1) = 41.475, p= .000, sig < .05, 2 tailed* from the sample data meaning that the null hypothesis is rejected and the alternative accepted that is *the three of Davis predictors ("ease of use," "usefulness" and intention to use) had significant influence on production of advantageous product (increased income, meeting market demands and differentiated product).* The findings are supported many similar studies in technology adoption in the customers context(Krueger et al., 2000; Al-Adwan et al., 2013; Park, 2009; Shroffet al., 2011; Fung, 2013; Chuttar, 2009; Cui et al., 2008; Smith et al., 2009; Bagozzi, 2007). This study, like many other previous studies, finds Technology Adoption Model (TAM) the most useful to predict the acceptance of food processing technology by MSEs in food industry. Studies on small enterprises have found out that economic globalisation has occasioned a dynamic and complex competition paradigm(Hitt et al., 2001).

In order to survive in the market, MSEs have to use latest technology (Mazurkiewicz & Poteralska, 2015), continually improving on the innovation and structuring themselves to be ahead of the rivals(Jin, 2007). According to Vorley et al., (2008) modernization has come with a basket of economic opportunities. However, local MSEs risks being bypassed because of low uptake of latest technologies that would enable them meet costly market entry requirements. This low uptake has bothered researchers to find out the predictors and barriers of technology adoption as a competitive advantage.

Behavioural intention to adopt technology scored highest n=129(97.7%) meaning that most MSEs were willing to acquire and adopt relevant technology. Second in the order of priority of agro-processors was instrumentality. Majority n=109(82.6%) perceived technology to be useful in making the advantageous agro-food products. Finally the results show that n= 102(77.3%) MSEs perceive technology as ease to use in manufacturing advantageous products.According to Davis (1989), perceived usefulness is *"the degree to which a person believes that using a particular system would enhance his or her job performance"* perceived ease of usefulness is "*the degree to which a person believes that using a particular system would be free of effort*".The survey found out thatholding other Davis variables constant, behaviouralintention to use technology (X_6) increases the log-odds of advantageous product by 2.677 for every one-unit increase in Behavioural intention to use technology score. According to Tsai (2012) behavioral intention of agro-food processing MSEs to adopt technology would mean the degree of an agro-food processor's willingness to use the new food manufacturing innovations. It also refers to how an agro-food manufacturing enterprise's evaluative feelings (either positive or negative) about using food processing innovations for realizing a highly competitive product(Viswanath, Thong & Xu, 2012).Various Scholars in technology adoption industry have bothered to find out how the behaviour could be enhanced in the end user so as to increase the technology anxiety (Yang& Forney, 2013; Micheni,Lule& Muketha, 2013).

The study measured the evaluative feeling of agro-food processors by considering the acceptability, willingness, support, prioritization, management commitment, preparedness and management awareness of the technology as antecedents of Behavioral Intentions to use the newest food processing innovations. Out of the seven variable, the leading voted variables are support n=127(96.1%), intention to implement n=125(94.7%) and management understanding of the right technology 123(93.7%). The lowest voted is technology prioritization and preparedness 111(84.1%). The findings on support as a critical antecedent to Behavioral Intention to use technology by the MSEs in agro-food processing are true to a study in Kenya on adopting money services(Micheni et al., 2013).

According to the study support is a facilitating condition that made the agro-food processor feel and have confidence that the enterprise and technical infrastructure exists to support the use of food innovation. Support has also been observed as playing moderating, facilitating and social influence role in innovation adoption to the end-user, innovation administrator support for the end user(Yang & Forney, 2013). The types of support that played the facilitating role to technology adoption by MSEs include infrastructure, research and development services, education, extension services, policies(Lundy,Vorley& MacGregor, 2009). A good example in time is the Malaysian government support to SMEs to adopt technology as a new and efficient method of performing business through cloud computing to deliver government services(Weerakkody,El-Haddadeh, Sadol, Ghonein & DZupka,2011). The results were reduced costs and wastages on the government side and improved efficiency and profitability for the SMEs.

In regard to intention to implement, studies in information management and mobile communication agree with the findings of the study, but further observe much more predictors to it. The predictors include perceived playfulness(Moon & Kim, 2001), perceived previous experience, perceived convenience and perceived self-efficacy (Tang & Chiang, 2009) or agro-food processor's self regard on capability to use food innovation to produce advantageous product(Moghavvemi,Hakimian& Feissal, 2012). The behavioral intention that would lead to actual use of food manufacturing innovations for advantageous product is not by chance but a product of well thought and planned behavior (Ajzen, 1985) and positive attitudes that are grounded on by end-users(Baker-Eveleth & Stone, 2008).

Other factors that stakeholders need to consider in improving the owner/manager's intention to implement technology is to work on their perceptions of technology efficiency (ease of use), instrumentality- usefulness and attitude (Davis, 1989**;** Al-Adwan et al., 2013; Park, 2009; Uaiene, 2011; Smith et al., 2009). Similar studies on cognitive process motivation found expectancy theory the best model to explain the enhancing of intention of the MSEs to implement food innovations(Parijat & Bagga, 2014). The theory believes that the strength of a tendency in an entrepreneur to adopt technology depends on the strength of an expectation that the technology will be followed by an attractive outcome, in this context, an advantegeous product that increases the MSE's income, addresses the the global market demand and is differentiated from the rivals(Stephan & Timothy, 2013). To enhance the tendency of the intention, owner/magers have to be motivated by altering their effort-to-performance expectancy(increasing the employee's self efficacy), performance-to-reward expectancy(rewarding performance) and reward valence by increasing the reward value(Lunenburg, 2011).

5.2.5 Confluence ofPorter's Forces and Davis predictors Influence on Advantageous Product

The study findings show that ***the confluence of Porter's competitive forces (buyers bargaining power, suppliers bargaining power and rivalry of incumbent competitors) and Davis predictors (perceived ease of use, perceived usefulness and behavioural intention to use technology) combinedsignificantly influences advantageous product*** (*Wald test =41.475,p=0.000, sig<.05, 2-tailed*) at 1degree of freedom. The study further indicate that neither competitive forces {buyers bargaining power (p = .108), suppliers bargaining power (p = .087), rivalry from incumbent competitors (p = 1.000)}individually nor technology adoption predictors {perceived technology ease of use (p = .768), perceived usefulness (p = .613) and behavioural intention to use technology (p = 1.000)} individually influenced advantageous product. Many studies have agreed that with the findings of this survey that solutions to high uptake of technology and competitiveness among MSEs does not lay in a single set of factors but in the confluence and interactions of various market and technology-related forces within a system over a given period(Smith & Keil, 2003; Cassiolato&Soares, 2014; Okpara, 2007; Badrinarayanan & West, 2010). In the same vein, Waldman (2007) warns that any output a value chain is dependent on interactions of its parts and studying the parts in isolation provides false results.

Rivalry from the incumbent competitors stood out to be the highest contributor of all the six factors. For every one-unit increase in rivalry from existing competitors score, a 19.035 increase in the log-odds of highly Advantageous Product is expected, holding other independent variables constant. A study in UK SME agrees with these findings that rivalry is hyper and has been exacerbated by e-commerce platform(Pavic,Koh, Simpson& Padmore, 2007). Intense competition from existing rivals in agro-food market landscape has been observed not only in developing countries(UNCTAD, 2005), but also in developed economies (Rusali & Gavrilescu, 2008).

Out of the confluence of Porter's competitive forces and Davis' technology adoption predictors, the buyers' bargaining power, rivalry of incumbent competitors, perceived technology ease of use and perceived usefulness were the most important features in the model. The eigen value (0.823) demonstrated that there were no variables underlying the set items hence the model was unidimensional. Further interaction terms of Porter's competitive forces (B_7) and Davis' technology adoption predictors (B_8) were determined. MSEs withpartial Davis Technology Adoption Predictors = 0, the effect of the Porters three competitive forces was3.521. Itmeans that an MSE with competitive forces would be expected to design 3.521 better advantageous products than an MSE with less Porters competitive forces. On the other hand an MSEs with full technology adoption predictors and the three of Porter's competitive forces would be expected to yield 6.042 better advantageous products than an MSE with less competitive forces.

5.2.6 Technology Adoption Perceptions Difference between Urban and Rural MSEs

According to the survey on 132 MSE in agro-food industry in Kenya there is no significant difference in technology adoption between urban and rural *(Mann-Whitney U*=722.2, *p=0.465813, sig≥.05, 2-tailed*. The study found no enough evidence to support the claim that there is difference in technology adoption propensity between rural and town food manufacturing enterprises, contrary to previous observations and theories (Cromartie, 2015; Frazier & Neihm, 2004; Burt, 1992; Lee & Phan, 2008). Those studies that contradict the findings find urban and rural scenarios are multidimensional and are differentiated by geographical isolation and population density(Cromartie, 2015). Many studies have observed disequilibrium between the two landscapes in terms of technology adoption and entrepreneurship because of socio-geographic differentiated obstacles (Albisu et al., 2000; UNCTAD, 2001; Nteere, 2012).

The most unfortunate MSEs are those based in the rural(European Commission, 2012). As observed by Frazier andNeihm (2004), the velocity by which two regions contribute to technology adoption among agro-food manufacturing can be well explained using social exchange theory. The theory explains that the entrepreneurial growth and technological advancement of an enterprise depends on the degree it is interconnected in the network; it is at distance from the key actors and the extent to which the enterprise is an intermediary for others in the network(Frazier & Neihm, 2004). Structural Hole theory(Burt, 1992), further explains that filling structural holes is like occupying positions in the networks occupied by other actors. This created new business opportunities and unique information alien to other actors. The network ties provide an efficient entrepreneurial ecosystem characterised by social capital, mutual support, validation and market intelligence. This connectedness that comes with networks is lacking in rural setup consequently predicting low technology uptake and hindering new venture take off(Lee & Phan, 2008).

One such successful network model is the *Triple Helix* system in Bo Kluea district, Thailand. Lessons learnt from Triple Helix model for rural communities in Thailand give bright solutionsto challenges of technology transfer among rural-based MSEs in agro-food manufacturing. According to the model, the industry collaborated with the government and university for new knowledge production, implementation and commercialisation with a focus on agricultural villages. The outcomes of this rural technology transfer model realised improved productivity, income and food security(Chaisalee, Jongkaewwattana, Tanticharoen, & Bhumiratana, 2010).

In Yatta district – Kenya, Ngungi andBwisa(2013), observed and recommended a similar successful model called *One Village One Product (OVOP)* for small food manufacturers to make staple products competitive. The model was first tried in Oita, Japan and transferred to Kenya by Japan Government in partnership with Government of Kenya – Ministry of Industrialisation to helpMSEs address challenges of technology adoption, product quality, access to finance and working markets(Ngugi & Bwisa, 2013). The OVOP model made MSE acquire mostly home-grown type of technology and imported some innovations for food value addition which contributed to improved efficiency. Other studies in rural food value addition innovations transfer have proved similar models such as *Product-specific Agro-food Industries* in the processing of flour, pastry and wine in Aragon, Spain (Albisu et al., 2000); and *Industrial District Model* invented in Italy by Becattini(1987) to explain how cooperation and competition developed by small firms and industries in a defined geographical environment.

However, the study findings seem to agree on a few elements of technology adoption that exhibited variance in respect to rural and urban settings of the MSEs. They include level of complexity (*Mann-Whitney U=485.000, p=0.000, sig<.05, 2-tailed),* use of technology in production function (*Mann-Whitney U=252.000, p=0.003, sig<.05, 2-tailed),* MSE experience with technology (*Mann-Whitney U=573.000, p=0.003, sig<.05, 2-tailed),* level of compatibility (*Mann-Whitney U=710.000, p=0.016, sig<.05, 2-tailed)* and cost of maintenance/repairs (*Mann-Whitney U=683.000, p=0.027, sig<.05, 2-tailed).* Learning from lessons of how agricultural technology transformed rural Russia (Shubina,Aldashev & Henry, 2014) and the importance of rural agri-business in employment creation and regional wealth distribution in Kenya, it is critical that the six factors mentioned above be addressed in managing innovations in rural agricultural value chains. Understanding and stimulating technopreneurship in rural food value-addition enterprises requires programmes and policies focusing on confluence of factors such as property rights and cultural biases that bring the observed differences(Yarzebinski, 1992). The public, private and multinational stakeholders mediate and broker information on latest technology as well as address geographic dispersion problems that widen the technology adoption gap between rural and urban enterprises(Liao & Welsh, 2005).

5.2.7 Challenges Experienced by MSEs in Agro-food Manufacturing

The study tested the intensity of the challenges and in the order of severity, the MSEsin food industry face inadequate finances n=80(68.2%), lack of skilled personnel, high cost repairs, lack of electricity and high production cost. As suggested by IFC (2013) financial constraints among micro and small enterprises, especially among the informal MSEs was likely. The finding on challenges are also supported by Burhanuddin,Fahmi, Aziza and Prabuwono,(2009) when highlighting other factors like MSEs occupying unapproved land sites for industrial use, low productivity, lack of skills and capabilities by management and burdensome regulatory requirements. A similar study among SMEs in Nigeria revealed that whereas some challenges were internal and within-oriented such as resources, some were external and far beyond the MSE control such as infrastructure(Awa,Eze, Urieto & Inyang,2011). Therefore, collaborative efforts by the both levels of governments, private sector and multinational stakeholder are needed to overcome the barriers that MSE face in acquiring right technology for agro-food processing(Kapurubandara & Lawson, 2006). Studies by International Financial Corporation (2013) suggest a raft of models to transform informal sectorin food value addition if ambitions of Kenya Vision 2030 have to be realised. First, the public, private and multilateral stakeholders can best incentivise the informal businesses into formal sector by supporting larger and formal Agro-food processors to integrate the informal agro-food MSEs into business distribution chains. Second, employ mobile banking and e-transaction platforms to cut down costs and increase penetration rates in the informal sector. Finally, enhancing financial inclusion by eliminating traditional barriers faced MSEs through designing small business banking solutions(IFC, 2011). In advent of globalisation and urbanism, food processing is unavoidable if the MSEs have to match the rivalry at the emerging market. Food processing adds value, enhances product shelf-life and has the potential of solving agricultural challenges be reducing farm produce wastages and feeding a growing population characterised by changing lifestyle and food habits(Awasthi, Jaggi & Padmanad, 2006). However, agro-food processing in developing countries, small food processers' contribution to economy and productivity is low due to unsuccessful adoption of technologies (Burhanuddin et al., 2009).

Studies have also proved that skills training for MSEs gave them additional growth potential, made them address market demand competitively, and increased income for employees and local community development (OECD, 2013; Ahmeti&Marmullaku, 2015; and Nolan &Garavan, 2016). In Belgium, Turkey, New Zealand, Poland, UK and Canada it was confirmed that there was low access MSEs to training and skills development (OECD, 2013). Another survey on Small enterprises in Kosovo revealed that the skills development made the MSEs not achieve optimum results and the management paid no attention to human capital development (Ahmeti & Marmullaku, 2015). A review of 117 articles in 31 journals published between 1995 and 2014 suggested that effective entrepreneurial training for small entrepreneurs needed to encompass strategic and institutional training, informal learning that was action and experiential, and committed resource training programme(Nolan & Garavan, 2016).

5.3 Conclusion

The entrepreneur and enterprise characteristics revealed that agro-food manufacturing in Kenya is male dominated and owner-managed by older people. Demographically, the industry is biased by socially excluding the women and youth who form the biggest pie of the population. The MSEs that make the products are young and small in size which makes them more susceptible to high risks of failure. This is exacerbated by cutthroat competition from incumbent rivals, emerging sophistication in customer tastes and preference, lack of access to finance and human capital, high costs of machine repair and electricity. The micro and small enterprises focus commonly on processing fresh fruits, wheat and milk for local and global market.The fresh-cut tropical fruits and vegetables products are highly perishable products that needed special trade practices and technologies.

As per objective one, bargaining power of buyers, bargaining power of suppliers and rivalry among competitors significantly influenced agro-food processors to produce advantageous product as a whole {*Wald (1) =41.475, p=.000, sig<.05, 2-tailed}* but not as independent stand alone competitive forces. In the amalgam of the three competitive forces, suppliers bargaining power is most influential with every unit change causing 3.098 increases in the log-odds of advantageous Product. The second force in strength of influence is buyers bargaining power whose unit change causes 2.819 increases in the log-odds of advantageous product.Rivalry of incumbent competitors is the least contributor. Every one unit increase in rivalry from existing competitors score causes 1.247 increases in the log-odds of advantageous product is expected.

In the second objective, Davis predictors (“ease of use,” “usefulness” and intention to use) influencedproduction of advantageous products as a wholeat *Wald (1) = 41.475, p= .000, sig < .05, 2 tailed*. As individual and independent variables,perceived ease of use (*p* =. 949), perceived usefulness (*p* = .485) and intention to use technology (*p* = .082) did not significantly influence the advantageous product.In this combination, behavioural intention to use technology had the highest positive influence with every unit increase causing 2.677 increases in the log-odds of advantageous product. Next in strength is perceived usefulness whose one-unit increase in score caused 2.067 positive changes in the log-odds of an advantageous product. Perceived ease of use is found to be inversely related to the advantageous product. Every unit increase score in perceived ease of use caused -0.188 decrease in the log-odds of advantageous product holding all other independent variables constant.

On the third objective in can be concluded that the confluence of bargaining power of suppliers, buyers, threat of competitors, perceived ease of use, usefulness and intention to use significantly influenceadvantageous product*Wald tests (1) = 41.475, p = .000, sig <0.05, 2 tailed*.Perceived ease of use and behavioural intention to use technology are inversely related to advantageous product meaning that an increase in the two predictors caused a negative change in advantageous products. Rivalry of incumbent competitors was the strongest by one-unit score increase causing 19.035 positive changes in the log-odds of advantageous Product.

Finally the study found no statistically significant difference between the means of technology adoption anxiety betweenNairobi (urban)and Busia (rural) Micro and Small agro-food processing enterprises (*Mann-Whitney U*=722.2, *p=0.465813, sig≥.05, 2-tailed)*.However, the firms in the two areas seemed to differ in their perceptions of technology complexity, use in production function, experiences compatibility and cost of repair in case of breakdown.

5.4 Recommendations

Structuring and modeling agro-food manufacturing MSEs to better address stiff global rivalry using latest innovations is the main recommendation of this study. Specifically the study recommends that:

i) The county governments should establish a data base of all agro-food processing enterprises through a census

ii) The MSEs should consider potatoes, maize and beans to be key components of their products since they are cheaply and largely produced in Kenya.

iii) Policy makers and program designers for food products should consider making the right mix of competitive factors in order to attain advantageous products that would increase income for the MSEs, meet market demand and having products that are different from competitors'.

iv) All MSE in agro-food processing should foster collective efficiency through production cluster or industrial districtsto counter rivalry of incumbent competitors by achieving economy of scale, visibility and a collective pull-down on suppliers, buyers and providers of infrastructure.

v) The agro-food industry should be made socially inclusive. The technology fabricators should be informed of the entrepreneurs' socio-cultural values, past and present experiences, and potential needs in order to make technologies that are easy to use by women and youth so as to foster better behavioral intentions for the youth and women towards industrialized agriculture.

vi) County and National Governments should put in place policies and programmes that would facilitate hi-tech food innovation systems permeate among MSEs to enable them manufacture competitive and advantageous products in the export market.

vii) Programmers in food manufacturing industry should consider multiple factors underlying MSEs competitiveness and technology choice if they have to be successful. No single factor can significantly influence agro-food processors' decision making in choosing food innovation systems for advantageous food products in a globally competitive market.

viii) Establish a food and beverage administration authority to assist food manufacturers adhere to hygienic safety manufacturing practices and ensure efficiency, purity and quality of products in accordance with Kenyan policies consistent with international best practices.

ix) Model financing support approaches to suit agro-food processing MSEs. Issues of perishability and seasonality should be considered while designing the insurance and financing products for the MSEs. This includes MSE banking solutions; mobile banking and e-transaction platforms to cut down costs and fostering venture capitalism as an alternative source of financing high technology for the MSEs.

5.5 Suggestions for Further Research

Based on the findings and conclusions generated from the study, the following suggestions feature for further research:

i) This research ascertained that there exists a strong relationship between activities of Porter's buyers' bargaining power, suppliers' bargaining power and rivalry from incumbent firms and advantageous products. It is worth doing research on the rest Michael Porters' forces (Threats from new entrants, threat from substitutes and complimentary factors) and their effect on designing advantageous products.

ii) This research determined that the confluence of Porters buyers' bargaining power, suppliers' bargaining power and rivalry from incumbent firms and Davis perceived ease of use, usefulness and intention to use technology positively influenced the design of advantageous product. Researchers may consider studying confluence of threats from new entrants, threat from substitutes and complimentary factors and Davis perceived ease of use, usefulness and intention to use technology effect of designing advantageous product.

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APPENDICES

Data Collection Tools

Questionnaire

Dear Respondent,

The Researcher is a student at Karatina University and requires some information about technology for food value addition. He is therefore kindly requesting you to spare your time to respond to the items in this questionnaire. The information given will be strictly for academic purposes and will be treated with utmost confidentiality. Your name won't be required and therefore it will not appear anywhere in this questionnaire.

Serial No:

Date:

Location:

INSTRUCTIONS

Most of the questions below are organized on summated Likert scale indicating a seven point rating system: very true, true,somewhat true, neither true nor untrue, somewhat untrue, untrue and very untrue assigning values of 7, 6, 5, 4, 3, 2 and 1 respectively.Kindly fill the questionnaire by writing and or ticking (√) where necessary.

Part A. This section of questions asks about your demographics

The respondent's bio data

A1 please indicate your Age

☐ ≤ 35 years old ☐ > 35 years old

A2 Sex: ☐ …….Male ☐ ……..Female

A3 Marital status: ☐ Married ☐ Single ☐ Widowed

A4 Designation: ☐ owner ☐ owner-manager ☐ operator

☐ ☐

A5 what is your level of education? Primary secondary

college university none

The firm's background data

A6 Name of the firm: ……………

A7 Is your firm registered? Yes No

A8 For how long have you operated as a firm? 0-3 years old 4-7 years old 8-11 years 12- 15 16 years and above

A9 Annual turnover 0 to 500000/= 500001/= to 1 million shillings

1m-1.5m shillings above 1.5 million shillings

A10 Staff establishment on permanent basis 1-10 people 11-20 people

21- 30 people 31- 40 people 41 – 50 people

above 50 people

A11What county of origin do your staff belong? Within this county outside this county both within and outside this county

A12 Are you a member of any association or trade group that addresses consumer values? Yes No

A13 Do you think trade associations are of any value to your firm? Yes

No

Part B. This section of questions asks about your advantageous product cues

Increasing the Firm's Income

B1	**How would you rate the products' contribution to the firm's revenue**	Very high	Moderately high	Slightly high	Neither high nor low	Slightly low	Moderately low	Very low
		7	6	5	4	3	2	1
B2	**Customers are satisfied with the products**	Very satisfied	Moderately satisfied	Slightly satisfied	Neither satisfied nor dissatisfied	Slightly dissatisfied	Moderately dissatisfied	Very dissatisfied
		7	6	5	4	3	2	1
B3	**The product is attracting more customers**	very true	true	some what	neithe r true nor untrue	some what	untrue	very untrue
		7	6	5	4	3	2	1
B4	**The product has more repeat-buying than the rest**	very true	true	some what	neithe r true nor untrue	some what	untrue	very untrue
		7	6	5	4	3	2	1
B5	**It costs less to produce the product compared to related once**	very true	true	some what	neithe r true nor untrue	some what	untrue	very untrue
		7	6	5	4	3	2	1
B6	**The product has higher sales volume/turnover than others**	very true	true	some what	neithe r true nor untrue	some what	untrue	very untrue
		7	6	5	4	3	2	1
B7	How good is the product's profit margin compared to other related products in the market	Far above	Moderately above	Slightly above	Neither above nor below	Slightly below	Moderately below	Far below
		7	6	5	4	3	2	1

Meeting Market Demand

	To what extent do you agree with the following statements below	Strongly agree	Agree	Slightly agree	Neither agree nor disagree	Slightly disagree	disagree	Strongly disagree
B8	The products are licensed by KeBS to be sold within Kenya	7	6	5	4	3	2	1
B9	The products meet international conventions (external markets) demands	7	6	5	4	3	2	1
B10	The products have added nutritive value	7	6	5	4	3	2	1
B11	The products' packaging is competitively good	7	6	5	4	3	2	1
B12	The products meets the market quantity required	7	6	5	4	3	2	1
B13	The products meets the market quality demand	7	6	5	4	3	2	1
B14	The products and production processes are eco-friendly	7	6	5	4	3	2	1

B15 Tick the markets you serve

____________Kenyan Market (domestic) ____________AGOA

____________East African community ____________COMESA

____________ European Union ____________Others (specify…………)

____________ No market ____________Do not know

Product differentiation

B16	The products are unique	very true	true	somewhat true	neither true nor untrue	somewhat untrue	untrue	very untrue
		7	6	5	4	3	2	1
B17	How different is the production process different from the competitors	Very different	Different	Slightly different	Neither different nor similar	Slightly similar	Similar	Very similar
		7	6	5	4	3	2	1
B18	How unique are the product benefits to customers	Very inimitable	Inimitable	Slightly inimitable	Neither inimitable nor imitable	Slightly imitable	Imitable	Very imitable
		7	6	5	4	3	2	1
B19	How protected is your production formula from your competitors	Very protected	protected	Slightly protected	Neither protected nor unprotected	Slightly unprotected	Unprotected	Very unprotected
		7	6	5	4	3	2	1
B20	How frequent do you improve your products	Very frequent	Frequently	Occasionall y	Neither frequent nor never	Rarely	Very rarely	Never
		7	6	5	4	3	2	1

B21 what specific product do you process? ………………………..

B22 Are nutrition values of your products scientifically determined? ☐ Yes ☐ No

B23 If Yes, who helped you determine the scientific nutrition content?

Government Agency ☐ private agency ☐ other (specify) …………..

B24 Are products patented? ☐ Yes ☐ No

Part C. This section of questions asks about the existence of the Porter's 3 forces

C i) Buyers bargaining power to the firm

		very true	true	somewhat true	neither true nor untrue	somewhat untrue	untrue	very untrue
	The buyers are more powerful than supplier							
	The customers are very sensitive on product prices							
	The customers are informed on what they need							
	The buyers have a customer union and alliances							
	Most customers buy the products for resale							
	Most customers have the ability to process their own foods (backward integration)							
	The buyer has to reduce price profitable below the selling price							
	It is likely to cost customers to switch suppliers							

C ii) Suppliers bargaining power to the firm

		very true	true	somewhat true	neither true nor untrue	somewhat untrue	untrue	very untrue
C9	The suppliers have a strong bargaining power	7	6	5	4	3	2	1
C10	The suppliers can easily switch to another firm	7	6	5	4	3	2	1
C11	Suppliers are unionized	7	6	5	4	3	2	1
C12	The firm's demand for inputs less than what the supplier is willing to supply	7	6	5	4	3	2	1
C13	The suppliers have the ability to start their own food processing plants (forward integration)	7	6	5	4	3	2	1
C14	There are few suppliers for buyers to choose from	7	6	5	4	3	2	1
C15	The products offered by suppliers are very different from each other	7	6	5	4	3	2	1

C iii) Rivalry from incumbent competitors on the firm

		very true	true	somewhat true	neither true nor untrue	somewhat untrue	untrue	very untrue
C16	There are very many incumbent competitors	7	6	5	4	3	2	1

C17	The product industry's growth is fast	7	6	5	4	3	2	1
C18	The product demand is less than supply for relatively short periods(intermittent overcapacity)	7	6	5	4	3	2	1
C19	It is difficult for the firm to shift from the current product to another (exit barriers)	7	6	5	4	3	2	1
C20	Large firms are dominant in making similar product	7	6	5	4	3	2	1
C21	Information required to develop the best product is complex	7	6	5	4	3	2	1
C22	The product is different from related products	7	6	5	4	3	2	1
C23	Customer identify with a given brand	7	6	5	4	3	2	1
C24	It is difficult to switch from this product to another	7	6	5	4	3	2	1

Part D. This section of questions asks about the existence of Davis Predictors

D i) Perceived Ease of Use (PEU)

D1 What level of difficult (complexity) do you get in using technology?

______ 1 - Very difficult ______ 2 - Slightly difficult ______ 3 – Difficult
______ 4 - Neither difficult nor easy ______ 5 - Slightly easy
______ 6- Easy ______ 7 - Very easy

______ 8 – Don't know _____ 9 – Not applicable

D2 How compatible is the technology with the firm?

______ **1** – completely incompatible ______ **2** – mostly incompatible
______ **3** – somewhat incompatible ______ **4** - Neither incompatible nor compatible
______ **5** – somewhat compatible ______ **6** - Mostly compatible
______**7** – completely compatible

______**8 –** Don't know ___________ **9** – Not applicable

D3 How often do the technology cause harm to the workers in the firm?

______ 1 – Always ______ 2 – often ______ 3 – slightly often
______ 4 – Neither often nor rare ______ 5 – Slightlyrarely
______6. Rarely ______ 7 – Never

______ 8 – Don't know _____ 9 – Not applicable

D4 How long does it require one to learn to operate the technology in your firm?

______ 1 – Very Long ______ 2 – long ______ 3 – somewhat long
______ 4- Neither long nor short ______ 5- somewhat short
______ 6- Short ______ 7 - Very short

______ 8 – Don't know _____ 9 – Not applicable

D5 Incase of breakdown, it is cheap to repair the machines.

______ 1 – Strongly disagree ______ 2 - disagree
______ 3 – Slightly disagree ______ 4 - Neither agree nor disagree
______ 5 - Slightly agree ______ 6 - Agree
______ 7 – Strongly agree

______ 8 – Don't know _____ 9 – Not applicable

D ii) Perceived Technology Usefulness (PU)

D6. How useful is technology to your firm?

____________1 – Not at all useful ____________2 – Low usefulness

____________3 – Slightly useful ____________4– Neither useful nor useless

____________5 – Moderately useful ____________6 – Very useful

____________7 – Extremely useful

____________ **8 –** Don't know___________ **9** – Not applicable

D7. Triability. How often has the technology been tried out before you adopted it?

______1 – never tried ______2 – very rarely tried ________3 – rarely tried

______4– Neither tried nor untried ______5 – Occasionally tried _______6.frequently tried ______7 – very frequently tried

____________ **8 –** Don't know __________ **9** – Not applicable

D8. What is the firm's experience with technology?

______1 – Very bad ______2 – bad ______3 – fair

______4– Neither good nor bad ______5 – good ______6 – Very good

____________7 – Excellent

______ **8 –** Don't know ______ **9** – Not applicable

D9. Does technology give your firm any competitive advantage over your competitors?

______**1** much worse ______2 worse______3 somewhat worse

______4 Neither worse nor better ______5 somewhat better ______6 better

______7much better

______ **8 –** Don't know ______ **9** – Not applicable

D10 How appropriate is the technology currently used by your firm?

______**1** Very inappropriate ______2 inappropriate _____3 slightly inappropriate

______4 Neither appropriate norinappropriate ______5 slightly appropriate _6 appropriate ______7 very appropriate

______ **8 –** Don't know ______ **9** – Not applicable

D11. Timeliness. The technology enhances timely processing and delivery of products and services.

______ 1 – Strongly disagree ______ 2 - disagree
______ 3 – Slightly disagree ______ 4 - Neither agree nor disagree
______ 5 - Slightly agree ______ 6 - Agree
______ 7 – Strongly agree

______ 8 – Don't know _____ 9 – Not applicable

D12. Mass production. The technology is useful in mass production.

______ 1 – Strongly disagree ______ 2 - disagree
______ 3 – Slightly disagree ______ 4 - Neither agree nor disagree
______ 5 - Slightly agree ______ 6 - Agree
______ 7 – Strongly agree

______ 8 – Don't know _____ 9 – Not applicable

D13. Which of the following functional areas of the firm do you use technology most?

☐ Production ☐ Marketing ☐ Finance

D iii) Behavioral intention (BI) to use technology

D14. Level of Acceptability. How acceptable is technology in your firm?

______1– Totally unacceptable ______2 – Unacceptable

______3 – Slightly unacceptable ______4 – neither acceptable nor unacceptable

______5 – Slightly acceptable ______6 – Acceptable

______7 – Perfectly Acceptable

______**8 –** Don't know ____________ **9** – Not applicable

D15. Intention to implement technology. How willing are you to use technology in your firm for value addition?

______1– Definitely will not ______2 – will not

______3 – Probably will not ______4 – neither will nor will not

______5 – Probably will ______6 – will implement

______7 – Definitely will

______**8 –** Don't know ____________ **9** – Not applicable

D16. Level of support to implement technology. Does your firm support the use technology for value addition?

______1– Strongly oppose ______2 – oppose

______3 – Somewhat oppose ______4 – neither oppose nor support

______5 – Somewhat favour ______6 – Favours

______7 – Strongly favour

______**8 –** Don't know ____________ **9** – Not applicable

D17. Does the firm gives technology adoption priority for value addition?

______1– Not a priority ______2 – Low Priority

______3 – Somewhat priority ______4 – neither low nor high priority

______5 – Moderate priority ______6 – High priority

______7 – Essential priority

______**8 –** Don't know ____________ **9** – Not applicable

D18. How committed is the firm's management to acquiring right technology?

______**1** very dedicated ______2 dedicated ________3 somewhat dedicated

______4 Neither dedicated nor not dedicated ______5 somewhat undedicated
______6 undedicated ______7 very undedicated

______ **8 –** Don't know ______ **9** – Not applicable

D19. Technology preparedness. How prepared is the firm to adopt technology for value addition?

______**1** very unprepared ______2 unprepared _______3 somewhat unprepared

______4 Neither prepared nor unprepared ______5 somewhat prepared _6 prepared
______7 very prepared

______ **8 –** Don't know ______ **9** – Not applicable

D20. The management clearly understands why firms should adopt technology

______ 1 – Strongly disagree ______ 2 - disagree
______ 3 – Slightly disagree ______ 4 - Neither agree nor disagree
______ 5 - Slightly agree ______ 6 - Agree
______ 7 – Strongly agree

______ 8 – Don't know _____ 9 – Not applicable

Part E. This section of questions asks about the challenges you face in adopting technology

E1In the order of severity, please share at least five challenges you face in adopting technology for agro-food processing?

i. ……………………………………………………………………………………..
ii. …………………………………………………………………………………….
iii. ……………………………………………………………………………………..
iv. ……………………………………………………………………………………
v. ……………………………………………………………………………………..

End

Thank you

Interview Guide

Dear Respondent,

The Researcher is an entrepreneurship PhD student at Karatina University studying *The Confluence of Porter's Three Competitive Forces and Davis' Technology Adoption Predictors in Determining Advantageous Products in Micro and Small Agro-Food Processing Firms in Kenya.* He thought it would be good to interview you so that he can better inform his academic research project, policy makers and programmers to better plan and program for improved technology adoption among food value addition venture in Kenya. He would like to ask you some questions about your background, opinion about Porter's forces, Davis technology predictors and their combinations on how they determined product's meeting market demand, uniqueness, and increased income in local and foreign markets and how you compare technology adoption among rural and urban micro and small firms engaged in agro-food processing. The information given will be strictly for academic purposes and will be treated with utmost confidentiality. The interview should take about 20 minutes. The researcher therefore kindly requests you to spare your time to respond to the items in this interview guide.

The respondents are support, regulatory and trade agencies that promote MSEs and food value-addition in Kenya.

INSTRUCTIONS

This is an interview process. Kindly feel free to give any other information relevant to the study.

Part A. Demographic data

1. Sex ____________________________
2. Name of the institution ____
3. Department ____
4. Area of specialization ____

Part B. Extent of Porter's Forces in the firm

B i) Buyers bargaining power

5. Describe the agro-food product customers' concentration and networks in the area. ____
____

6. What is the customers' average level of education and awareness of their rights? _
____

7. How do you consider agro-food products buyers' influence on the following features of an advantageous product?
   a. Meeting market demand____
   ____
   b. Increase in income____
   ____
   c. Unique product____
   ____

B ii) Extent suppliers' bargaining power in the agro-food processing firms

8. How are suppliers of raw materials to agro-food processors organized in these area? ____

9. Explain their likelihood to integrate forward _______________________________
____

10. How do the suppliers influence the following product features?
   a. Meeting market demand____
   ____
   b. Increase in income ____
   ____

c. Unique product____

____

BiiiExtent of threats from rivals on product

11. Explain the concentration and magnitude of rivals to the micro and small scale agro-food processors in the area ____

    ____

12. How does rivalry from existing competitors threaten the following product features?

    a. Market demand____

    ____

    b. Increased income ____

    ____

    c. Differentiation ____

    ____

Part C. Extent of Davis' technology adoption predictors [ease of use(EU), usefulness(U) and Intention (I) to use technology for advantageous products

13. Describe the attitude of Micro and Small Agrofood processors towards technology adoption in improving their products _____________________________

    ____

14. Explain how technology contributes to advantageous products in terms of

    a. Perceived effectiveness ____

    ____

b. Perceived ease of use ____

____

c. Intention to use technology ____

____

Part D. combinations of porter's forces and Davis' technology adoption predictors on advantageous products

15. Suggest what of the Porter's forces (competitors rivalry, buyers' bargaining power, suppliers' bargaining power) would you combine with Davis predictors (E, EU, I) to yield the following characteristics of an advantageous product.
    a. Meeting Market demand____

    ____

    b. Increased income____

    ____

    c. Product uniqueness____

    ____

Part E. Comparison of technology adoption between urban and rural micro and small agro-food processing firms

16. Describe the propensity of technology adoption in urban as compared to rural based micro and small agro-food processing firms ___________________________

    ____

17. What challenges do MSE in agro-food processing face in adopting technology? __

    ____

18. Suggest ways to improving technology adoption in agro-food processing firms

    ____

End

Thank you

Introduction Letter from the University

Inspiring Innovation and Leadership

KARATINA UNIVERSITY

SCHOOL OF BUSINESS

SCHOOL GRADUATE COMITTEE

Email: school_business@karatinauniversity.ac.ke
deansob@karatinauniversity.ac.ke

Tel: +254 (0)705761162

P.O. Box 1957 – 10101
KARATINA,
KENYA.

16th March, 2015

TO WHOM IT MAY CONCERN:

RE: FRANCIS OMILLO – B301/1945/P/13

This is to confirm that the above named is a bonafide student at Karatina University School of Business; he is pursuing a Doctor of Philosophy (PhD) in Entrepreneurship degree.

The Student completed his course work and has successfully defended his thesis proposal; he has now been permitted to collect data on his thesis titled: ***Adoption predictors in determining advantageous products in Micro and Small Agro – Food Processing firms in Kenya***

Any assistance accorded to him will be highly appreciated.

Thank you,

for **Dr. Julius Huho,**
CHAIR, SCHOOL GRADUATE COMITTEE

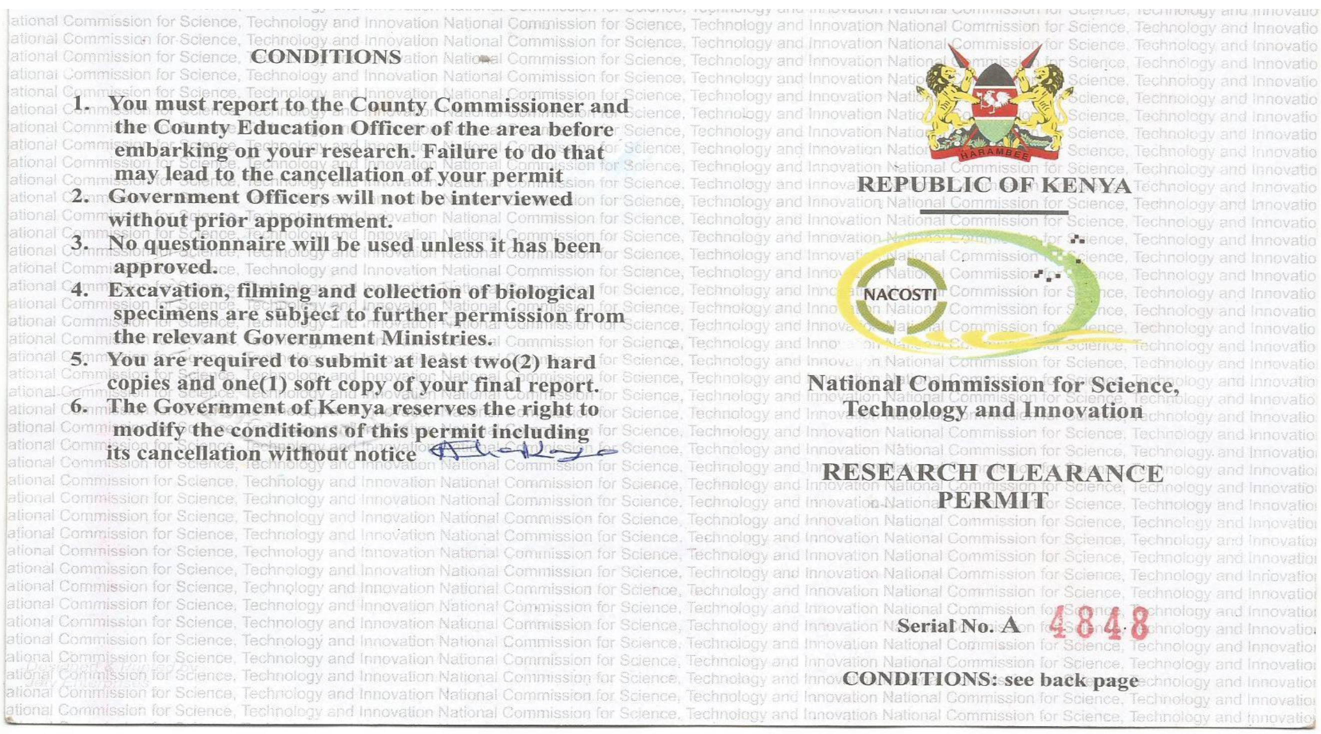
Research Permit

KARATINA UNIVERSITY
P. O. BOX 1957 - 10101, Karatina, Kenya
Email: regarsa@karatinauniversity.ac.ke
Website: www.karatinauniversity.ac.ke
Tel: +254 716 974 126

Inspiring Innovation and Leadership

Name : Okumu Francis Omillo
Reg No: B301/1945P/13
Expiry : 2017

STUDENT IDENTIFICATION CARD



CONDITIONS

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice

REPUBLIC OF KENYA

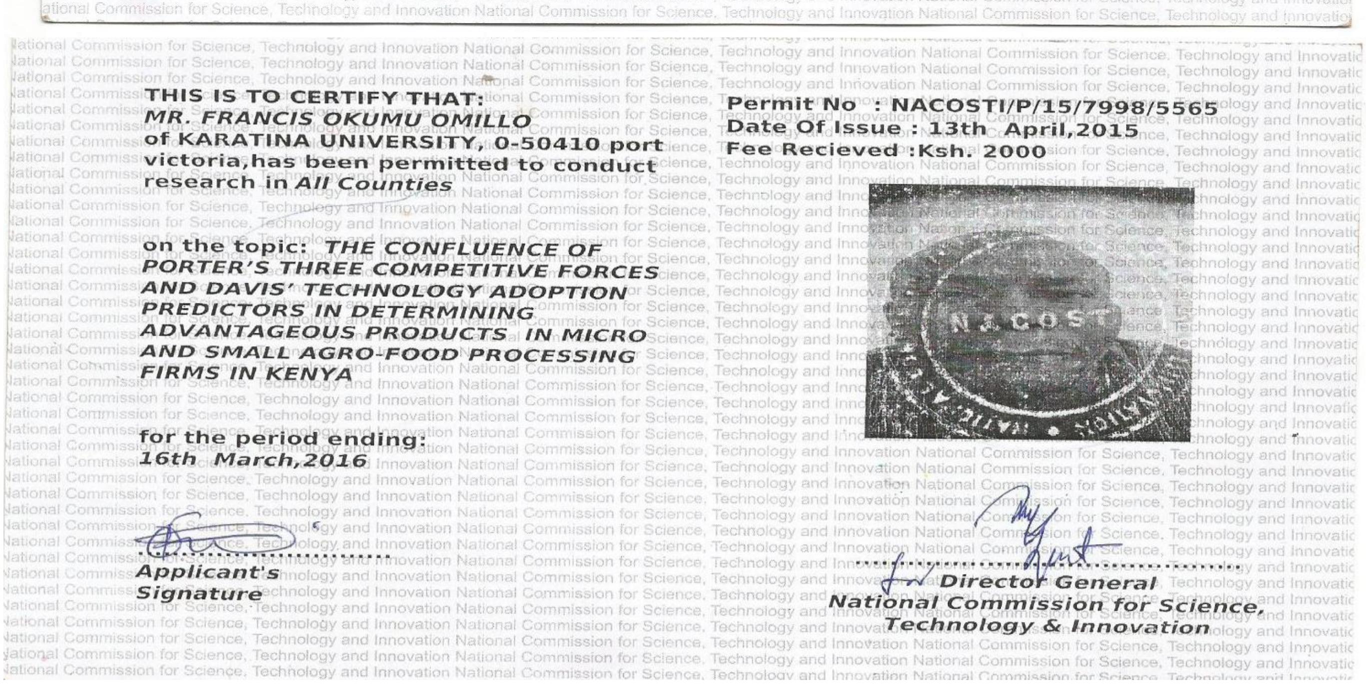
NACOSTI

National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No. A 4848

CONDITIONS: see back page



THIS IS TO CERTIFY THAT:
MR. FRANCIS OKUMU OMILLO
of KARATINA UNIVERSITY, 0-50410 port victoria, has been permitted to conduct research in *All Counties*

on the topic: *THE CONFLUENCE OF PORTER'S THREE COMPETITIVE FORCES AND DAVIS' TECHNOLOGY ADOPTION PREDICTORS IN DETERMINING ADVANTAGEOUS PRODUCTS IN MICRO AND SMALL AGRO-FOOD PROCESSING FIRMS IN KENYA*

for the period ending:
16th March,2016

Permit No : NACOSTI/P/15/7998/5565
Date Of Issue : 13th April,2015
Fee Recieved :Ksh. 2000

Applicant's Signature

Director General
National Commission for Science, Technology & Innovation

NACOSTI

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471, 2241349, 310571, 2219420
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Email: secretary@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No.

Date:

13th April, 2015

NACOSTI/P/15/7998/5565

CDA-KISUMU ~~Ased~~ 15.4.2015
COUNTY DIRECTOR OF AGRICULTURE
P. O. BOX 1700-40100
KISUMU
ALL SCAOs AND WAEOs ATTN
Please accord the necessary assistance.

Francis Okumu Omillo
Karatina University
P.O. Box 1957-10101
KARATINA.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"The confluence of Porter's Three Competitive Forces and Davis' Technology adoption predictors in determining advantageous products in Micro and Small Agro-Food Processing Firms in Kenya"*** I am pleased to inform you that you have been authorized to undertake research in **all Counties** for a period ending **16th March, 2016.**

You are advised to report to **the Chief Executive Officers of selected Firms, the County Commissioners and the County Directors of Education, all Counties** before embarking on the research project.

On completion of the research, you are required to submit **two hard copies and one soft copy in pdf** of the research report/thesis to our office.

DR. S. K. LANGAT, OGW
FOR: DIRECTOR GENERAL/CEO

Copy to:

The Chief Executive Officers
Selected Firms.

The County Commissioners
All Counties.

Tables

Table 4.44: Ranked Means of Rural and Town MSEs

Ranks				
	The area where business is located	N	Mean Rank	Sum of Ranks
What level of difficult (complexity) do you get in using technology?	Rural	19	35.53	675.00
	town	112	71.17	7971.00
	Total	131		
How compatible is the technology with the firm?	Rural	19	47.37	900.00
	Town	112	69.16	7746.00
	Total	131		
How often do the technology cause harm to the workers in the firm?	Rural	19	66.63	1266.00
	Town	112	65.89	7380.00
	Total	131		
How long does it require one to learn to operate the technology in your firm?	Rural	19	53.97	1025.50
	Town	111	67.47	7489.50
	Total	130		
Incase of breakdown, it is cheap to repair the machines	Rural	18	47.44	854.00
	Town	112	68.40	7661.00
	Total	130		
How useful is technology to your firm?	Rural	19	67.47	1282.00
	Town	112	65.75	7364.00
	Total	131		
Triability. How often has the technology been tried out before you adopted it?	Rural	19	66.26	1259.00
	Town	112	65.96	7387.00
	Total	131		
What is the firm's experience with technology?	Rural	18	41.33	744.00
	Town	112	69.38	7771.00
	Total	130		
Does technology give your firm any competitive advantage over your competitors?	Rural	19	63.29	1202.50
	Town	112	66.46	7443.50
	Total	131		
How appropriate is the technology currently used by your firm?	Rural	18	56.03	1008.50
	Town	112	67.02	7506.50
	Total	130		
Timeliness. The technology	Rural	19	63.66	1209.50

enhances timely processing and delivery of products and services.	Town	109	64.65	7046.50
	Total	128		
Mass production. The technology is useful in mass production	Rural	19	58.74	1116.00
	Town	111	66.66	7399.00
	Total	130		
Which of the following functional areas of the firm do you use technology most?-PRODUCTION	Rural	8	45.00	360.00
	Town	72	40.00	2880.00
	Total	80		
Which of the following functional areas of the firm do you use technology most?-MARKETING	Rural	7	21.50	150.50
	Town	35	21.50	752.50
	Total	42		
Which of the following functional areas of the firm do you use technology most?-FINANCE	Rural	4	14.50	58.00
	Town	24	14.50	348.00
	Total	28		
Level of Acceptability. How acceptable is technology in your firm?	Rural	19	74.42	1414.00
	Town	112	64.57	7232.00
	Total	131		
Intention to implement technology. How willing are you to use technology in your firm for value addition?	Rural	19	85.50	1624.50
	Town	112	62.69	7021.50
	Total	131		
Level of support to implement technology. Does your firm support the use technology for value addition?	Rural	19	77.50	1472.50
	Town	112	64.05	7173.50
	Total	131		
Does the firm gives technology adoption priority for value addition?	Rural	19	73.21	1391.00
	Town	111	64.18	7124.00
	Total	130		
How committed is the firm's management to acquiring right technology?	Rural	19	58.61	1113.50
	Town	112	67.25	7532.50
	Total	131		
Technology preparedness. How prepare is the firm to adopt technology for value addition?	Rural	19	72.95	1386.00
	Town	112	64.82	7260.00
	Total	131		
The management clearly understands why firms should adopt technology	Rural	19	64.66	1228.50
	Town	112	66.23	7417.50
	Total	131		

Table 4.47 Independent Sample t-test Group Statistics

Group Statistics					
	Advantegeous product	N	Mean	Std. Deviation	Std. Error Mean
It costs less to produce the product compared to related once	>= .5	129	4.1860	1.67597	.14756
	< .5	2	3.0000	.00000	.00000
The products are licensed by KeBS to be sold within Kenya	>= .5	129	4.9147	1.69111	.14889
	< .5	2	2.0000	.00000	.00000
The products meets the market quantity required	>= .5	126	5.4444	1.37728	.12270
	< .5	2	2.0000	.00000	.00000
The products meets the market quality demand	>= .5	128	5.8750	1.08679	.09606
	< .5	2	2.0000	1.41421	1.00000
Kenyan Market (domestic)	>= .5	3	1.0000	.00000	.00000
	< .5	0[a]	.	.	.
AGOA	>= .5	8	1.0000	.00000	.00000
	< .5	0[a]	.	.	.
East African community	>= .5	0[a]	.	.	.
	< .5	0[a]	.	.	.
COMESA	>= .5	0[a]	.	.	.
	< .5	0[a]	.	.	.
European Union	>= .5	0[a]	.	.	.
	< .5	0[a]	.	.	.
The products are unique	>= .5	128	5.5625	1.00197	.08856
	< .5	2	4.0000	1.41421	1.00000
How different is the production process different from the competitors	>= .5	128	5.3984	1.01438	.08966
	< .5	2	3.5000	.70711	.50000
How unique are the product benefits to customers	>= .5	128	6.0703	6.39412	.56517
	< .5	2	3.5000	.70711	.50000

How protected is your production formula from your competitors	>= .5	128	5.1172	1.48282	.13106
	< .5	2	3.0000	1.41421	1.00000
How frequent do you improve your products	>= .5	128	5.7188	.95520	.08443
	< .5	1	2.0000	.	.
The buyers have a customer union and alliances	>= .5	126	3.5952	1.66459	.14829
	< .5	2	2.5000	.70711	.50000
The buyer has to reduce price profitable below the selling price	>= .5	125	4.4960	1.55348	.13895
	< .5	2	4.5000	.70711	.50000
a. t cannot be computed because at least one of the groups is empty.					

Table 4.48 Independent Samples t-test

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
It costs less to produce the product compared to related once	Equal variances assumed	5.981	.016	.997	129	.321	1.18605	1.18960	-1.16761	3.53970
	Equal variances not assumed			8.038	128.000	.000	1.18605	.14756	.89407	1.47802
The products are licensed by KeBS to be sold within Kenya	Equal variances assumed	5.691	.019	2.428	129	.017	2.91473	1.20035	.53980	5.28965
	Equal variances not assumed			19.576	128.000	.000	2.91473	.14889	2.62012	3.20934
The products meets the market quantity required	Equal variances assumed	3.825	.053	3.523	126	.001	3.44444	.97768	1.50965	5.37924
	Equal variances not assumed			28.073	125.000	.000	3.44444	.12270	3.20161	3.68728
The products meets the market quality demand	Equal variances assumed	.129	.720	4.990	128	.000	3.87500	.77655	2.33847	5.41153
	Equal variances not assumed			3.857	1.019	.158	3.87500	1.00460	-8.35353	16.10353
The products are unique	Equal variances assumed	.205	.652	2.180	128	.031	1.56250	.71677	.14424	2.98076

	Equal variances not assumed			1.556	1.016	.361	1.56250	1.00391	-10.73547	13.86047
How different is the production process different from the competitors	Equal variances assumed	.600	.440	2.632	128	.010	1.89844	.72141	.47101	3.32586
	Equal variances not assumed			3.737	1.065	.154	1.89844	.50798	-3.69178	7.48865
How unique are the product benefits to customers	Equal variances assumed	.036	.850	.566	128	.572	2.57031	4.53890	-6.41067	11.55130
	Equal variances not assumed			3.406	5.122	.018	2.57031	.75459	.64436	4.49626
How protected is your production formula from your competitors	Equal variances assumed	.083	.774	2.004	128	.047	2.11719	1.05630	.02712	4.20726
	Equal variances not assumed			2.099	1.035	.276	2.11719	1.00855	-9.72676	13.96113
How frequent do you improve your products	Equal variances assumed	.	.	3.878	127	.000	3.71875	.95892	1.82122	5.61628
	Equal variances not assumed			.	.	.	3.71875	.	.	.
The buyers have a customer union and alliances	Equal variances assumed	1.804	.182	.926	126	.356	1.09524	1.18248	-1.24486	3.43534
	Equal variances not assumed			2.100	1.184	.251	1.09524	.52153	-3.53428	5.72476
The buyer has to reduce price profitable below the selling	Equal variances assumed	1.885	.172	-.004	125	.997	-.00400	1.10371	-2.18838	2.18038
	Equal variances not			-.008	1.160	.995	-.00400	.51895	-4.79042	4.78242

price	assumed									

Table 4.49: Indices for Increase in Agro-food MSE's Income

Score for increase in come (Y1)								
B1	B2	B3	B4	B5	B6	B7	Total score	Indices
5	5	6	6	5	6	6	39	0.795918
7	6	6	6	6	6	6	43	0.877551
5	6	6	6	6	6	6	41	0.836735
3	3	3	3	3	3	3	21	0.428571
4	5	6	6	5	4	5	35	0.714286
6	7	7	7	6	6	6	45	0.918367
4	7	6	5	2	4	4	32	0.653061
4	6	7	6	6	6	5	40	0.816327
5	6	6	6	5	5	5	38	0.77551
6	7	6	6	5	4	4	38	0.77551
7	7	7	7	6	6	4	44	0.897959
5	7	7	6	7	5	6	43	0.877551
5	7	7	6	7	5	6	43	0.877551
2	5	5	5	7	6	5	35	0.714286
5	7	6	7	5	5	6	41	0.836735
3	6	6	6	2	6	3	32	0.653061
5	6	6	7	5	6	5	40	0.816327
2	5	6	6	7	6	3	35	0.714286
6	6	6	5	5	3	5	36	0.734694
5	6	6	5	5	6	5	38	0.77551
4	5	6	6	6	2	3	32	0.653061
7	6	5	6	6	6	6	42	0.857143

6	7	6	5	3	5	6	38	0.77551
5	5	6	4	2	2	5	29	0.591837
5	5	5	2	5	2	5	29	0.591837
5	5	6	2	2	5	4	29	0.591837
5	6	5	2	2	4	4	28	0.571429
5	6	6	6	3	5	5	36	0.734694
5	6	4	5	2	5	5	32	0.653061
7	6	6	3	2	2	5	31	0.632653
6	5	5	4	4	6	4	34	0.693878
4	5	4	5	3	4	5	30	0.612245
5	4	6	3	2	4	5	29	0.591837
6	5	7	3	2	5	5	33	0.673469
6	5	6	5	4	5	5	36	0.734694
5	6	4	5	2	5	5	32	0.653061
5	6	3	2	1	5	5	27	0.55102
5	6	6	2	2	3	5	29	0.591837
5	5	4	2	2	4	5	27	0.55102
5	6	6	2	2	3	5	29	0.591837
6	7	4	4	5	2	5	33	0.673469
5	5	6	2	2	5	4	29	0.591837
5	6	4	5	2	5	5	32	0.653061
5	5	6	2	2	5	4	29	0.591837
6	7	7	6	6	5	6	43	0.877551
7	7	7	7	2	7	7	44	0.897959
6	6	6	5	4	3	7	37	0.755102
7	7	6	5	7	6	7	45	0.918367

7	7	7	6	6	7	5	45	0.918367
7	7	7	6	6	7	6	46	0.938776
6	6	6	6	4	5	7	40	0.816327
7	7	7	6	3	7	6	43	0.877551
7	7	7	5	6	7	3	42	0.857143
7	7	7	7	4	7	7	46	0.938776
5	6	6	5	6	5	6	39	0.795918
6	7	6	5	4	4	5	37	0.755102
6	5	6	5	5	5	5	37	0.755102
5	5	6	5				21	0.428571
6	7	7	6	6	5	6	43	0.877551
6	6	5	5	4	4	4	34	0.693878
6	7	7	7	6	6	5	44	0.897959
6	6	5	6	6	5	6	40	0.816327
5	7	6	6	6	7	7	44	0.897959
7	7	7	7	6	6	6	46	0.938776
5	6	6	5	6	5	6	39	0.795918
7	7	6	5	5	5	5	40	0.816327
6	6	4	5	3	6	5	35	0.714286
6	6	5	5	4	4	4	34	0.693878
7	6	6	6	3	6	5	39	0.795918
6	7	7	7	7	6	6	46	0.938776
6	6	6	7	6	6	7	44	0.897959
6	6	6	7	6	6	7	44	0.897959
6	6	5	5	5	4	4	35	0.714286
6	6	5	6	5	6	5	39	0.795918

7	7	6	5	4	2	5	36	0.734694
7	6	5	5	4	3	5	35	0.714286
6	6	6	6	6	4	4	38	0.77551
6	6	5	5	4	4	4	34	0.693878
5	7	6	6	6	7	7	44	0.897959
6	6	5	6	6	4	4	37	0.755102
6	6	6	6	3	6	6	39	0.795918
6	7	6	6	6	5	5	41	0.836735
5	6	6	6	6	6	5	40	0.816327
6	5	6	5	5	6	5	38	0.77551
5	5	5	6	6	5	5	37	0.755102
6	6	5	6	5	6	5	39	0.795918
7	5	6	4	5	7	7	41	0.836735
7	6	7	7	6	5	6	44	0.897959
7	7	7	7	4	7	7	46	0.938776
7	7	7	7	6	6	5	45	0.918367
7	7	6	6	3	4	5	38	0.77551
7	7	7	7	2	7	7	44	0.897959
7	7	7	6	3	7	7	44	0.897959
7	7	7	7	3	7	7	45	0.918367
6	5	6	5	4	6	5	37	0.755102
7	7	7	7	4	7	7	46	0.938776
7	7	7	7	4	7	7	46	0.938776
6	6	6	6	3	6	6	39	0.795918
7	7	7	7	4	7	7	46	0.938776
6	6	6	6	3	6	5	38	0.77551

7	7	7	7	4	7	7	46	0.938776
6	7	7	7	2	7	6	42	0.857143
7	6	6	6	2	6	7	40	0.816327
7	7	7	7	3	7	7	45	0.918367
7	6	6	6	7	5	7	44	0.897959
6	6	5	4	6	5	5	37	0.755102
7	7	7	7	4	7	7	46	0.938776
5	7	6	5	6	4	4	37	0.755102
6	5	6	5	4	6	5	37	0.755102
6	5	6	5	4	6	5	37	0.755102
7	7	7	7	4	7	7	46	0.938776
7	7	7	7	4	7	7	46	0.938776
6	6	6	6	3	6	6	39	0.795918
7	7	7	7	4	7	7	46	0.938776
6	6	6	6	3	6	5	38	0.77551
	6	6	6	2	6	6	32	0.653061
7	7	7	7	3	7	7	45	0.918367
6	7	7	7	2	7	7	43	0.877551
7	7	7	7	4	7	7	46	0.938776
6	6	6	6	2	6	6	38	0.77551
7	7	7	7	2	7	7	44	0.897959
6	6	6	6	3	6	5	38	0.77551
7	7	7	7	3	7	6	44	0.897959
7	7	7	7	2	7	6	43	0.877551
7	7	7	7	1	7	7	43	0.877551
5	6	6	6	1	6	6	36	0.734694

7	6	7	7	2	6	5	40	0.816327
7	7	7	7	7	7	7	49	1
7	7	7	7	3	7	7	45	0.918367
6	6	6	6	6	6	5	41	0.836735
7	6	6	6	3	7	7	42	0.857143
5	5	6	5	5	5	4	35	0.714286

Table 4.50: Indices for Agro-food MSE's Products Meeting Market Demand

	Scores for meeting market demand						Total	Y2 Indices
B8	B9	B10	B11	B12	B13	B14		
6	5	6	6	6	7	7	43	0.877551
6	6	6	6	6	6	6	42	0.857143
1	2	7	6	1	3	5	25	0.510204
2	2	3	3	2	3	2	17	0.346939
1	1	6		6	4	5	23	0.469388
5	3	7	4	6	6	6	37	0.755102
1	2	7	5	7	6	7	35	0.714286
6	4	7	7	7	6	6	43	0.877551
7	4	7	6	5	6	6	41	0.836735
7	7	6	7	7	6	7	47	0.959184
4	4	2	6	6	6	6	34	0.693878
3	2	7	7	7	7	7	40	0.816327
3	2	7	7	7	7	7	40	0.816327
2	2	7	2	2	2	2	19	0.387755
2	4	6	6	2	6	7	33	0.673469
7	3	2	5	2	5	3	27	0.55102
6	5	6	5	6	6	6	40	0.816327
4	1	1	2	4	6	6	24	0.489796
6	2	4	6	5	3	7	33	0.673469
5	6	2	6	5	6	7	37	0.755102
6	2	6	4		5	6	29	0.591837
2	5	6	6	6	5	2	32	0.653061

2	3	7	7	7	7	7	40	0.816327
4	2	6	5	6	3	6	32	0.653061
6	2	6	6	5	6	6	37	0.755102
6	2	6	5	6	5	5	35	0.714286
6	4	6	5	6	6	7	40	0.816327
3	5	6	5	7	4	7	37	0.755102
6	5	6	5	4	6	7	39	0.795918
6	5	6	6	5	6	7	41	0.836735
7	5	6	4	4	5	4	35	0.714286
2	1	5	4	2	1	5	20	0.408163
6	5	6	5	5	7	7	41	0.836735
7	6	7	5	7	6	6	44	0.897959
5	6	6	5	5	6	7	40	0.816327
6	3	7	6	6	4	7	39	0.795918
6	4	7	6	6	6	7	42	0.857143
7	5	7	6	6	7	7	45	0.918367
6	3	6	2	5	5	6	33	0.673469
7	5	7	5	6		7	37	0.755102
6	5	6	7	7	6	7	44	0.897959
6	3	7	4	7	6	6	39	0.795918
6	3	7	6	6	4	7	39	0.795918
6	3	7	4	7	7	6	40	0.816327
7	7	6	6	6	6	7	45	0.918367
7	1	7	7	7	7	7	43	0.877551
7	7	7	6	6	7	5	45	0.918367
3	2	6	6	4	5	6	32	0.653061

2	4	4	5	5	6	7	33	0.673469
3	5	6	7	5	7	6	39	0.795918
6	4	6	6	4	6	6	38	0.77551
7	4	7	7	6	6	7	44	0.897959
3	1	6	6	5	4	6	31	0.632653
7	3	7	7	7	7	7	45	0.918367
5	4	5	3	2	5	6	30	0.612245
6	4	6	6	6	6	6	40	0.816327
6	6	6	5	5	5	6	39	0.795918
								0
7	7	6	6	6	6	7	45	0.918367
4	4	6	6	5	5	6	36	0.734694
5	4	6	7	7	7	7	43	0.877551
4	4	6	6	5	5	6	36	0.734694
6	6	7	7	7	7	7	47	0.959184
4	4	6	5	6	6	6	37	0.755102
6	4	5	3	2	5	6	31	0.632653
5	6	6	6	6	6	6	41	0.836735
7	5	6	4	7	6	5	40	0.816327
4	4	6	6	5	5	6	36	0.734694
2	2	5	3	4	5	5	26	0.530612
6	4	7	7	6	6	6	42	0.857143
6	6	7	6	5	5	5	40	0.816327
6	6	7	5	5	5	5	39	0.795918
4	4	4	5	5	4	6	32	0.653061
4	4	5	5	4	5	5	32	0.653061

5	6	6	6	4	5	6	38	0.77551
4	4	6	5	6	6	5	36	0.734694
3	4	6	6	5	5	5	34	0.693878
4	4	3	3	5	6	4	29	0.591837
6	6	7	7	7	7	7	47	0.959184
3	4	6	6	5	5	5	34	0.693878
3	1	6	6	6	6	5	33	0.673469
6	5	5	5	6	5	6	38	0.77551
5	5	6	6	7	7	7	43	0.877551
4	4	4	4	5	4	5	30	0.612245
4	4	6	6	6	6	6	38	0.77551
4	4	5	5	4	5	6	33	0.673469
6		5		5	6	7	29	0.591837
7	7	7	6	5	6	7	45	0.918367
6	4	6	6	7	7	7	43	0.877551
6	7	7	7	6	5	6	44	0.897959
6	7	7	6	5	4	6	41	0.836735
7	1	3	7	7	7	7	39	0.795918
3	2	6	6	4	6	6	33	0.673469
7	4	3	7	7	7	7	42	0.857143
3	1	6	6	4	6	6	32	0.653061
5	2	6	7	5	7	5	37	0.755102
4	2	6		5	7	5	29	0.591837
3	1	6	6	6	6	5	33	0.673469
3	2	6	6	5	6	6	34	0.693878
2	2	5	5	3	6	5	28	0.571429

6	4	6	7	7	7	7	44	0.897959
4	2	6	7	4	7	6	36	0.734694
5	2	6	6	3	7	6	35	0.714286
7	5	3	7	7	7	7	43	0.877551
7	3	7	7	7	7	7	45	0.918367
4	4	3	3		4	6	24	0.489796
7	3	7	7	7	7	7	45	0.918367
4	4	6	6	6	6	6	38	0.77551
3	4	5	5		6	7	30	0.612245
3	1	6	6	4	6	6	32	0.653061
5	2	6	7	5	7	5	37	0.755102
4	2	6		5	7	5	29	0.591837
3	1	6	6	6	6	5	33	0.673469
3	2	6	6	5	6	6	34	0.693878
2	2	5	5	3	6	5	28	0.571429
5	2	6	6	3	7	6	35	0.714286
5	2	7	7	7	7	7	42	0.857143
4	2	6	7	4	7	6	36	0.734694
6	2	6	6	5	7	6	38	0.77551
5	2	6	6	6	6	6	37	0.755102
7	2	7	7	7	7	7	44	0.897959
3	1		7	5	7	6	29	0.591837
7	2	7	7	7	7	7	44	0.897959
7	2	7	7	7	7	7	44	0.897959
6	7	7	7	7	7	7	48	0.979592
2	1	6	5	6	6	5	31	0.632653

6	2	6	6	4	6	6	36	0.734694
7	2	7	7	7	7	7	44	0.897959
7	3	7	7	7	7	7	45	0.918367
5	7	7	7	7	7	7	47	0.959184
5	6	6	6	6	7	7	43	0.877551
2	1	6	3	3	3	3	21	0.428571

Table 4.51: Indices for Differentiated Agro-food Products

Scores for Differentiated Products								Total score	Y3 indices
B16	B17	B18	B19	820	B22	B23	B24		
6	5	5	6	5	1	2	2	32	0.761905
6	6	6	6	6	1	3	2	36	0.857143
5	5	5	2	5	1	2	2	27	0.642857
3	3	4	4	2	1	2	2	21	0.5
5	5	5	5	5	1	3	2	31	0.738095
6	6	6	2	5	1	3	2	31	0.738095
6	5	6	5	5	1	1	2	31	0.738095
4	5	5	6	6	1	2	1	30	0.714286
4	5	6	6	5	1		2	29	0.690476
5	6	6	7	6	1	1	1	33	0.785714
5	5	5	6	5	1	2	2	31	0.738095
5	4	5	6	7	1	2		30	0.714286
5	4	5	6	7	1	2		30	0.714286
6	6	6	6	5	2		1	32	0.761905
4	5	5	6	5	1	2	2	30	0.714286
6	3	6	5	3	1	1	2	27	0.642857
6	4	5	5	6	1			27	0.642857
2	2	1	2	3	2		2	14	0.333333
2	4	5	6	5	1	1	1	25	0.595238
6	5	6	5	5	1	2	1	31	0.738095
6	6	5	3	3	1		2	26	0.619048
6	6	5	7	6	1	1		32	0.761905
6	6	7	6	7	1	1		34	0.809524
6	5	6	6	5	1	1	1	31	0.738095
6	4	5	6	5	1	1	1	29	0.690476
5	5	4	2	5	2			23	0.547619
5	5	4	3	6	2		2	27	0.642857
6	5	6	6	6	1	1	1	32	0.761905
5	5	4	3	5	1	2		25	0.595238
4	5	5	6	6	1	3	1	31	0.738095
5	5	5	6	6	1	2		30	0.714286
5	4	3	2		2			16	0.380952
6	5	6	6	6		2	1	32	0.761905
5	6	5	6	6	1	2	1	32	0.761905
6	5	6	6	6	1	2	1	33	0.785714

6	5	4	2	5	1	7	6	36	0.857143
5	6	5	2	5	2		2	27	0.642857
5	6	6	5	6	1	2	1	32	0.761905
5	2	2	2	3	2		2	18	0.428571
5	6	6	5	6		2	1	31	0.738095
6	6	5	6	6	2		2	33	0.785714
6	6	5	4	6	1	2		30	0.714286
6	6	4	2	5			2	25	0.595238
6	6	5	4	6	1	2		30	0.714286
7	5	6	5	6	1	1	1	32	0.761905
7	7	6	6	7	1	1	2	37	0.880952
7	6	7	7	4	1	1	2	35	0.833333
5	5	6	5	6	2		2	31	0.738095
6	5	6	7	6	1	2	1	34	0.809524
4	4	5	6	7	1	1	1	29	0.690476
7	7	7	6	6	1	2	1	37	0.880952
7	7	7	7	7	1	3	2	41	0.97619
5	5	5	3	6	2		2	28	0.666667
7	7	7	7	7	1	1	2	39	0.928571
6	6	6	6	6	1	2	1	34	0.809524
6	7	6	7	5	1	2	1	35	0.833333
6	6	6	6	5	1	2	2	34	0.809524
									0
7	5	6	5	6	1	1	1	32	0.761905
6	5	5	7	6	1	2	2	34	0.809524
6	5	5	5	5	1	3	2	32	0.761905
6	5	6	5	5	1	3	2	33	0.785714
7	6	6	6	6	1	2	1	35	0.833333
6	6	6	4	5	1	2	2	32	0.761905
6	6	6	6	6	1	2	1	34	0.809524
6	6	6	6	6	1	2	1	34	0.809524
5	7	5	6	7	1	2		33	0.785714
6	5	5	7	6	1	2	2	34	0.809524
5	6	5	2	5	2		2	27	0.642857
7	7	6	5	5	1	2	2	35	0.833333
7	6	6	6	6	1	2		34	0.809524
7	6	6	6	6	1	2		34	0.809524
6	5	6	7	6	1	2	2	35	0.833333
5	5	6	5	5	1	2	2	31	0.738095
6	5	5	6	7	1	2	1	33	0.785714

5	4	4	3	2	1	2	1	22	0.52381
6	6	5	5	5	1		2	30	0.714286
6	4	6	4	7	1	1	2	31	0.738095
7	6	6	6	6	1	2	1	35	0.833333
6	6	5	5	5	2		2	31	0.738095
5	4	6	4	6	1	2	1	29	0.690476
6	6	5	5	5	1	1	1	30	0.714286
6	6	6	5	6	1	2	1	33	0.785714
5	6	5	5	5	1	2		29	0.690476
6	5	4	5	5	1	2	2	30	0.714286
5	5	6	5	5	1	2	2	31	0.738095
5	6	7	6	7	1	2	1	35	0.833333
5	5	5	4	6	1	2	2	30	0.714286
6	6	7	7	7	1	1	2	37	0.880952
5	5	5	4	6	1	2	2	30	0.714286
6	6	6	7	6	1	2	2	36	0.857143
7	7	7	7	7	1	1	2	39	0.928571
5	5	6	5	6	2		2	31	0.738095
7	7	7	7	7	1	1	2	39	0.928571
5	4	4	5	6	2		2	28	0.666667
4	5	6	4	6	2		2	29	0.690476
6	6	6	6	6	2		2	34	0.809524
4	4	5	4	6	2		2	27	0.642857
5	5	5	3	6	2		2	28	0.666667
5	6	5	2	5	2		2	27	0.642857
6	6	77	7	7	1	1	2	107	2.547619
5	5	5	6	6	2		2	31	0.738095
7	7	7	6	7	1	2	2	39	0.928571
7	7	7	7	7	1	1	2	39	0.928571
7	7	7	7	6	1	1	2	38	0.904762
6	4	6	6	5	1	2	2	32	0.761905
7	7	7	7	7	1	1	2	39	0.928571
6	5	6	5	5	1	3	2	33	0.785714
5	4	4	5	6	2		2	28	0.666667
5	4	4	5	6	2		2	28	0.666667
4	5	6	4	6	2		2	29	0.690476
6	6	6	6	6	2		2	34	0.809524
4	4	5	4	6	2		2	27	0.642857
5	5	5	3	6	2		2	28	0.666667
5	6	5	2	5	2		2	27	0.642857

7	7	7	6	7	2		2	38	0.904762
5	4	5	4	7	2		2	29	0.690476
5	5	5	5	6	2		2	30	0.714286
7	7	7	6	7	2		2	38	0.904762
5	6	5	6	6	2		2	32	0.761905
5	6	6	5	6	1	1	2	32	0.761905
6	5	6	3	6	2		2	30	0.714286
					4	6	5	15	0.357143
6	6	6	5	6	2		2	33	0.785714
7	7	7	7	7	1	1	2	39	0.928571
6	5	5	3	5	2		2	28	0.666667
5	6	6	6	6	2		2	33	0.785714
4	6	6	7	7	1	1	2	34	0.809524
5	6	6	5	6	1	1	2	32	0.761905
4	5	5	4	5	2		2	27	0.642857
4	5	6	4	6	2		2	29	0.690476
3	3	3	2	3	2		2	18	0.428571

Table 4.52 Value for Perception of Agro-food Advantageous products Y4

B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19	B20	B21	B22	B23	B24	TOTAL	Y4
5	5	6	6	5	6	6	6	5	6	6	6	7	7	1	2	2	87	0.828571
7	6	6	6	6	6	6	6	6	6	6	6	6	6	1	3	2	91	0.866667
5	6	6	6	6	6	6	1	2	7	6	1	3	5	1	2	2	71	0.67619
3	3	3	3	3	3	3	2	2	3	3	2	3	2	1	2	2	43	0.409524
4	5	6	6	5	4	5	1	1	6		6	4	5	1	3	2	64	0.609524
6	7	7	7	6	6	6	5	3	7	4	6	6	6	1	3	2	88	0.838095
4	7	6	5	2	4	4	1	2	7	5	7	6	7	1	1	2	71	0.67619
4	6	7	6	6	6	5	6	4	7	7	7	6	6	1	2	1	87	0.828571
5	6	6	6	5	5	5	7	4	7	6	5	6	6	1		2	82	0.780952
6	7	6	6	5	4	4	7	7	6	7	7	6	7	1	1	1	88	0.838095
7	7	7	7	6	6	4	4	4	2	6	6	6	6	1	2	2	83	0.790476
5	7	7	6	7	5	6	3	2	7	7	7	7	7	1	2		86	0.819048
5	7	7	6	7	5	6	3	2	7	7	7	7	7	1	2		86	0.819048
2	5	5	5	7	6	5	2	2	7	2	2	2	2	2		1	57	0.542857
5	7	6	7	5	5	6	2	4	6	6	2	6	7	1	2	2	79	0.752381
3	6	6	6	2	6	3	7	3	2	5	2	5	3	1	1	2	63	0.6
5	6	6	7	5	6	5	6	5	6	5	6	6	6	1			81	0.771429
2	5	6	6	7	6	3	4	1	1	2	4	6	6	2		2	63	0.6
6	6	6	5	5	3	5	6	2	4	6	5	3	7	1	1	1	72	0.685714
5	6	6	5	5	6	5	5	6	2	6	5	6	7	1	2	1	79	0.752381
4	5	6	6	6	2	3	6	2	6	4		5	6	1		2	64	0.609524

7	6	5	6	6	6	6	2	5	6	6	6	5	2	1	1		76	0.72381
6	7	6	5	3	5	6	2	3	7	7	7	7	7	1	1		80	0.761905
5	5	6	4	2	2	5	4	2	6	5	6	3	6	1	1	1	64	0.609524
5	5	5	2	5	2	5	6	2	6	6	5	6	6	1	1	1	69	0.657143
5	5	6	2	2	5	4	6	2	6	5	6	5	5	2			66	0.628571
5	6	5	2	2	4	4	6	4	6	5	6	6	7	2		2	72	0.685714
5	6	6	6	3	5	5	3	5	6	5	7	4	7	1	1	1	76	0.72381
5	6	4	5	2	5	5	6	5	6	5	4	6	7	1	2		74	0.704762
7	6	6	3	2	2	5	6	5	6	6	5	6	7	1	3	1	77	0.733333
6	5	5	4	4	6	4	7	5	6	4	4	5	4	1	2		72	0.685714
4	5	4	5	3	4	5	2	1	5	4	2	1	5	2			52	0.495238
5	4	6	3	2	4	5	6	5	6	5	5	7	7		2	1	73	0.695238
6	5	7	3	2	5	5	7	6	7	5	7	6	6	1	2	1	81	0.771429
6	5	6	5	4	5	5	5	6	6	5	5	6	7	1	2	1	80	0.761905
5	6	4	5	2	5	5	6	3	7	6	6	4	7	1	7	6	85	0.809524
5	6	3	2	1	5	5	6	4	7	6	6	6	7	2		2	73	0.695238
5	6	6	2	2	3	5	7	5	7	6	6	7	7	1	2	1	78	0.742857
5	5	4	2	2	4	5	6	3	6	2	5	5	6	2		2	64	0.609524
5	6	6	2	2	3	5	7	5	7	5	6		7		2	1	69	0.657143
6	7	4	4	5	2	5	6	5	6	7	7	6	7	2		2	81	0.771429
5	5	6	2	2	5	4	6	3	7	4	7	6	6	1	2		71	0.67619
5	6	4	5	2	5	5	6	3	7	6	6	4	7			2	73	0.695238
5	5	6	2	2	5	4	6	3	7	4	7	7	6	1	2		72	0.685714

6	7	7	6	6	5	6	7	7	6	6	6	6	7	1	1	1	91	0.866667
7	7	7	7	2	7	7	7	1	7	7	7	7	7	1	1	2	91	0.866667
6	6	6	5	4	3	7	7	7	7	6	6	7	5	1	1	2	86	0.819048
7	7	6	5	7	6	7	3	2	6	6	4	5	6	2		2	81	0.771429
7	7	7	6	6	7	5	2	4	4	5	5	6	7	1	2	1	82	0.780952
7	7	7	6	6	7	6	3	5	6	7	5	7	6	1	1	1	88	0.838095
6	6	6	6	4	5	7	6	4	6	6	4	6	6	1	2	1	82	0.780952
7	7	7	6	3	7	6	7	4	7	7	6	6	7	1	3	2	93	0.885714
7	7	7	5	6	7	3	3	1	6	6	5	4	6	2		2	77	0.733333
7	7	7	7	4	7	7	7	3	7	7	7	7	7	1	1	2	95	0.904762
5	6	6	5	6	5	6	5	4	5	3	2	5	6	1	2	1	73	0.695238
6	7	6	5	4	4	5	6	4	6	6	6	6	6	1	2	1	81	0.771429
6	5	6	5	5	5	5	6	6	6	5	5	5	6	1	2	2	81	0.771429
5	5	6	5														21	0.2
6	7	7	6	6	5	6	7	7	6	6	6	6	7	1	1	1	91	0.866667
6	6	5	5	4	4	4	4	4	6	6	5	5	6	1	2	2	75	0.714286
6	7	7	7	6	6	5	5	4	6	7	7	7	7	1	3	2	93	0.885714
6	6	5	6	6	5	6	4	4	6	6	5	5	6	1	3	2	82	0.780952
5	7	6	6	6	7	7	6	6	7	7	7	7	7	1	2	1	95	0.904762
7	7	7	7	6	6	6	4	4	6	5	6	6	6	1	2	2	88	0.838095
5	6	6	5	6	5	6	6	4	5	3	2	5	6	1	2	1	74	0.704762
7	7	6	5	5	5	5	5	6	6	6	6	6	6	1	2	1	85	0.809524
6	6	4	5	3	6	5	7	5	6	4	7	6	5	1	2		78	0.742857
6	6	5	5	4	4	4	4	4	6	6	5	5	6	1	2	2	75	0.714

																		286
7	6	6	6	3	6	5	2	2	5	3	4	5	5	2		2	69	0.657143
6	7	7	7	7	6	6	6	4	7	7	6	6	6	1	2	2	93	0.885714
6	6	6	7	6	6	7	6	6	7	6	5	5	5	1	2		87	0.828571
6	6	6	7	6	6	7	6	6	7	5	5	5	5	1	2		86	0.819048
6	6	5	5	5	4	4	4	4	4	5	5	4	6	1	2	2	72	0.685714
6	6	5	6	5	6	5	4	4	5	5	4	5	5	1	2	2	76	0.72381
7	7	6	5	4	2	5	5	6	6	6	4	5	6	1	2	1	78	0.742857
7	6	5	5	4	3	5	4	4	6	5	6	6	5	1	2	1	75	0.714286
6	6	6	6	6	4	4	3	4	6	6	5	5	5	1		2	75	0.714286
6	6	5	5	4	4	4	4	4	3	3	5	6	4	1	1	2	67	0.638095
5	7	6	6	6	7	7	6	6	7	7	7	7	7	1	2	1	95	0.904762
6	6	5	6	6	4	4	3	4	6	6	5	5	5	2		2	75	0.714286
6	6	6	6	3	6	6	3	1	6	6	6	6	5	1	2	1	76	0.72381
6	7	6	6	6	5	5	6	5	5	5	6	5	6	1	1	1	82	0.780952
5	6	6	6	6	6	5	5	5	6	6	7	7	7	1	2	1	87	0.828571
6	5	6	5	5	6	5	4	4	4	4	5	4	5	1	2		71	0.67619
5	5	5	6	6	5	5	4	4	6	6	6	6	6	1	2	2	80	0.761905
6	6	5	6	5	6	5	4	4	5	5	4	5	6	1	2	2	77	0.733333
7	5	6	4	5	7	7	6		5		5	6	7	1	2	1	74	0.704762
7	6	7	7	6	5	6	7	7	7	6	5	6	7	1	2	2	94	0.895238
7	7	7	7	4	7	7	6	4	6	6	7	7	7	1	1	2	93	0.885714
7	7	7	7	6	6	5	6	7	7	7	6	5	6	1	2	2	94	0.895238
7	7	6	6	3	4	5	6	7	7	6	5	4	6	1	2	2	84	0.8

7	7	7	7	2	7	7	7	1	3	7	7	7	7	1	1	2	87	0.828571
7	7	7	6	3	7	7	3	2	6	6	4	6	6	2		2	81	0.771429
7	7	7	7	3	7	7	7	4	3	7	7	7	7	1	1	2	91	0.866667
6	5	6	5	4	6	5	3	1	6	6	4	6	6	2		2	73	0.695238
7	7	7	7	4	7	7	5	2	6	7	5	7	5	2		2	87	0.828571
7	7	7	7	4	7	7	4	2	6		5	7	5	2		2	79	0.752381
6	6	6	6	3	6	6	3	1	6	6	6	6	5	2		2	76	0.72381
7	7	7	7	4	7	7	3	2	6	6	5	6	6	2		2	84	0.8
6	6	6	6	3	6	5	2	2	5	5	3	6	5	2		2	70	0.666667
7	7	7	7	4	7	7	6	4	6	7	7	7	7	1	1	2	94	0.895238
6	7	7	7	2	7	6	4	2	6	7	4	7	6	2		2	82	0.780952
7	6	6	6	2	6	7	5	2	6	6	3	7	6	1	2	2	80	0.761905
7	7	7	7	3	7	7	7	5	3	7	7	7	7	1	1	2	92	0.87619
7	6	6	6	7	5	7	7	3	7	7	7	7	7	1	1	2	93	0.885714
6	6	5	4	6	5	5	4	4	3	3		4	6	1	2	2	66	0.628571
7	7	7	7	4	7	7	7	3	7	7	7	7	7	1	1	2	95	0.904762
5	7	6	5	6	4	4	4	4	6	6	6	6	6	1	3	2	81	0.771429
6	5	6	5	4	6	5	3	4	5	5		6	7	2		2	71	0.67619
6	5	6	5	4	6	5	3	1	6	6	4	6	6	2		2	73	0.695238
7	7	7	7	4	7	7	5	2	6	7	5	7	5	2		2	87	0.828571
7	7	7	7	4	7	7	4	2	6		5	7	5	2		2	79	0.752381
6	6	6	6	3	6	6	3	1	6	6	6	6	5	2		2	76	0.72381
7	7	7	7	4	7	7	3	2	6	6	5	6	6	2		2	84	0.8
6	6	6	6	3	6	5	2	2	5	5	3	6	5	2		2	70	0.666667

	6	6	6	2	6	6	5	2	6	6	3	7	6	2		2	71	0.67619
7	7	7	7	3	7	7	5	2	7	7	7	7	7	2		2	91	0.866667
6	7	7	7	2	7	7	4	2	6	7	4	7	6	2		2	83	0.790476
7	7	7	7	4	7	7	6	2	6	6	5	7	6	2		2	88	0.838095
6	6	6	6	2	6	6	5	2	6	6	6	6	6	2		2	79	0.752381
7	7	7	7	2	7	7	7	2	7	7	7	7	7	1	1	2	92	0.87619
6	6	6	6	3	6	5	3	1		7	5	7	6	2		2	71	0.67619
7	7	7	7	3	7	6	7	2	7	7	7	7	7	4	6	5	103	0.980952
7	7	7	7	2	7	6	7	2	7	7	7	7	7	2		2	91	0.866667
7	7	7	7	1	7	7	6	7	7	7	7	7	7	1	1	2	95	0.904762
5	6	6	6	1	6	6	2	1	6	5	6	6	5	2		2	71	0.67619
7	6	7	7	2	6	5	6	2	6	6	4	6	6	2		2	80	0.761905
7	7	7	7	7	7	7	7	2	7	7	7	7	7	1	1	2	97	0.92381
7	7	7	7	3	7	7	7	3	7	7	7	7	7	1	1	2	94	0.895238
6	6	6	6	6	6	5	5	7	7	7	7	7	7	2		2	92	0.87619
7	6	6	6	3	7	7	5	6	6	6	6	7	7	2		2	89	0.847619
5	5	6	5	5	5	4	2	1	6	3	3	3	3	2		2	60	0.571429

Table 4.53 Value for Perceptions of Buyers Bargaining Power

									X1
7	5	6	6	6	6	6	6	48	0.857143
6	6	6	6	6	2	6	6	44	0.785714
2	5	2	2	2	2	2	6	23	0.410714
4	4	3	3	5		4	3	26	0.464286
5	5	5	4	6	6	6		37	0.660714
3	7	2	1	2	6	3	2	26	0.464286
7	7	2	1	3	4	3	5	32	0.571429
6	6	6	6	6	6	3	3	42	0.75
6	6	5	4	3	2	3	3	32	0.571429
6	7	6	1	6	1	1	1	29	0.517857
2	6	6	6	2	3	2	4	31	0.553571
1	6	6	1	1	1	1	6	23	0.410714
1	6	1	1	1	1	6	6	23	0.410714
2	1	7	2	2	2	6	6	28	0.5
5	7	6	2	3	4	2	5	34	0.607143
6	7	6	2	7	5	3	5	41	0.732143
									0
5	6	7	5	7	4	6	6	46	0.821429
5	7	5	2	3			6	28	0.5
5	7	7	4	4	5	6	7	45	0.803571
6	7	6	2	2	2	3	4	32	0.571429
6	7	6	5	7	2	3	6	42	0.75
6	7	7	5	7	2	6	7	47	0.839286
6	7	7	2	5	5	5	7	44	0.785714
6	6	7	5	4	4	5	7	44	0.785714
6	7	6	4	5	2	3	6	39	0.696429
5	7	7	2	4	6	3	2	36	0.642857
5	7	7	4	6	5	2	7	43	0.767857
6	6	7	4	4	3	5	7	42	0.75
6	7	6	4	6	5	6	7	47	0.839286
6		6	3	4	5	7	6	37	0.660714
2	7	6	2	4	4	5	1	31	0.553571
6	7	7	4	4	4	5	7	44	0.785714
6	7	6		5	6	3	7	40	0.714286
6	7	7	6	5	2	6	6	45	0.803571
6	3	5	2	5	6	6	6	39	0.696429
5	7	6	3	4	3	5	7	40	0.714286

5	7	7	4	6	7	3	6	45	0.803571
2	6	7	2	2	6	2	7	34	0.607143
5	7	7	4	6	7	3	6	45	0.803571
5	7	7	4	6	5	6	7	47	0.839286
5	7	6		4	2		7	31	0.553571
7	6	6	3	5	2	5	6	40	0.714286
5	7	6	6	4	2	5	7	42	0.75
5	6	5	3	5	2	5	5	36	0.642857
7	7	7	6	7	4	4	6	48	0.857143
7	7	7	6	6	5	4	3	45	0.803571
4	7	7	4	5	5	4	5	41	0.732143
4	6	6	7	6		5	6	40	0.714286
6	7	7	4	3	4	4	6	41	0.732143
7	7	7	6	6	5	4	7	49	0.875
5	6	7	4	3	5	7	6	43	0.767857
5	7	7	4	6	6	5	7	47	0.839286
6	7	7	5	6	6	5	7	49	0.875
4	6	5	2	2	4	5	7	35	0.625
6	6		1	4	3	2	2	24	0.428571
5	5		3	2	2	2	5	24	0.428571
									0
5	6	5	3	5	2	5	5	36	0.642857
5	5	4	2	2	2		5	25	0.446429
6	6	7	2	4	4	3	4	36	0.642857
6	6		2	2	6	4	4	30	0.535714
6	6	7	6	7	7	7	6	52	0.928571
3	6	6	5	4	4	2	4	34	0.607143
4	6	5	3	3	4	5	5	35	0.625
4	5	5	2	6	1	4	5	32	0.571429
7	5	7	6	4	6	7	5	47	0.839286
5	5	4	2	2	2	2	5	27	0.482143
6	7		1	2	1	5	7	29	0.517857
6	6	5	4	7	4	6	6	44	0.785714
6	7	6	7	7	7	7	7	54	0.964286
6	7	7	7	7	7	7	7	55	0.982143
5	5	2	2	2	2	2	5	25	0.446429
4	5	5	2	2	1	4	4	27	0.482143
4	5	5	2	7	1	4	5	33	0.589286
4	4		3	3	6	5	4	29	0.517857
6	6	5	3	2	2	4	6	34	0.607143

6	6	4	4	4	6	7	5	42	0.75
6	5	5	2	2	2	5	5	32	0.571429
6	6		5	3	2	2	4	28	0.5
6	7	7	4	3	4	4	6	41	0.732143
1	6	5	4	1	6	5	5	33	0.589286
6	7	6	6	6	7	6	6	50	0.892857
6	6	7	7	6	2	2	3	39	0.696429
5	6	6	2	2	2	2	6	31	0.553571
4	5	5	2	2	1	4	4	27	0.482143
5	7		6	6	5	6	3	38	0.678571
5	6	6	4	4	5	5	5	40	0.714286
6	7	7	6	7	7	6	7	53	0.946429
5	6	6	4	4	5	5	5	40	0.714286
7	6		4	3	5	6	4	35	0.625
7	7	7	6	7	4	4	6	48	0.857143
4	7	7	3	5	5	4	5	40	0.714286
5	7	7	3	6	6	4	5	43	0.767857
6	7	7	1	5	3	4	6	39	0.696429
7	7	7	4	7	7	7	7	53	0.946429
6	7	7	4	6	6	4	6	46	0.821429
6	7	7	4	3	4	4	6	41	0.732143
5	7	7	4	6	6	6	7	48	0.857143
2	6	7	1	1	1	6	7	31	0.553571
6	7	7	6	7	7	6	7	53	0.946429
6	7	7	3	4	5	5	6	43	0.767857
5	7	7	2	1	1	4	5	32	0.571429
2	5	7	7	3	6	6	4	40	0.714286
6	7	7	6	5	6	6	7	50	0.892857
5	4	4	4		6	7	5	35	0.625
6	7	7	5	6	6	5	7	49	0.875
6	7	2	2	4	3	2	2	28	0.5
6	7	7	1	2	3	4	6	36	0.642857
6	7	7	1	5	3	4	6	39	0.696429
7	7	7	4	7	7	7	7	53	0.946429
6	7	7	4	6	6	4	6	46	0.821429
6	7	7	4	3	4	4	6	41	0.732143
5	7	7	4	6	6	6	7	48	0.857143
2	6	7	1	1	1	6	7	31	0.553571
5	7	7	2	1	1	4	5	32	0.571429
6	7	7	4	7	7	5	7	50	0.892857

6	7	7	3	5	5	5	6	44	0.785714
5	7	7	4	6	5	5	4	43	0.767857
6	7	7	4	6	6	5	1	42	0.75
6	7	7	3	6	6	6	2	43	0.767857
6	7	7	4	5	6	5	1	41	0.732143
6	7	7	4	6	6	6	1	43	0.767857
6	7	7	3	5	5	4	3	40	0.714286
6	7	7	2	5	6	2	1	36	0.642857
5	7	7	2	5	6	5	2	39	0.696429
4	7	4	6	5	5	2	6	39	0.696429
5	7	7	4	7	7	5	2	44	0.785714
6	7	7	3	6	6	6	1	42	0.75
6	7	7	3	6	6	6	1	42	0.75
4	7	7	4	6	4	4	6	42	0.75
2	6	6	1	2	5	2	2	26	0.464286

Table 4.54 Values of Perception of Suppliers Bargaining Power

								X2
6	6	2	6	6	2	2	30	0.612245
6	6	6	6	6	2	6	38	0.77551
2	2	6	6	5	2	2	25	0.510204
4		4	3	3	3	4	21	0.428571
3	4	2	2	4	2	3	20	0.408163
6	3	2	6	2	6	6	31	0.632653
2	1	6	7	6	5	6	33	0.673469
5	5	2	4		3	2	21	0.428571
5	4	2	2	3	3	2	21	0.428571
6	6	6	1	5	1	6	31	0.632653
5	4	2	2	3	2	2	20	0.408163
6	4	1	1	6	4	4	26	0.530612
4	6	1	1	6	4	4	26	0.530612
6	2	6	2	6	2	7	31	0.632653
5	6	1	4	5	7	2	30	0.612245
6	6	5	5	5	3	6	36	0.734694
6	2	6	5	6	3	2	30	0.612245
4	3	5	3	4	6	5	30	0.612245
5	6	4	5	6	4	2	32	0.653061
7	6	5	6	4	4	5	37	0.755102
6	7	2	3	1		6	25	0.510204
6	7	6	5	6	5	5	40	0.816327
7	6	5	7	2	3	6	36	0.734694
6	7	1	6	6	6	6	38	0.77551
6	7	4	5	6	5	4	37	0.755102
6	5	4	3	4	6	2	30	0.612245
7	6	2	5	5	2	6	33	0.673469
7	6	5	6	5	5	2	36	0.734694
6	7	4	6	4	5	6	38	0.77551
6	7	6	5	6	7	7	44	0.897959
6	7	4	5	4	5	4	35	0.714286
6	6	4	3	5	2	5	31	0.632653
6	7	5	6	5	6	5	40	0.816327
6	7	3	2	6	5	6	35	0.714286
6	7	5	6	6	6	6	42	0.857143
3	7	6	5	6	7	7	41	0.836735
6	7	3	6	5	4	6	37	0.755102

6	7	5	7	6	4	7	42	0.857143
6	7	2	3	6	2	3	29	0.591837
6	7	5	7	6	4	7	42	0.857143
7	6	4	6	5	6	6	40	0.816327
6	7	5	3	2	6	6	35	0.714286
6	6	3	7	6	5	6	39	0.795918
6	7	5	3	2	6	6	35	0.714286
6	6	7	5	4	3	7	38	0.77551
7	7	7	3	6	6	5	41	0.836735
6	5	5	7	7	6	7	43	0.877551
5	6	4	3	4	3	4	29	0.591837
6	2	1	6	4	1	3	23	0.469388
6	5	3	3	2	6	7	32	0.653061
7	4	5		6	5	6	33	0.673469
7	6	6	4	4	5	4	36	0.734694
6	6	4	4	5	3	6	34	0.693878
7	6	6	4	6	6	5	40	0.816327
7	7	5	1	4	6	7	37	0.755102
7	6	6	5	1	4	4	33	0.673469
5	5	6	5	5	4	4	34	0.693878
								0
6	6	7	5	4	3	7	38	0.77551
6	6	6	5	5	3	5	36	0.734694
5	6	6	4	5	6	5	37	0.755102
5	4	5	4	5	4	6	33	0.673469
7	6	6	6	5	6	6	42	0.857143
5	6	6	5	6	6	5	39	0.795918
7	7	7	5	1	4	5	36	0.734694
5	6	6	5	5	5	6	38	0.77551
7	5	6	7	5	6	4	40	0.816327
6	6	6	5	5	3	5	36	0.734694
5	2	1	6	4	1	3	22	0.44898
6	7	7	7	7	6	6	46	0.938776
6	6	7	6	3	5	5	38	0.77551
6	6	7	6	3	5	5	38	0.77551
6	6	6	5	5	7	5	40	0.816327
7	7	7	5	4	4	6	40	0.816327
5	6	5	4	5	6	6	37	0.755102
6	5	5	4	4		5	29	0.591837
6	5	6	5	4	4	5	35	0.714286

6	7	6	4	3	2	5	33	0.673469
7	6	6	6	5	6	6	42	0.857143
6	5	6	5	4	4	5	35	0.714286
6	5	3	3	6	6	5	34	0.693878
6	6	6	5	6	6	5	40	0.816327
6	6	7	6	6	7	6	44	0.897959
6	7	6	6	7	7	5	44	0.897959
6	6	6	6	2	5	3	34	0.693878
7	7	7	5	4	6	7	43	0.877551
5	4	5	6	7	7	5	39	0.795918
6	7	5	4	4	4	3	33	0.673469
6	5	6	4	6	5	4	36	0.734694
6	7	5	4	4	3	4	33	0.673469
6	7	6	4	3	5	6	37	0.755102
7	7	7	3	6	6	5	41	0.836735
5	6	4	3	4	3	4	29	0.591837
7	6	6	3	5	4	4	35	0.714286
5	5	3	5	4	6	3	31	0.632653
6	5	6	4	6	4	5	36	0.734694
7	6	6	3	6	7	5	40	0.816327
6	5	3	3	6	5	6	34	0.693878
6	6	4	4	6	5	6	37	0.755102
5	2	1	6	4	1	3	22	0.44898
6	5	6	4	6	5	4	36	0.734694
6	5	6	4	3	5	6	35	0.714286
6	4	2	6	6	6	5	35	0.714286
5	7	6	6	3	5	4	36	0.734694
7	6	6	4	4	6	5	38	0.77551
6	7	6	4	3	2	5	33	0.673469
7	6	4	6		6	6	35	0.714286
7	6	6	4	1	4	5	33	0.673469
5	5	3	5	4	6	3	31	0.632653
5	5	3	5	4	6	3	31	0.632653
6	5	6	4	6	4	5	36	0.734694
7	6	6	3	6	7	5	40	0.816327
6	5	3	3	6	5	6	34	0.693878
6	6	4	4	6	5	6	37	0.755102
5	2	1	6	4	1	3	22	0.44898
6	4	2	6	6	6	5	35	0.714286
6	6	6	3	6	4	5	36	0.734694

6	5	6	4	5	3	5	34	0.693878
6	5	6	5	6	6	6	40	0.816327
6	5	4	3	6	6	5	35	0.714286
6	5	5	2	5	6	5	34	0.693878
6	6	4	3	4	6	6	35	0.714286
6	5	2	4	6	5	4	32	0.653061
6	6	4	4	6	6	6	38	0.77551
7	5	4	2	5	6	6	35	0.714286
6	5	4	4	6	6	6	37	0.755102
4	5	4	5	6	5	5	34	0.693878
6	6	6	4	6	5	4	37	0.755102
6	6	4	3	6	6	6	37	0.755102
6	6	3	4	6	6	5	36	0.734694
6	5	4	3	5	4	4	31	0.632653
6	2	2	3	6	6	3	28	0.571429

Table 4.55 Value for Perceptions of Rivalry from Incumbent Competitors

										X3
6	6	6	2	6	6	6	2	2	42	0.666667
6	2	6	6	6	6	6	2	2	42	0.666667
3	6	2	6	6	2	2	6	2	35	0.555556
3	3	5	4	4	4	4	3	3	33	0.52381
3	3	3	3	3	3	3	3	3	27	0.428571
6	3	2	1	2	6	6	5	2	33	0.52381
6	4	6	7	6	6	5	6	6	52	0.825397
3	5	5	5	5	6	6	6	4	45	0.714286
3	5	3	3	5	4	6	6	4	39	0.619048
1	4	4	6	6	6	6	5	6	44	0.698413
6	5	3	6	6	6	6	6	6	50	0.793651
6	4	4	4		5	4	4	4	35	0.555556
6	4	4	4		6	4	4	4	36	0.571429
6	6	2	2	2	2	7	6	2	35	0.555556
4	6	3	5	2	4	5	6	6	41	0.650794
6	6	3	6	6	4	6	6	6	49	0.777778
7	6	3	3	7	3	2	6	2	39	0.619048
3	2	6	5	2	5	3	6	2	34	0.539683
5	5	4	6	5	5	6	5	5	46	0.730159
6	7	2	7	6	5	6	5	7	51	0.809524
2	5	2	6	5	6	6	6	7	45	0.714286
5	6	4	6	7	2	5	6	7	48	0.761905
7	6	7	7	6	1	2	7	7	50	0.793651
6	6	3	6	7	6	3	6	7	50	0.793651
6	5	4	6	7	4	4	6	7	49	0.777778
6	6	3	6	6	3	6	5	7	48	0.761905
7	6	7	7	7	2	5	7	6	54	0.857143
6	7	3	6	7	2	6	7	7	51	0.809524
6	7	5	6	7	3	2	6	6	48	0.761905
6	7	6	6	6	6	2	6	7	52	0.825397
5	6	6	6	4	7	7	6	6	53	0.84127
6	5	2	6	7	5	7	2	7	47	0.746032
6	7	5	7	7	6	6	6	7	57	0.904762
6	7	5	7	6	2	5	6	7	51	0.809524
6	6	7	7	6	5	5	7	5	54	0.857143
6	6	7	5	4	6	7	6	7	54	0.857143
6	7	6	6	7	3	5	6	7	53	0.84127

6	7	2	6	7	2	5	6	7	48	0.761905
6	7	2	6	7	2	2	2	7	41	0.650794
6	7	2	6	7	2	5	5	7	47	0.746032
6	7	3	6	6	2	7	6	7	50	0.793651
6	7	5	6	7	2	6	7	7	53	0.84127
7	7	6	6	7	5	4	6	7	55	0.873016
6	7	5	6	7	2	6	7	7	53	0.84127
7	5	5	6	6	7	5	4	7	52	0.825397
5	6	4	4	7	7	5	7	4	49	0.777778
7	6	3	3	7	7	5	7	7	52	0.825397
6	6	7	3	6	5	4	6	4	47	0.746032
7	4	3	4	3	5	2	3	2	33	0.52381
5	6	5	4	7	7	5	7	4	50	0.793651
7	7	6	3	7	7	4	7	4	52	0.825397
5	6	3	4	7	7	5	7	4	48	0.761905
6	5	3	7	7	6	6	5	4	49	0.777778
5	6	4	2	6	6	5	7	4	45	0.714286
7	6	6	7	7	5	6	6	6	56	0.888889
6	7	6	7	7	6	4	6	7	56	0.888889
6	5	5	6	6	6	4	4	6	48	0.761905
										0
7	5	5	5	7	6	7	7	6	55	0.873016
5	5	4	6	6	6	6	6	5	49	0.777778
5	5	6	5	4	6	5	6	5	47	0.746032
6	4	5	5	4	6	5	6	4	45	0.714286
7	6	6	5	7	6	6	6	7	56	0.888889
5	6	6	5	6	6	5	6	6	51	0.809524
7	7	6	6	7	7	5	6	6	57	0.904762
6	6	6	6	6	6	6	6	7	55	0.873016
6	7	5	6	5	4	6	5	6	50	0.793651
5	5	4	6	6	6	6	6	5	49	0.777778
7	4	3	4	3	4	2	4	2	33	0.52381
6	7	6	6	6	7	6	6	5	55	0.873016
6	6	5	7	7	6	6	6	6	55	0.873016
6	6	5	7	7	6	6	6	6	55	0.873016
5	5	4	6	6	6	6	6	5	49	0.777778
7	6	6	4	7	6	4	6	6	52	0.825397
6	6	6	6	6	6	6	6	7	55	0.873016
6	4	5	5	4	6	6	5	4	45	0.714286
6	6	5	6	7	6	5	7	5	53	0.84127

6	5	7	6	6	6	5	5	6	52	0.825397
7	6	6	5	7	6	6	6	7	56	0.888889
6	6	5	6	7	6	5	7	5	53	0.84127
6	6	4	4	7	7	5	7	4	50	0.793651
6	6	5	7	7	7	5	6	6	55	0.873016
6	6	6	7	7	7	6	6	6	57	0.904762
5	6	5	5	4	5	5	4	5	44	0.698413
6	6	5	6	7	7	5	6	6	54	0.857143
6	4	4	6	4	6	6	6	4	46	0.730159
4	5	7	6	5	6	7	5	4	49	0.777778
4	7	2	3	4	2	4	5	5	36	0.571429
6	6	3	3	7	7	5	7	5	49	0.777778
7	2	3	4	2	4	5	5	5	37	0.587302
6	5	5	6	6	6	4	4	6	48	0.761905
5	6	4	4	7	7	5	7	4	49	0.777778
6	6	7	3	6	5	4	6	4	47	0.746032
5	6	3	4	7	7	5	7	4	48	0.761905
6	6	5	5	7	7	5	7	6	54	0.857143
6	5	4	3	7	7	6	7	5	50	0.793651
5	6	4	6	7	7	5	7	6	53	0.84127
5	6	5	4	7	7	5	7	4	50	0.793651
6	5	3	3	7	7	3	7	4	45	0.714286
7	4	3	4	3	5	2	3	2	33	0.52381
6	6	3	3	7	7	5	7	5	49	0.777778
7	6	4	4	7	4	5	7	6	50	0.793651
4	3	5	3	7	7	5	7	4	45	0.714286
4	5	6	3	4	3	5	4	7	41	0.650794
5	6	4	2	6	6	5	4	3	41	0.650794
6	5	7	7	6	6	5	5	6	53	0.84127
5	5	6	4	2	2	6	5	7	42	0.666667
7	7	6	1	5	6	4	7	2	45	0.714286
6	6	5	5	7	7	5	7	6	54	0.857143
6	6	5	5	7	7	5	7	6	54	0.857143
6	5	4	3	7	7	6	7	5	50	0.793651
5	6	4	6	7	7	5	7	6	53	0.84127
5	6	5	4	7	7	5	7	4	50	0.793651
6	5	3	3	7	7	3	7	4	45	0.714286
7	4	3	4	3	5	2	3	2	33	0.52381
4	6	3	3	7	7	5	7	4	46	0.730159
7	6	2	5	7	7	5	7	4	50	0.793651

7	6	4	4	7	7	5	7	6	53	0.84127
4	6	7	4	7	6	5	7	4	50	0.793651
5	7	4	3	7	7	5	7	3	48	0.761905
6	7	4	4	7	7	5	7	4	51	0.809524
7	6	4	4	7	7	4	7	6	52	0.825397
6	7	4	3	7	7	5	7	3	49	0.777778
6	6	4	3	7	7	5	7	4	49	0.777778
5	6	4	4	7	7	4	7	4	48	0.761905
5	6	4	4	7	7	4	7	6	50	0.793651
6	4	4	7	7	5	7	5	5	50	0.793651
5	6	4	3	7	7	4	7	4	47	0.746032
7	7	4	3	6	7	6	7	3	50	0.793651
7	7	5	3	7	7	4	7	3	50	0.793651
6	5	3	5	7	7	5	3	9	50	0.793651
6	5	3	4	6	5	4	3	6	42	0.666667

Table 4.56 Values of the Combined Porters Three Competitive Forces

X1	X2	X3		X7
0.857143	0.612245	0.666667	2.136055	0.712018
0.785714	0.77551	0.666667	2.227891	0.74263
0.410714	0.510204	0.555556	1.476474	0.492158
0.464286	0.428571	0.52381	1.416667	0.472222
0.660714	0.408163	0.428571	1.497448	0.499149
0.464286	0.632653	0.52381	1.620749	0.54025
0.571429	0.673469	0.825397	2.070295	0.690098
0.75	0.428571	0.714286	1.892857	0.630952
0.571429	0.428571	0.619048	1.619048	0.539683
0.517857	0.632653	0.698413	1.848923	0.616308
0.553571	0.408163	0.793651	1.755385	0.585128
0.410714	0.530612	0.555556	1.496882	0.498961
0.410714	0.530612	0.571429	1.512755	0.504252
0.5	0.632653	0.555556	1.688209	0.562736
0.607143	0.612245	0.650794	1.870182	0.623394
0.732143	0.734694	0.777778	2.244615	0.748205
0	0.612245	0.619048	1.231293	0.410431
0.821429	0.612245	0.539683	1.973357	0.657786
0.5	0.653061	0.730159	1.88322	0.62774
0.803571	0.755102	0.809524	2.368197	0.789399
0.571429	0.510204	0.714286	1.795919	0.59864
0.75	0.816327	0.761905	2.328232	0.776077
0.839286	0.734694	0.793651	2.367631	0.78921
0.785714	0.77551	0.793651	2.354875	0.784958
0.785714	0.755102	0.777778	2.318594	0.772865
0.696429	0.612245	0.761905	2.070579	0.690193
0.642857	0.673469	0.857143	2.173469	0.72449
0.767857	0.734694	0.809524	2.312075	0.770692
0.75	0.77551	0.761905	2.287415	0.762472
0.839286	0.897959	0.825397	2.562642	0.854214
0.660714	0.714286	0.84127	2.21627	0.738757
0.553571	0.632653	0.746032	1.932256	0.644085
0.785714	0.816327	0.904762	2.506803	0.835601
0.714286	0.714286	0.809524	2.238096	0.746032
0.803571	0.857143	0.857143	2.517857	0.839286
0.696429	0.836735	0.857143	2.390307	0.796769
0.714286	0.755102	0.84127	2.310658	0.770219

0.803571	0.857143	0.761905	2.422619	0.80754
0.607143	0.591837	0.650794	1.849774	0.616591
0.803571	0.857143	0.746032	2.406746	0.802249
0.839286	0.816327	0.793651	2.449264	0.816421
0.553571	0.714286	0.84127	2.109127	0.703042
0.714286	0.795918	0.873016	2.38322	0.794407
0.75	0.714286	0.84127	2.305556	0.768519
0.642857	0.77551	0.825397	2.243764	0.747921
0.857143	0.836735	0.777778	2.471656	0.823885
0.803571	0.877551	0.825397	2.506519	0.835506
0.732143	0.591837	0.746032	2.070012	0.690004
0.714286	0.469388	0.52381	1.707484	0.569161
0.732143	0.653061	0.793651	2.178855	0.726285
0.875	0.673469	0.825397	2.373866	0.791289
0.767857	0.734694	0.761905	2.264456	0.754819
0.839286	0.693878	0.777778	2.310942	0.770314
0.875	0.816327	0.714286	2.405613	0.801871
0.625	0.755102	0.888889	2.268991	0.75633
0.428571	0.673469	0.888889	1.990929	0.663643
0.428571	0.693878	0.761905	1.884354	0.628118
0	0	0	0	0
0.642857	0.77551	0.873016	2.291383	0.763794
0.446429	0.734694	0.777778	1.958901	0.652967
0.642857	0.755102	0.746032	2.143991	0.714664
0.535714	0.673469	0.714286	1.923469	0.641156
0.928571	0.857143	0.888889	2.674603	0.891534
0.607143	0.795918	0.809524	2.212585	0.737528
0.625	0.734694	0.904762	2.264456	0.754819
0.571429	0.77551	0.873016	2.219955	0.739985
0.839286	0.816327	0.793651	2.449264	0.816421
0.482143	0.734694	0.777778	1.994615	0.664872
0.517857	0.44898	0.52381	1.490647	0.496882
0.785714	0.938776	0.873016	2.597506	0.865835
0.964286	0.77551	0.873016	2.612812	0.870937
0.982143	0.77551	0.873016	2.630669	0.87689
0.446429	0.816327	0.777778	2.040534	0.680178
0.482143	0.816327	0.825397	2.123867	0.707956
0.589286	0.755102	0.873016	2.217404	0.739135
0.517857	0.591837	0.714286	1.82398	0.607993
0.607143	0.714286	0.84127	2.162699	0.7209

0.75	0.673469	0.825397	2.248866	0.749622
0.571429	0.857143	0.888889	2.317461	0.772487
0.5	0.714286	0.84127	2.055556	0.685185
0.732143	0.693878	0.793651	2.219672	0.739891
0.589286	0.816327	0.873016	2.278629	0.759543
0.892857	0.897959	0.904762	2.695578	0.898526
0.696429	0.897959	0.698413	2.292801	0.764267
0.553571	0.693878	0.857143	2.104592	0.701531
0.482143	0.877551	0.730159	2.089853	0.696618
0.678571	0.795918	0.777778	2.252267	0.750756
0.714286	0.673469	0.571429	1.959184	0.653061
0.946429	0.734694	0.777778	2.458901	0.819634
0.714286	1.673469	0.587302	2.975057	0.991686
0.625	0.755102	0.761905	2.142007	0.714002
0.857143	0.836735	0.777778	2.471656	0.823885
0.714286	0.591837	0.746032	2.052155	0.684052
0.767857	0.714286	0.761905	2.244048	0.748016
0.696429	0.632653	0.857143	2.186225	0.728742
0.946429	0.734694	0.793651	2.474774	0.824925
0.821429	0.816327	0.84127	2.479026	0.826342
0.732143	0.693878	0.793651	2.219672	0.739891
0.857143	0.755102	0.714286	2.326531	0.77551
0.553571	0.44898	0.52381	1.526361	0.508787
0.946429	0.734694	0.777778	2.458901	0.819634
0.767857	0.714286	0.793651	2.275794	0.758598
0.571429	0.714286	0.714286	2.000001	0.666667
0.714286	0.734694	0.650794	2.099774	0.699925
0.892857	0.77551	0.650794	2.319161	0.773054
0.625	0.673469	0.84127	2.139739	0.713246
0.875	0.714286	0.666667	2.255953	0.751984
0.5	0.673469	0.714286	1.887755	0.629252
0.642857	0.632653	0.857143	2.132653	0.710884
0.696429	0.632653	0.857143	2.186225	0.728742
0.946429	0.734694	0.793651	2.474774	0.824925
0.821429	0.816327	0.84127	2.479026	0.826342
0.732143	0.693878	0.793651	2.219672	0.739891
0.857143	0.755102	0.714286	2.326531	0.77551
0.553571	0.44898	0.52381	1.526361	0.508787
0.571429	0.714286	0.730159	2.015874	0.671958
0.892857	0.734694	0.793651	2.421202	0.807067

0.785714	0.693878	0.84127	2.320862	0.773621
0.767857	0.816327	0.793651	2.377835	0.792612
0.75	0.714286	0.761905	2.226191	0.742064
0.767857	0.693878	0.809524	2.271259	0.757086
0.732143	0.714286	0.825397	2.271826	0.757275
0.767857	0.653061	0.777778	2.198696	0.732899
0.714286	0.77551	0.777778	2.267574	0.755858
0.642857	0.714286	0.761905	2.119048	0.706349
0.696429	0.755102	0.793651	2.245182	0.748394
0.696429	0.693878	0.793651	2.183958	0.727986
0.785714	0.755102	0.746032	2.286848	0.762283
0.75	0.755102	0.793651	2.298753	0.766251
0.75	0.734694	0.793651	2.278345	0.759448
0.75	0.632653	0.793651	2.176304	0.725435
0.464286	0.571429	0.666667	1.702382	0.567461

Table 4.57: Determination of Perceived Ease of Use of Technology(X_4) by Agro-food MSEs

						X4
2	6	3	6	2	19	0.542857
7	3	6	2	6	24	0.685714
5	6	2	1	3	17	0.485714
2	0	0	0		2	0.057143
3	5	3	2	2	15	0.428571
2	5	6	6	5	24	0.685714
6	1	0	6	2	15	0.428571
2	6	6	5	2	21	0.6
2	6	6	5	2	21	0.6
1	3	3	6	2	15	0.428571
6	5	6	6	2	25	0.714286
5	7	6	6	3	27	0.771429
5	7	6	6	3	27	0.771429
2	2	0	7	3	14	0.4
5	5	0	6	5	21	0.6
6	7	6	6	6	31	0.885714
2	3	6	5	3	19	0.542857
0	0	6	2	6	14	0.4
4	5	5	4	1	19	0.542857
7	6	5	3	6	27	0.771429
3	3	6	5	1	18	0.514286
4	7	6	5	2	24	0.685714
6	7	5	4	1	23	0.657143
5	6	2	6	1	20	0.571429
2	6	2	3	1	14	0.4
6	6	6	6	3	27	0.771429
7	6	6	7	2	28	0.8
6	7	6	4	2	25	0.714286
6	6	4	6	2	24	0.685714
7	6	3	7	1	24	0.685714
6	5	2	1	1	15	0.428571
2	5	2	6	3	18	0.514286
7	7	2	6	2	24	0.685714
2	6	5	1	6	20	0.571429
6	6	2	4	1	19	0.542857
5	5	2	7	6	25	0.714286

5	5	3	5	1	19	0.542857
7	6	5	3	6	27	0.771429
1	3	2	4	2	12	0.342857
7	6	5	3	6	27	0.771429
6	6	4	2	1	19	0.542857
5	6	5	5	1	22	0.628571
5	5	2	7	6	25	0.714286
5	6	5	5	1	22	0.628571
6	7	6	3	2	24	0.685714
6	6	6	6	5	29	0.828571
5	7	5	5	7	29	0.828571
6	6	6	6	3	27	0.771429
6	7	5	7	6	31	0.885714
7	7	7	7	7	35	1
7	7	6	7	7	34	0.971429
7	7	7	7	7	35	1
0	0	0	0	0	0	0
6	6	6	6	6	30	0.857143
6	7	5	3	2	23	0.657143
6	7	6	4	2	25	0.714286
4	4	5	5	2	20	0.571429
						0
6	7	6	3	2	24	0.685714
6	2	6	5	3	22	0.628571
7	6	6	3	5	27	0.771429
7	6	5	7	2	27	0.771429
7	6	5	1	3	22	0.628571
2	6	7	4	3	22	0.628571
6	7	5	3	2	23	0.657143
7	6	5	5	2	25	0.714286
6	7	5	7	6	31	0.885714
6	2	6	5	3	22	0.628571
6	7	5	1	7	26	0.742857
6	6	5	6	6	29	0.828571
6	6	6	6	7	31	0.885714
6	6	6	7	5	30	0.857143
6	2	6	5	3	22	0.628571
0	0	7	7	1	15	0.428571
7	6	5	5	2	25	0.714286
0	0	7	5	6	18	0.514286

2	5	6	4	4	21	0.6
6	2	6	5	3	22	0.628571
7	6	5	1	3	22	0.628571
2	5	6	4	4	21	0.6
7	7	7	7	7	35	1
7	6	6	2	6	27	0.771429
3	3	3	2	3	14	0.4
6	6	2	7	6	27	0.771429
1	6	7	0	0	14	0.4
0	0	7	0	1	8	0.228571
3	6	5	6	5	25	0.714286
6	4	6	6	0	22	0.628571
5	7	5	5	7	29	0.828571
6	4	6	0	0	16	0.457143
6	6	7	6	4	29	0.828571
6	6	6	6	5	29	0.828571
6	6	6	6	3	27	0.771429
7	7	7	7	5	33	0.942857
0	0	0	0	0	0	0
6	6	6	6	6	30	0.857143
0	0	0	0	0	0	0
7	7	7	7	7	35	1
0	0	0	0	0	0	0
6	7	5	7	1	26	0.742857
5	7	5	5	7	29	0.828571
0	0	0	0	0	0	0
5	6	6	5	3	25	0.714286
7	7	7	7	5	33	0.942857
6	6	6	6	6	30	0.857143
6	4	6	5	5	26	0.742857
4	6	6	6	6	28	0.8
6	6	7	5	2	26	0.742857
0	0	0	0	0	0	0
0	0	0	0	0	0	0
6	6	6	6	6	30	0.857143
0	0	0	0	0	0	0
7	7	7	7	7	35	1
0	0	0	0	0	0	0
6	7	5	7	1	26	0.742857
5	6	7	6	3	27	0.771429

6	7	6	6	6	31	0.885714
0	0	0	0	0	0	0
6	6	7	7	4	30	0.857143
0	0	0	0	0	0	0
7	7	6	6	7	33	0.942857
0	0	0	0	0	0	0
7	7	6		7	27	0.771429
0	0	0	0	0	0	0
7	6	6	6	2	27	0.771429
6	6	7	7	6	32	0.914286
6	6	7	6	7	32	0.914286
7	7	7	7	6	34	0.971429
4	6	5	6	5	26	0.742857
7	7	7	6	7	34	0.971429
0	0	0	0	0	0	0
1	1	3	7	0	12	0.342857

Table 4.58 Values of Perceived Technology Usefulness(X_5) among MSEs in Agro-food Industry

								X5
6	6	5	7	7	6	6	43	0.877551
6	5	6	7	6	6	6	42	0.857143
1	5	5	6	6	6	6	35	0.714286
0	5	3	5	0	0	0	13	0.265306
0	0	0	0		0	0	0	0
6	6	6	6	7	7	7	45	0.918367
6	6	6	6	6	6	3	39	0.795918
6	5	3	6	6	6	5	37	0.755102
6	5	3	6	6	6	5	37	0.755102
7	6	5	5	6	7	7	43	0.877551
6	7	6	6	6	6	6	43	0.877551
7	5	5	7	7	7	7	45	0.918367
7	5	5	7	7	7	7	45	0.918367
7	6	5	6	6	6	6	42	0.857143
6	5	6	7	6	6	3	39	0.795918
5	6	6	6	6	1	1	31	0.632653
7	7	5	7	5	6	6	43	0.877551
0	1		0	0	0	0	1	0.020408
6	5	5	6	6	6	6	40	0.816327
6	5	6	6	7	6	6	42	0.857143
3	3	4	4	5	5	4	28	0.571429
6	6	6	6	7	6	6	43	0.877551
6	7	7	6	7	6	6	45	0.918367
6	6	5	6	6	6	6	41	0.836735
6	6	5	6	6	7	7	43	0.877551
6	5	5	6	6	6	6	40	0.816327
6	5	6	6	6	6	6	41	0.836735
6	7	5	6	7	6	7	44	0.897959
6	5	5	6	6	6	7	41	0.836735
6	6	6	6	7	6	7	44	0.897959
6	5	3	5	5	6	6	36	0.734694
6	6	5	5	6	1	6	35	0.714286
6	6	6	7	7	7	7	46	0.938776
6	6	6	6	6	6	6	42	0.857143
6	6	7	7	7	6	7	46	0.938776
6	6	6	6	7	6	6	43	0.877551

5	5	5	6	5	6	6	38	0.77551
7	6	6	6	7	6	6	44	0.897959
4	3	2	4	3	4	5	25	0.510204
7	6	6	6	7	6	6	44	0.897959
6	6	6	5	6	6	6	41	0.836735
6	6	6	6	6	7	6	43	0.877551
6	6	6	6	7	6	6	43	0.877551
6	6	6	6	6	7	6	43	0.877551
7	6	6	7	7	7	7	47	0.959184
6	5	7	6	6	6	6	42	0.857143
7	3	6	6	7	7	6	42	0.857143
6	5	6	6	6	6	6	41	0.836735
7	3	7	7	7	7	7	45	0.918367
7	7	7	7	7	7	7	49	1
7	2	6	6	7	7	7	42	0.857143
7	5	7	7	7	5	7	45	0.918367
0	0	0	0	0	0	0	0	0
7	6	6	6	7	7	6	45	0.918367
7	7	7	7	7	7	7	49	1
7	7	6	7	7	7	7	48	0.979592
5	5	3	5	6	5	5	34	0.693878
								0
7	6	6	7	7	7	7	47	0.959184
5	5	5	6	0	5	5	31	0.632653
5	5	5	7	5	5	6	38	0.77551
3	1	4	5	6	6	5	30	0.612245
7	5	5	6	1	3	5	32	0.653061
6	5	6	7	6	6	5	41	0.836735
7	7	7	7	7	7	7	49	1
6	6	6	7	7	7	6	45	0.918367
6	5	6	5	7		7	36	0.734694
5	5	5	6	6	5	5	37	0.755102
7	3	7	7	7	7	7	45	0.918367
5	5	5	5	6	6	6	38	0.77551
5	7	5	7	6		5	35	0.714286
7	5	7	6	6	5	1	37	0.755102
5	5	5	6	6	5	5	37	0.755102
2	3	4	5	6	4	5	29	0.591837
6	6	6	7	7	7	6	45	0.918367
5	4	7	5	6	6	7	40	0.816327

3	3	3	5	5	5	6	30	0.612245
3	5	6	6	6	7	7	40	0.816327
7	5	5	6	1	3	5	32	0.653061
3	3	3	5	5	5	6	30	0.612245
7	6	7	7	7	7	7	48	0.979592
5	2	5	7	5	5	5	34	0.693878
5	5	5	6	5	5	2	33	0.673469
5	5	5	5	6	5	5	36	0.734694
0	1	0	0	0	0	5	6	0.122449
2	3	0	0	0	5	5	15	0.306122
7	5	6	7	7	6	7	45	0.918367
5	0	5	6	0	0	0	16	0.326531
7	6	6	6	6	7	6	44	0.897959
5	0	5	6	0	0	0	16	0.326531
5	5	4	6	0	5	7	32	0.653061
6	5	7	6	6	6	6	42	0.857143
6	5	6	6	6	6	6	41	0.836735
7	6	7	7	7	7	7	48	0.979592
0	1	0	0	0	0	0	1	0.020408
6	6	6	7	6	6	6	43	0.877551
0	0	0	0	0	0	0	0	0
7	6	7	7	7	7	7	48	0.979592
0	0	0	0	0	0	0	0	0
7	3	7	7	7	7	7	45	0.918367
7	6	6	6	7	7	6	45	0.918367
0	0	0	0	0	0	0	0	0
7	5	7	7	6	6	7	45	0.918367
7	6	7	7	7	7	7	48	0.979592
7	6	6	6	7	7	6	45	0.918367
5	5	6	6	6	7	5	40	0.816327
6	7	6	6	6	7	7	45	0.918367
5	5	5	7	5	5	4	36	0.734694
0	1	0	0	0	0		1	0.020408
0	1	0	0	0	0	0	1	0.020408
6	6	6	7	6	6	6	43	0.877551
0	0	0	0	0	0	0	0	0
7	6	7	7	7	7	7	48	0.979592
0	0	0	0	0	0	0	0	0
7	3	7	7	7	7	7	45	0.918367
7	5	7	7	5	6	7	44	0.897959

6	5	5	6	6	6	6	40	0.816327
0	0	0	0	0	0	0	0	0
7	3	7	6	6	6	6	41	0.836735
0	0	0	0	0	0	0	0	0
6	6	7	7	7	7	7	47	0.959184
0	0	0	0	0	0	5	5	0.102041
7	7	7	7	6	7	7	48	0.979592
0	0	0	0	0	0	0	0	0
7	6	7	7	6	6	6	45	0.918367
6	5	6	6	6	6	6	41	0.836735
6	1	7	7	7	7	7	42	0.857143
7	6	7	6	6	7	7	46	0.938776
6	6	6	6	7	6	6	43	0.877551
7	7	7	7	7	6	6	47	0.959184
0	0	0	0	0		0	0	0
0	1	4	0	0	0	0	5	0.102041

Table 4.59 Values of Behavioral Intention to Use Technology(X_6) among MSEs in Agro-food Industry

								X6
2	2	6	6	6	2	6	30	0.612245
2	6	6	2	6	6	6	34	0.693878
2	2	3	6	2	6	6	27	0.55102
3	4	3	3	5	4	4	26	0.530612
2	3	3	3	3	3	3	20	0.408163
6	6	6	3	2	1	2	26	0.530612
5	6	6	4	6	7	6	40	0.816327
3	2	3	5	5	5	5	28	0.571429
3	2	3	5	3	3	5	24	0.489796
1	6	1	4	4	6	6	28	0.571429
2	2	6	5	3	6	6	30	0.612245
4	4	6	4	4	4		26	0.530612
4	4	6	4	4	4		26	0.530612
2	7	6	6	2	2	2	27	0.55102
7	2	4	6	3	5	2	29	0.591837
3	6	6	6	3	6	6	36	0.734694
3	2	7	6	3	3	7	31	0.632653
6	5	3	2	6	5	2	29	0.591837
4	2	5	5	4	6	5	31	0.632653
4	5	6	7	2	7	6	37	0.755102
	6	2	5	2	6	5	26	0.530612
5	5	5	6	4	6	7	38	0.77551
3	6	7	6	7	7	6	42	0.857143
6	6	6	6	3	6	7	40	0.816327
5	4	6	5	4	6	7	37	0.755102
6	2	6	6	3	6	6	35	0.714286
2	6	7	6	7	7	7	42	0.857143
5	2	6	7	3	6	7	36	0.734694
5	6	6	7	5	6	7	42	0.857143
7	7	6	7	6	6	6	45	0.918367
5	4	5	6	6	6	4	36	0.734694
2	5	6	5	2	6	7	33	0.673469
6	5	6	7	5	7	7	43	0.877551
5	6	6	7	5	7	6	42	0.857143
6	6	6	6	7	7	6	44	0.897959
7	7	6	6	7	5	4	42	0.857143

4	6	6	7	6	6	7	42	0.857143
4	7	6	7	2	6	7	39	0.795918
2	3	6	7	2	6	7	33	0.673469
4	7	6	7	2	6	7	39	0.795918
6	6	6	7	3	6	6	40	0.816327
6	6	6	7	5	6	7	43	0.877551
5	6	7	7	6	6	7	44	0.897959
6	6	6	7	5	6	7	43	0.877551
3	7	7	5	5	6	6	39	0.795918
6	5	5	6	4	4	7	37	0.755102
6	7	7	6	3	3	7	39	0.795918
3	4	6	6	7	3	6	35	0.714286
1	3	7	4	3	4	3	25	0.510204
6	7	5	6	5	4	7	40	0.816327
5	6	7	7	6	3	7	41	0.836735
5	4	5	6	3	4	7	34	0.693878
3	6	6	5	3	7	7	37	0.755102
6	5	5	6	4	2	6	34	0.693878
6	7	7	6	6	7	7	46	0.938776
4	4	6	7	6	7	7	41	0.836735
4	4	6	5	5	6	6	36	0.734694
								0
3	7	7	5	5	5	7	39	0.795918
3	5	5	5	4	6	6	34	0.693878
6	5	5	5	6	5	4	36	0.734694
4	6	6	4	5	5	4	34	0.693878
6	6	7	6	6	5	7	43	0.877551
6	5	5	6	6	5	6	39	0.795918
4	5	7	7	6	6	7	42	0.857143
5	6	6	6	6	6	6	41	0.836735
6	4	6	7	5	6	5	39	0.795918
3	5	5	5	4	6	6	34	0.693878
1	3	7	4	3	4	3	25	0.510204
6	6	6	7	6	6	6	43	0.877551
5	5	6	6	5	7	7	41	0.836735
5	5	6	6	5	7	7	41	0.836735
7	5	5	5	4	6	6	38	0.77551
4	6	7	6	6	4	7	40	0.816327
6	6	6	6	6	6	6	42	0.857143
	5	6	4	5	5	4	29	0.591837

4	5	6	6	5	6	7	39	0.795918
2	5	6	5	7	6	6	37	0.755102
6	6	7	6	6	5	7	43	0.877551
4	5	6	6	5	6	7	39	0.795918
6	5	6	6	4	4	7	38	0.77551
6	5	6	6	5	7	7	42	0.857143
7	6	6	6	6	7	7	45	0.918367
7	5	5	6	5	5	4	37	0.755102
5	3	6	6	5	6	7	38	0.77551
6	7	6	4	4	6	4	37	0.755102
7	5	4	5	7	6	5	39	0.795918
4	3	4	7	2	3	4	27	0.55102
5	4	6	6	3	3	7	34	0.693878
3	4	7	2	3	4	2	25	0.510204
5	6	6	5	5	6	6	39	0.795918
6	5	5	6	4	4	7	37	0.755102
3	4	6	6	7	3	6	35	0.714286
4	4	5	6	3	4	7	33	0.673469
6	3	6	6	5	5	7	38	0.77551
4	5	6	5	4	3	7	34	0.693878
7	5	5	6	4	6	7	40	0.816327
5	6	5	6	5	4	7	38	0.77551
5	6	6	5	3	3	7	35	0.714286
1	3	7	4	3	4	3	25	0.510204
5	4	6	6	3	3	7	34	0.693878
5	6	7	6	4	4	7	39	0.795918
6	5	4	3	5	3	7	33	0.673469
5	4	4	5	6	3	4	31	0.632653
6	5	5	6	4	2	6	34	0.693878
2	5	6	5	7	7	6	38	0.77551
6	6	5	5	6	4	2	34	0.693878
4	5	7	7	6	1	5	35	0.714286
6	3	6	6	5	5	7	38	0.77551
6	3	6	6	5	5	7	38	0.77551
4	5	6	5	4	3	7	34	0.693878
7	5	5	6	4	6	7	40	0.816327
5	6	5	6	5	4	7	38	0.77551
5	6	6	5	3	3	7	35	0.714286
1	3	7	4	3	4	3	25	0.510204
6	5	4	6	3	3	7	34	0.693878

4	5	7	6	2	5	7	36	0.734694
3	5	7	6	4	4	7	36	0.734694
6	6	4	6	7	4	7	40	0.816327
6	5	5	7	4	3	7	37	0.755102
6	5	6	7	4	4	7	39	0.795918
6	6	7	6	4	4	7	40	0.816327
5	4	6	7	4	3	7	36	0.734694
6	6	6	6	4	3	7	38	0.77551
6	6	5	6	4	4	7	38	0.77551
6	6	5	6	4	4	7	38	0.77551
5	5	6	4	4	7	7	38	0.77551
5	4	5	6	4	3	7	34	0.693878
6	6	7	7	4	3	6	39	0.795918
6	5	7	7	5	3	7	40	0.816327
4	4	6	5	3	5	7	34	0.693878
6	3	6	5	3	4	6	33	0.673469

Table 4.60: Values of Combined TAM Predictors(X_8) among MSEs in Agro-food Industry

X4	X5	X6		X8
0.542857	0.877551	0.612245	2.032653	0.677551
0.685714	0.857143	0.693878	2.236735	0.745578
0.485714	0.714286	0.55102	1.75102	0.583673
0.057143	0.265306	0.530612	0.853061	0.284354
0.428571	0	0.408163	0.836734	0.278911
0.685714	0.918367	0.530612	2.134693	0.711564
0.428571	0.795918	0.816327	2.040816	0.680272
0.6	0.755102	0.571429	1.926531	0.642177
0.6	0.755102	0.489796	1.844898	0.614966
0.428571	0.877551	0.571429	1.877551	0.62585
0.714286	0.877551	0.612245	2.204082	0.734694
0.771429	0.918367	0.530612	2.220408	0.740136
0.771429	0.918367	0.530612	2.220408	0.740136
0.4	0.857143	0.55102	1.808163	0.602721
0.6	0.795918	0.591837	1.987755	0.662585
0.885714	0.632653	0.734694	2.253061	0.75102
0.542857	0.877551	0.632653	2.053061	0.684354
0.4	0.020408	0.591837	1.012245	0.337415
0.542857	0.816327	0.632653	1.991837	0.663946
0.771429	0.857143	0.755102	2.383674	0.794558
0.514286	0.571429	0.530612	1.616327	0.538776
0.685714	0.877551	0.77551	2.338775	0.779592
0.657143	0.918367	0.857143	2.432653	0.810884

0.571429	0.836735	0.816327	2.224491	0.741497
0.4	0.877551	0.755102	2.032653	0.677551
0.771429	0.816327	0.714286	2.302042	0.767347
0.8	0.836735	0.857143	2.493878	0.831293
0.714286	0.897959	0.734694	2.346939	0.782313
0.685714	0.836735	0.857143	2.379592	0.793197
0.685714	0.897959	0.918367	2.50204	0.834013
0.428571	0.734694	0.734694	1.897959	0.632653
0.514286	0.714286	0.673469	1.902041	0.634014
0.685714	0.938776	0.877551	2.502041	0.834014
0.571429	0.857143	0.857143	2.285715	0.761905
0.542857	0.938776	0.897959	2.379592	0.793197
0.714286	0.877551	0.857143	2.44898	0.816327
0.542857	0.77551	0.857143	2.17551	0.72517
0.771429	0.897959	0.795918	2.465306	0.821769
0.342857	0.510204	0.673469	1.52653	0.508843
0.771429	0.897959	0.795918	2.465306	0.821769
0.542857	0.836735	0.816327	2.195919	0.731973
0.628571	0.877551	0.877551	2.383673	0.794558
0.714286	0.877551	0.897959	2.489796	0.829932
0.628571	0.877551	0.877551	2.383673	0.794558
0.685714	0.959184	0.795918	2.440816	0.813605
0.828571	0.857143	0.755102	2.440816	0.813605
0.828571	0.857143	0.795918	2.481632	0.827211
0.771429	0.836735	0.714286	2.32245	0.77415
0.885714	0.918367	0.510204	2.314285	0.771428

1	1	0.816327	2.816327	0.938776
0.971429	0.857143	0.836735	2.665307	0.888436
1	0.918367	0.693878	2.612245	0.870748
0	0	0.755102	0.755102	0.251701
0.857143	0.918367	0.693878	2.469388	0.823129
0.657143	1	0.938776	2.595919	0.865306
0.714286	0.979592	0.836735	2.530613	0.843538
0.571429	0.693878	0.734694	2.000001	0.666667
0	0	0	0	0
0.685714	0.959184	0.795918	2.440816	0.813605
0.628571	0.632653	0.693878	1.955102	0.651701
0.771429	0.77551	0.734694	2.281633	0.760544
0.771429	0.612245	0.693878	2.077552	0.692517
0.628571	0.653061	0.877551	2.159183	0.719728
0.628571	0.836735	0.795918	2.261224	0.753741
0.657143	1	0.857143	2.514286	0.838095
0.714286	0.918367	0.836735	2.469388	0.823129
0.885714	0.734694	0.795918	2.416326	0.805442
0.628571	0.755102	0.693878	2.077551	0.692517
0.742857	0.918367	0.510204	2.171428	0.723809
0.828571	0.77551	0.877551	2.481632	0.827211
0.885714	0.714286	0.836735	2.436735	0.812245
0.857143	0.755102	0.836735	2.44898	0.816327
0.628571	0.755102	0.77551	2.159183	0.719728
0.428571	0.591837	0.816327	1.836735	0.612245
0.714286	0.918367	0.857143	2.489796	0.829932

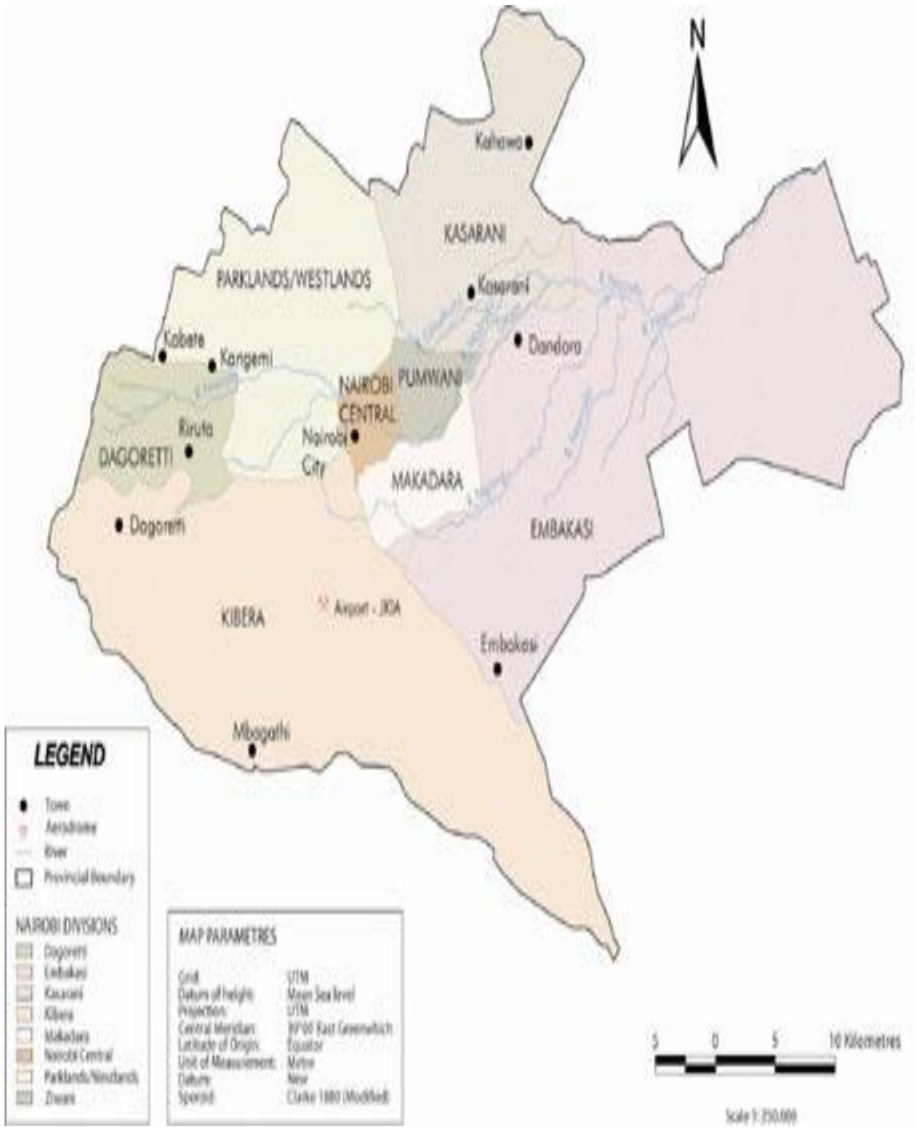
0.514286	0.816327	0.591837	1.92245	0.640817
0.6	0.612245	0.795918	2.008163	0.669388
0.628571	0.816327	0.755102	2.2	0.733333
0.628571	0.653061	0.877551	2.159183	0.719728
0.6	0.612245	0.795918	2.008163	0.669388
1	0.979592	0.77551	2.755102	0.918367
0.771429	0.693878	0.857143	2.32245	0.77415
0.4	0.673469	0.918367	1.991836	0.663945
0.771429	0.734694	0.755102	2.261225	0.753742
0.4	0.122449	0.77551	1.297959	0.432653
0.228571	0.306122	0.755102	1.289795	0.429932
0.714286	0.918367	0.795918	2.428571	0.809524
0.628571	0.326531	0.55102	1.506122	0.502041
0.828571	0.897959	0.693878	2.420408	0.806803
0.457143	0.326531	0.510204	1.293878	0.431293
0.828571	0.653061	0.795918	2.27755	0.759183
0.828571	0.857143	0.755102	2.440816	0.813605
0.771429	0.836735	0.714286	2.32245	0.77415
0.942857	0.979592	0.673469	2.595918	0.865306
0	0.020408	0.77551	0.795918	0.265306
0.857143	0.877551	0.693878	2.428572	0.809524
0	0	0.816327	0.816327	0.272109
1	0.979592	0.77551	2.755102	0.918367
0	0	0.714286	0.714286	0.238095
0.742857	0.918367	0.510204	2.171428	0.723809
0.828571	0.918367	0.693878	2.440816	0.813605

0	0	0.795918	0.795918	0.265306
0.714286	0.918367	0.673469	2.306122	0.768707
0.942857	0.979592	0.632653	2.555102	0.851701
0.857143	0.918367	0.693878	2.469388	0.823129
0.742857	0.816327	0.77551	2.334694	0.778231
0.8	0.918367	0.693878	2.412245	0.804082
0.742857	0.734694	0.714286	2.191837	0.730612
0	0.020408	0.77551	0.795918	0.265306
0	0.020408	0.77551	0.795918	0.265306
0.857143	0.877551	0.693878	2.428572	0.809524
0	0	0.816327	0.816327	0.272109
1	0.979592	0.77551	2.755102	0.918367
0	0	0.714286	0.714286	0.238095
0.742857	0.918367	0.510204	2.171428	0.723809
0.771429	0.897959	0.693878	2.363266	0.787755
0.885714	0.816327	0.734694	2.436735	0.812245
0	0	0.734694	0.734694	0.244898
0.857143	0.836735	0.816327	2.510205	0.836735
0	0	0.755102	0.755102	0.251701
0.942857	0.959184	0.795918	2.697959	0.89932
0	0.102041	0.816327	0.918368	0.306123
0.771429	0.979592	0.734694	2.485715	0.828572
0	0	0.77551	0.77551	0.258503
0.771429	0.918367	0.77551	2.465306	0.821769
0.914286	0.836735	0.77551	2.526531	0.842177
0.914286	0.857143	0.77551	2.546939	0.84898

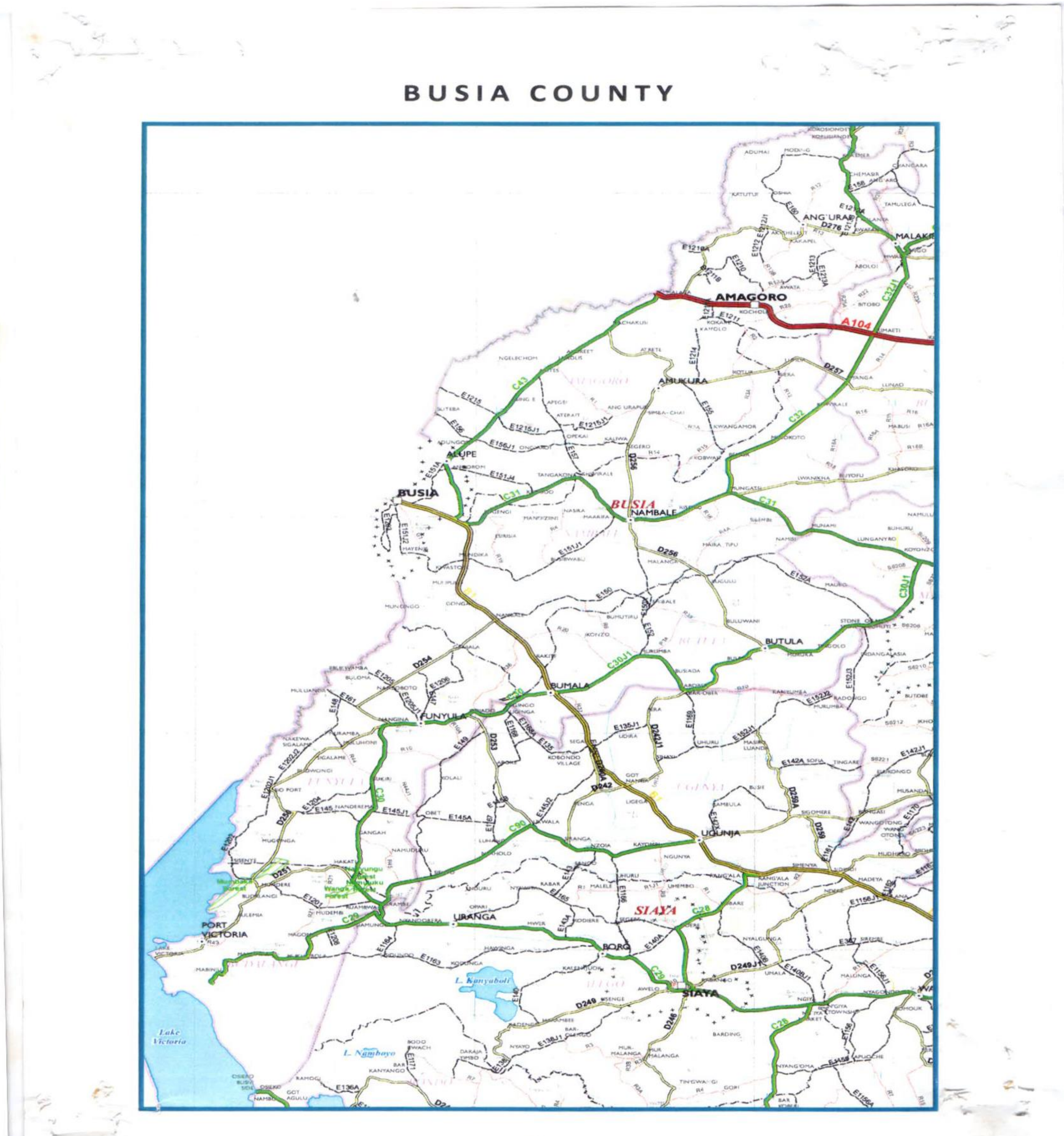
0.971429	0.938776	0.693878	2.604083	0.868028
0.742857	0.877551	0.795918	2.416326	0.805442
0.971429	0.959184	0.816327	2.74694	0.915647
0	0	0.693878	0.693878	0.231293
0.342857	0.102041	0.673469	1.118367	0.372789

Maps

Nairobi City County Map



Busia County Map



Kisumu County Map