UNIVERSITY OF NAIROBI
SCHOOL OF COMPUTING AND INFORMATICS

A FRAMEWORK FOR ADOPTION OF E-AGRICULTURAL INFORMATION SERVICES BY ENTERPRENEURAL YOUTHS IN KIAMBU, A CASE OF KIKUYU SUB-COUNTY

BY

PATRICK ODUOR OWINO

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DECLARATION

This Project report is my original work and has not been presented for any award in any other University.

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Patrick Oduor Owino **Date**

P56/P/7347/2005

This Project report has been submitted for examination with my approval as the University Supervisor**.**

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Dr. Elisha T. Opiyo Omulo **Date**

Senior Lecturer

School of Computing and Informatics, University of Nairobi

DEDICATION

I dedicate this work to the many unemployed youths within the age of 15 to 34 whose plight inspired me to think of carrying out this study.

ABSTRACT

Youth unemployment is a major challenge to many developing Nations like Kenya, yet the youths have little interest in agriculture, and there is little or no effort to entice them towards agriculture using technological innovations. The need to reverse the youth's mind set and harness their passions and energy by re-directing it towards agricultural production is what necessitated this study. The main objective of the study was to formulate a framework for adoption of e-Agricultural Information Services (eAIS) by the youths out of school, who are aged 15 to 34 years. The aim was to re-direct their passions towards agriculture with enhanced knowledge and efficiency. The study adopted descriptive research design and Extended Technology Acceptance Model by Rongers (2003). Primary data was collected by a pre-tested semi structured questionnaires on 111 youths using simple random sampling method across active farming youth groups within Kikuyu Sub-county. Secondary data was gathered from reliable sources such as government agricultural reports, journals and e-resources. Content analysis was used to analyse respondent's views on the Framework for adoption of eAIS. Descriptive statistics such as means, modes, frequencies and standard deviations were generated using SPSS and Smart PLS 2.0 M3. Graphical presentations such as charts, graphs, frequency tables and others were used as appropriate. Completely coded dataset in SPSS was transferred to Smart PLS SEM, a Partial List Square Structural Equation Modeling tool. The tool was used to model the framework, to estimate path coefficients or weights, to investigate the interactions between dependent and independent variables and possible associations established. Statistical significance testing of the relationships between variables and/or the hypotheses revealed that, for $0<p<0.05$, the following null hypotheses were rejected. *H02*: JR does not influence PU, *H03*: Image does not influence PU, H05a: Experience does not influence PU, *H06a*: PEOU does not influence PU, *H05b*: Experience does not moderate SAN, *H06b*: PEOU does not influence ITU, *H010*: TOS does not influence ITU, *H012*: ITU does not influence UB and *H013*: UB does not influence Adoption of eAIS. The following null hypotheses were accepted for $p>0.05$: ***H01*:** OQ does not influence PU, ***H04*:** SAN does not influence PU, ***H07*:** Voluntariness does not moderate SAN, ***H08*:** PU does not influence ITU, ***H09*:** SAN does not influence ITU and ***H011*:** Connectivity does not influence ITU. The study concluded that the framework was composed of experience moderated SAN, Experience, Image, JR and TOS and all the TAM constructs. The study further concluded that from the eAIS adoption conceptual framework's Output quality, moderating factor Voluntariness, Connectivity, the relationship between SAN and PU and the relationship between SAN and ITU were eliminated. The study also concluded that there were challenges that faced the respondents and the study itself. The results of analysis were used to formulate a framework for adoption of eAIS. The framework was for guiding the youths of Kikuyu Sub-county into adopting e-Agricultural Information Services (eAIS). The findings can further be useful to the Sub-county and County Agricultural Officers for disseminating agricultural information, for strategic planning and development by the Counties, National Government, policy makers and NGOs. The research recommends further studies to validate the inclusion of TOS into the framework and the elimination of some constructs and relationships of the extended TAM from the frame work with respect to the formulated eAIS model.

LIST OF ACRONYMS AND ABBREVIATIONS

AIS	- Agricultural Information Services
AES	- Agricultural Extension Services
AEW	- Agricultural Extension Worker
APA	- American Psychological Association, citing style.
AI	- Artificial Insemination(r)
AMITSA	- Web and Mobile based Market Information System on Agro-inputs
CIA	- Central Intelligence Agency World Fact Book
CD	- Compact Disk
COMESA	- Common Market for Eastern and Southern Africa
DVD	- Digital Versatile Disc or Digital Video Disk
EAC	- East Africa Community
eAIS	- e-Agricultural Information Services
Esoko	- Esoko is a simple powerful cell phone communication tool for businesses projects, NGOs and governments to connect with farmers in Africa
FFD	- Farmers Field Days
Fig	- Figure
GDP	- Gross Domestic Product
GSM	- Global System for Mobile Communication
GSMA	- Group Special Mobile Association
4-H	- 4 Health areas (Plant, Human, Animal and Environmental)
ICT	- Information Communication and Technology

ICT4D - Information Communication and Technology for Development

IFDC - IFDC - International Fertilizer Development Center

ITU - Intention To Use

ISO - International Standards Organization

JR - Job Relevance

KNBS - Kenya National Bureau of Statistics

Ksh. - Kenya Shillings

KDP - Kenya Demographic Profile

KCGR - Kiambu County Government Report

MOALF - Ministry of Agriculture Livestock and Fisheries

NAFIS - National Agricultural Farmers Information System

NCCK - National Communication Council of Kenya

NGOs - Non Governmental Organisations

OQ - Output Quality

PU - Perceived Usefulness

PEOU - Perceived Ease Of Use

SMS - Short Message Service

SME - Small and Medium Enterprises

Smart PLS - Smart Partial Least Squares

SQ. KM - Square Kilometers

SPSS - Statistical Package for Social Sciences

SEM - Structural Equation Modeling

SAN - Subjective Adoption Norm

TAM - Technology Acceptance Model

TOF - The Organic Farmer

TRA - Theory of Reasoned Action

TPB - The theory of Planned Behavior

T&V - Training and Visits

TOS - Type of e-Service

UTAUT - Unified Theory of Acceptance and Use of Technology

UB - User Behavior

Vet - Veterinary doctor

WSIS - World Summit on Information Society

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CHAPTER 1

INTRODUCTION

1.1 Background Information

In Africa 200 million people are aged between 15 and 24 years, comprising more than 20% of the population. On average 74% of the youth population in Africa lives on less than US$2 per day lacking the resources and skills to be competitive. Majority of the youths (70%) reside in rural areas and most of those employed work primarily in the agricultural sector, where they account for 65% of the work force. Young African men and women are critical to the development of agriculture in Africa and for efforts to ensure food security. They are the future farmers, future policy makers, future leaders, future researchers and future drivers of Africa's social and economic development! (CIA World Fact Book, 2014). Considering the competitive nature of global agricultural markets, with changing technologies, demands for quality and standards, there is the need to change labour composition of the agricultural sector from the ageing population to the vibrant and energetic ones.

1.2 Problem Statement

The youths in Kenya have little interest in farming as they prefer white-collar jobs which are "clean" and interesting. Currently less than 10% of the youths are involved in agricultural activities leaving farm work to the elderly population whose economic productivity is low. Due to Kenya's highly competitive educational system, most youths have high expectations which encourage them to disregard manual and agricultural work in favor of scarce white collar jobs. (Ministry of Agriculture, Livestock and Fisheries, 2013). There is however, little effort to reverse the mind-set of the youths through innovations, to harness their passions and energy and re-directing it towards agricultural production and agri-business. Further more little is known of the existing frameworks for adoption of e-agricultural information services for the entrepreneurial youths in Kikuyu sub-county.

1.3 Goal of the study

The overall objective of this project was to design a framework for adoption of e-agricultural information services (eAIS) by the entrepreneurial youths in Kikuyu sub-county, in Kiambu.

1.4 Specific Objectives

a) Examine technology adoption models, to inform the development of an adoption framework.
b) Determine the extent to which e-agricultural information services are perceived to be useful to the entrepreneurial farming youth communities in Kikuyu sub-county.
c) Formulate a framework for e-agricultural information services that guides the youths into adopting e-agricultural information services.

1.5 Significance of Study

The researcher used the findings of the study to design a framework for adoption of e-agricultural information services, which was to guide the farming youths of Kikuyu sub-county into adopting e-agricultural information services in their farming activities. The findings could be also useful to the County Agricultural Officers for disseminating agricultural information. National Government policy makers and NGOs could also use the results for strategic planning and development. The findings of the study provide baseline data for policy makers and developmental agencies for planning agricultural projects.

1.6 Scope of Study

The study involved all entrepreneurial farming youths within the age brackets of 15 to 34 years, predominantly the youths out-of- School.

1.7 Limitation of Study

The study majorly concentrated in Kikuyu, a sub-county of Kiambu county and hence the generalization of the results should be done with caution.

CHAPTER 2

LITERATURE REVIEW

2.1 Background Information

In the present era, the entire world is focusing on agricultural development because of increased population and un-employment, and a decreased agricultural production. Reason for decrease in production of agricultural products differs from place to place. The trouble-free access of farmers to agricultural inputs and information has been possible because of the transformation in the agricultural sector through ICT. Youths in agriculture and farmers can receive subsidies on fertilizers and information about price and weather directly through a web-based system or mobile phone based services. In India, the government has made remarkable achievements especially in the area of agriculture by giving various facilities to the farmers in which the ICT services is key helping the farmers to understand the modern cultivation methods, availability of agriculture inputs, irrigational sources, availability of pesticide and fertilizers for increasing the production and productivity of crops. India is a developing economic country where agriculture forms the backbone of the economy (Kumar and Sankarakumar, 2012).

2.1.1 Agricultural Information and E-Agricultural Information Services

Agricultural extension services provide critical access to the knowledge, information and technology that farmers require to improve the productivity and thus improve the quality of their lives and livelihoods. It is hence crucial to provide farmers with the knowledge and information of quality and in a timely way. Although some ground-breaking tools like the tele-centers can serve as major catalysts for information, knowledge and development opportunities, the access for farmers in remote villages is restricted due to the lack of infrastructure (UN, 2005).

2.1.2 Agricultural Information Services

The findings by Xiaolan Fu and Shaheen Akter (2006), show that the amount and quality of the agricultural information services and the speed of services delivery improves significantly as a result of the intervention of ICT enabled services such as the mobile phone technology which enhanced agricultural extension services delivery in India.

There are also indirect benefits from this ICT-enhanced services delivery system not only in greater awareness and knowledge in agriculture technology and information but also in terms of farmers'

attitudes towards trying new technology and new ways of life in the future. Evidence from the evaluation suggests that the less privileged farmers benefit more from this intervention than those who are better off.

Global attention came back to agriculture due to the price hike in recent years, resulting partly from long-standing negligence on diffusion of appropriate technology that stagnated production in the face of a rising population. Increasing production is a major challenge facing present agriculture. Smallholder farmers which dominate the landscape of developing world need to improve farming through acquiring adequate knowledge and information (UN, 2005). Agricultural extension services provide critical access to the knowledge, information and technology that farmers require to improve their productivity and thus improve the quality of their lives and livelihoods.

2.1.3 Agricultural extension services

Agricultural extension services include transferring knowledge to farmers, advising and educating farmers in their decision making, enabling farmers to clarify their own goals and possibilities, and stimulating desirable agricultural developments. Agricultural extension services provide the means through which agricultural information is disseminated to the farmers. Traditional public-sector extension services use a variety of extension programmes to overcome barriers to technological adoption without much success (Anderson and Feder, 2004, Anandajayasekeram et al. 2008 and Aker, 2010). Historically, agricultural service delivery in developing countries started with production-oriented limited extension services for export crops. The attention was diverted in the fifties to food production and improved farming techniques (Anandajayasekeram et al. 2008). In the 1960s US-led 'technology transfer model' employed a large number of extension agents to provide extension services. Many variants of approaches of models and methods have since then emerged to connect researchers, extension officers, farmers and consumers (Anderson and Feder, 2004).

The World Bank sponsored Training and Visit (T&V) extension model, Farmers Field Schools (FFS) and fee-for-services are the most common approaches. In the T&V and FFS systems, extension workers passed information to selected contact farmers who shared information with other farmers (Anderson & Feder, 2004). It is widely accepted that extension services are an important element within the array of market and non-market entities and agents that provide human capital-enhancing inputs, as well as flows of information that can improve farmers' and other rural peoples' welfare. However, these services

delivery models are also subject to criticisms, for example, poor and marginalized farmers in remote villages remain beyond the reach of appropriate services due to poor infrastructure (UN, 2005).

2.1.4 E-Agricultural Information Services

In India mobile phone penetration has been growing rapidly even in the remote rural areas. The unprecedented speed of adoption of mobile phone technology has raised the general expectations about its potential contributions to spread of innovative farming technology, as well as farmers' knowledge and awareness of other relevant knowledge and information. There are important questions however, that still require answers, and for example the impact of mobile phone technology on the agricultural extension services delivery and impact on farmers' attitudes to new agricultural technology in the future. The normal assessment method is often subject to serious selection bias (Heeks and Molla, 2009).

In addition to the normal question regarding the impact on the speed, quality and volume of services delivery, it is also important to understand the influence of the experience on farmers' knowledge of agricultural technology and their attitudes towards future adoption of new technology. It is widely expected to be a useful tool contributing to development around the world (UNDP, 2001; Friedman, 2005).

It is found that ICT allows efficient and transparent storage, processing and communication of information and that entrepreneurial innovation in this field may affect economic and social change (Kaushik and Singh, 2004). Growth in ICT investment is also found to be positively associated with growth in both GDP and productivity in Asia-Pacific countries for the period 1984-1990 (Kraemer and Dedrick, 1994). It is increasingly recognized that ICT is necessary for accessing required information and knowledge (Anandajayasekeram et al. 2008; Mcnamara 2009; Aker 2010). ICT kiosks, ICT-equipped intermediary organizations and mobile phones are expected to play an important role in strengthening the information and knowledge-sharing on which agricultural innovations depend.

ICT would enable extension workers to gather, store, retrieve and disseminate a broad range of information needed by small producers such as information on best practices, new technology, better prices of inputs and outputs, better storage facilities, improved transportation links, collective negotiations with buyers, information on weather and such like.

Scaling up of delivery though, still remains at experimental stage. Although farmers have the real need to access market information, land records and services, accounting and farm management information,

management of pests and diseases, rural development programmes and ICT could help accessing these services, ICT projects dealing in such services are still limited. Moreover, Heeks and Molla (2009) find in their ICT evaluation compendium that ICT is not fully utilized in agriculture.

Mobile phone technology has been diffused rapidly in the rural areas of the developing countries in recent years and Kenya is no exception. It has the advantage over other ICT tools in terms of its appropriateness for the under-developed local conditions. Other than mobile phones, other ICT tools suffers from the problem of feasibility for the poor in geographically disadvantaged areas because of lack of enabling environments such as infrastructure and capital. For example Internet enhanced technologies are not appropriate in the areas lacking electricity and network infrastructure. On the contrary, mobile phone technology has much less requirement on the infrastructure and hence wider applicability. Mobile phones enable both audio and video functions which can meet most of the basic needs of the poor.

The expected promise though, is not always delivered, a common phenomenon in ICT. Chowdhury (2006) finds a negative effect of ICT investment on the labour productivity of East African SMEs. This is most likely due to low cost of labour relative to capital in East Africa, which prevents substitutability being a profit maximizing approach. Moreover, a lack of knowledge of best practices in IT usage as well as IT-related skill deficiencies in the workforce will also constrain the benefits from ICT, as argued by Kaushik and Singh (2004) from the case studies they undertook in North India. The digital divide is not merely a problem of access to ICT, it is part of a larger developmental problem in which vast sections of the world's population are deprived of the capabilities necessary to use ICTs, acquire information and convert it into useful knowledge. Balanced growth is needed and pertinent structural issues must be solved to make ICT-induced development more relevant to the concerned groups (Parayil, 2005).

2.2 The Interaction between Agricultural Practice and Technology

2.2.1 The Web and Agricultural Entrepreneurs

In Nigeria and West Africa agro-based web information reached 1.5 million farmers including the youth in agriculture and 7.5million felt the impact in the first year. A data base of farmers was developed with 10 million registered. Sadaf et al. (2006) in his research stressed that encouragement to utilize ICT is important due to fact that some agriculture community still use traditional ways by relying on their neighbours, family and fellow farmers in getting agriculture information. According to Barton (2003), the website provides farmers with the ability to communicate over long distances with other farmers,

agribusiness and universities. In fact, website is considered to be one of the most popular online services for farmers, considering that it is often cheaper than the telephone. Based on the facts given, there is a lot of website surfing advantages, but do farming youth entrepreneurs in Kenya utilize these advantages for the profits of their farming enterprises. The aim of this study is more of enticing the young farmers to website surfing for farming information and knowledge.

2.2.2 Surfing and Agricultural Entrepreneurs

According to Muske et al. (2004), agro-based entrepreneurs agreed that possessing and surfing website will increase their agro-business profits. Surfing website is a great advantage, but according to Ohmart (2002), some challenges to surf website identified are the safety and reliability of using the website, some of them found to have concern to conduct transactions through the website. Some of them also claim that surfing the website is not cost effective. Mishra and Williams (2006), suggested that adoption of computers with internet access allowed website surfing activity and it is positively related to age and educational level of the operator, off-farm business income, presence of a spouse and regional location of the farm and this is supported by a research done by Burke and Sewake (2008), who claimed that those with higher education level prefer to own and surf website for their enterprises. Referring to Arokoyo (2008), factor of ICT readiness of the country and the major stakeholders in the agricultural sector, was found to be a limiting factor for effective ICT use. Thus, this study was to reveal that web surfing is one of the e-services that can influence farming for the youths in Kikuyu sub-county.

2.2.3 ICT and Agriculture

Information Communication Technology (ICT) offers an abundance of benefits to users, particularly in relation to socio-economic aspects. Agricultural based entrepreneurs are one group of users that has experienced such benefits. Additionally, young farming entrepreneurs are able to access more opportunities with high ICT knowledge and compatibility.

According to the MOALF (2012), agriculture sectors contribute 26% yearly to Kenya's overall GDP. However, the lack of guaranteed market access, high-cost margins, lack of information and market infrastructure means that agricultural activities have been slow to thrive. One of the main challenges in the industry relates to marketing. So far, within the Kenyan scope, there are a few bodies acting as the main government marketing agency for agriculture products. Other challenges faced by modern farmers include volatile and low prices and poor information management, particularly on the latest market prices and the supply or stock for the long-term and short-term market.

All of these problems can be easily solved by one tool which is Information Communication Technology (ICT). Studies conducted by Hassan et al. (2009), Bahaman et al. (2009), Shaffril et al. (2009) and Azarian et al. (2012) have proven ICT to be an effective solution to problems that occur in the agriculture industry, such as weak marketing linkages, poor information management, low productivity, low income and a lack of diversity. The main objective of this study had much to do with trying to explore and/or reinforce the potential benefits of ICT for farming youth entrepreneurs in Kikuyu sub-county. The use of innovative ICT by young people is thus changing the face of agriculture. Farmers recognize that ICTs can help to make them more efficient and improve both production and sales; ICTs are bringing new solutions to a range of farming problems, promoting more efficient irrigation, better livestock management and even encouraging the development of self-funding solutions. Despite these successes, however, significant challenges still remain. A lack of electricity and poor internet connectivity in many areas are still widespread problems.

The common problems in adoption of ICT in rural segments are ICT illiteracy, non availability of relevant and localized contents in their own languages, easy and affordable accessibility and other issues such as awareness and willingness for adoption of new technologies among the rural peoples (Kumar and Sankarakumar, 2012). With this background information, the study was devoted to direct the level of attitudes of the youths towards ICT application in agriculture, impact of ICT application in agriculture activities and address the problems in accessing the ICT services in agricultural activities in Kikuyu sub-county, through adoption of e-agricultural information services.

2.3 Benefits of ICT for Youth Agricultural Enterprises

2.3.1 Improved operational efficiency

Many sectors have benefited from the superior functions of ICT, especially when it comes to improving responses to customers and increasing productivity (Harindranath et al., 2008; Omar et al., 2014; Ghee-Than et al., 2012). One of the reasons for this scenario is that ICT can synchronize data between suppliers and customers and also improve decision-making processes. In addition, ICT can improve the exchange of supply and demand information between farmer and entrepreneurs (Molony, 2008).

2.3.2 Increased income

By using ICT, entrepreneurs can reduce both direct and indirect costs, especially advertising costs and at the same time can improve their business processes. Lower costs mean that entrepreneurs can increase

their income. According to Muriithi et al. (2009), ICT also enables entrepreneurs to increase production and sell more products to potential buyers and also to coordinate sales. In this way, entrepreneurs can increase their income, as well as their sales volumes.

2.3.3 Strengthened marketing aspects

Through the use of ICT, entrepreneurs can access up-to-date market information. ICT provides opportunities for the youth based enterprises to create their own networks and linkages, regardless of time and place (Bahamanet al., 2009, 2010; Velmurugan and Velmurugan, 2014). Such opportunities offered to entrepreneurs will strengthen and improve their marketing aspects at both a regional and an international level (Bahaman et al., 2009). As a result, they can market and supply their products not only domestically but also internationally.

2.3.4 Creation of new opportunities

By having access to ICT, entrepreneurs can create new opportunities by penetrating the global market. In addition, they can find new partners and exchange information, reach new customers and expand to new markets, as well as improving value chain coordination (Zhu et al., 2006). According to Gakuru et al. (2009) and Sahharon et al. (2014) by using ICT, entrepreneurs can overcome challenges to up scaling, such as by sharing and transferring knowledge, as well as innovating and increasing the sustainability of their products. Furthermore, entrepreneurs can form public-private partnerships, which lead to win-win situations for all concerned (Muriithi et al., 2009).

2.4 ICT for Agriculture and Rural development

In 2003 and 2005, the World Summit on the Information Society (WSIS) focused on Information and Communications Technologies (ICTs) and their role in the information society. The Summit enabled stakeholders to examine ways of bridging the global digital divide and increasing access to the Internet and ICT services in developing countries. E-agriculture is one of the WSIS "Action Lines" and looks at how ICTs can improve agriculture and contribute to rural development. Based on the e-Agriculture forum discussion entitled "Looking back and moving forward", the following recommendations for governments and project implementers on the use of Information and Communication Technologies (ICTs) in agriculture and rural development were suggested:

Technology: A combination of different technologies strengthens the delivery of content. The appropriate mix depends on the context. A combination of radio and mobile phones appears to work well in many situations

Trust: Farmers are to change from their traditional farming habits and adopt new technologies only if information is delivered by a source they trust. Experience suggests that information best reaches target groups when services and content are delivered by trusted intermediaries and community level knowledge disseminators.

Approach: A bottom-up approach, starting with the actual person on the ground, starting with the farmers' or traders' needs, has worked best for defining useful content and services.

Sustainability: Identifying sustainable business models remains a challenge; collecting data and creating content requires important investments.

Monitor and Evaluation: More standardized indicators (for example, based on the value chain for specific products) need to be developed.

Gender and Youth: Women access to ICTs is very limited amongst rural populations; ICT for development (ICT4D) projects should always include gender-specific considerations, as well as cultural and regional specificities, in both their design and implementation stages. Youth are often ICT savvy and their input should be included in strategies and projects (WSIS, 2005)

2.5 E-Agriculture

E-Agriculture has been described as an emerging field focusing on the enhancement of agricultural and rural development through improved information and communication processes. More specifically, e-Agriculture involves the conceptualization, design, development, evaluation and application of innovative ways to adopt information and communication technologies in the rural domain, with a primary focus on agriculture. In addition to individuals having access to a new technology, adoption must also occur, which means that individuals accept the innovation as valuable and use it. Several factors could influence IT adoption and use in agricultural organizations.

2.5.1 Reasons for Successful Adoption of ICTs in Agriculture

The reasons for the successful adoption process include several factors that includegg the following:

a) An increased need for information

The larger the production unit and crop diversity the larger the need for more sophisticated data management and support for decision making. So, as the enterprise increase in the production capacity, there will be an increased need for accurate and readily available information.

b) Prevalence and simplicity

The prevalence of computers is consistently increasing which in turn reduces reluctance to adopt the technology associated with them. The less educated farmers tend to search for simple non challenging solutions either by use mobile phones or simple web-based approaches.

c) Returns on investment

Farmers who find ICT to be beneficial and compatible with their needs point out the following advantages: easy collection of data, favorable comparisons of cost and income, follow-up of data input, establishment of cumulative data sets, their use and information accessibility. All these translate into management efficiency. The level of investment though is not necessarily correlated to profitability, hence if ICT indeed improved the production processes, then these improvements should eventually be evident for example better decisions in a specific production process, shorter supply lead-time and so on. Measuring the benefit from the use of information systems is difficult (Rapley, 1997). One reason is the unavailability of quantifiable variables, although attempts to measure information have been made (Srorey and Barnett, 2000). This makes measuring the expected benefit of information systems very difficult. One of the intuitively obvious variables is the return on investment but the level of investment is not necessarily correlated to profitability. Contrary to expectations it was found that quantifiable changes were modest at best (Christensen, 1992).

d) Maintaining existing competencies

An adopter's level of education and training correlates positively with the ability to manage information, production processes and level of benefit accrued from adopting a new technology (Gelb, 1998). ICT enables even the most conservative farm managers to utilize the system for supporting decisions. Older and traditionally trained managers can easily adopt ICT without a need to study new background data

sets and / or management methodology. Prior knowledge for using ICT is not a prerequisite for adoption.

It stands to reason as well that an adopter's level of education correlates positively with the level of benefit accrued to adoption of the managerial information systems. Despite the approach that agriculture is a comprehensive business as any other, most farmers limit their management efforts to production aspects. In comparison to other businesses, farmers are usually isolated professionally in their decisions, a self-perpetuating situation that encourages resistance to changes in production methods and changes in business management methodology. It is in line with the contention that individuals tend to justify their actions according to their beliefs, past experience and reluctance to relinquish their time proven traditions and experience (Varela et al., 1994). This may result in disassociation from a new technology and diversion of time and efforts to alternatives (Von-Krogh et al., 2000). ICT enables the user to maintain his habits thereby minimizing the resistance.

e) Flexibility

ICT is not confined to a specific agricultural item or its pattern which in turn allows the farmer maximum adaptation flexibility. Different farmers doing the same agricultural practice may utilize the program differently. Experience indicates that in many cases dedicated programs, attempting to be all-inclusive become inflexible, and eventually irrelevant.

f) On time Information

When information is unavailable when needed on time at a decision point, the decision is taken based on a currently different situation. This can distort the managerial processes. ICT enables accessing data and information when needed. This is due to the simplicity of data entry and reports extraction.

g) Training and support

Operational proficiency training is important for a successful information technology adoption, the more so with complicated software (Ptak and Schragenheim, 1999). Training need however, varies. Support should be free or cheaply available, both on-line and on-phone, backed up with occasional on-demand refresher courses

2.5.2 e-Agriculture and the youth

In Kenya, the youths out-of-school constitutes 75% of the unemployed population, which stands at 40% (KNBS, 2014). Based on demographics from the NCCK (2013), 3 million out of 11 million Kenyan

youths looking for work in the formal sector are unemployed. It is envisaged that youths are the current and next generation of farmers with a population of more than 65% (KDP, 2012).

Young entrepreneurial farmers can benefit from e-Agriculture by getting through e-agricultural information services and sharing the information among fellow farmers around the world. Young unemployed farming entrepreneurs can tap into e-agriculture by bridging the gap between the rural farmers and the consumers or giving them information on for example weather, cheapest prices of seeds and inputs, planting tips and places to sell their goods at a good price within their localities and beyond, information on livestock and plant diseases and so on.

Millions of rural farmers have access to phones or at least has a phone that can make and receive calls, unemployed youths should utilize the Information and Communication Technology (ICT) channels like Bulk SMS, to create a platform for communication with these rural farmers and create time to physically see and encourage their work. In Nigeria Youths are encouraged to create and research more on the challenges faced by rural farmers and see how to use technology to provide the solutions. Challenge to all unemployed youths was to create platforms and ask other farmers to subscribe to them to be provided with agricultural information.

The value chains of agriculture are many, and youths can venture in any of them such that they can entice other farmers to use e-agriculture to improve their yields thereby creating employment for others.

2.5.3 Benefits from e-Agriculture

In order to feed the world population, there is need to use e-agriculture information services to:

- Reduce Agricultural produce loss and wastage resulting from lack of proper knowledge for storage or handling and lack of customers to the rural farmers.
- Share information of high yielding varieties to the farmer and where to buy them.
- Provide information on right planting time, spacing and other tips that will improve yield. Provide information on livestock and fisheries rearing and/or production, their diseases, market and so on.
- Provide the right information on the use of herbicides, pesticides, fertilizers, medication for livestock and so on.

- Provide proper and efficient market information to enable profit to the farmer.
- The global warming and its effects are hitting hard on the farmers, there is need to know the best areas to plant or practice agriculture to prevent their crops from being washed away by flood or where fish or livestock will thrive with favorable conditions or minimal diseases.
- Increase the level of entrepreneurial farmers' knowledge and improve on their efficiency in all aspects and/or faculties of agriculture of livestock, plant, poultry, agri-business and so on.

2.5.4 Hindrance to e-Agriculture Adoption

Individual's personal motivations and drivers, in combination with resources they have available to them, are key factors in determining how individuals can act and bring about change for them as well as in relating to their communities. Efforts of individuals are often aided or constrained by (social) structures that surround them, such as organizations, policies, laws and customs. Some of these motivations, structural constraints and opportunities play an important role in the adoption of ICT by young farmers. One of the main factors that have hindered the adoption of e-agricultural information services has been the general location of farms in rural areas. Access to technology like computers and the internet is generally lower in rural areas as well as wireless network availability; even electricity has proved to be unreliable in such areas (Scott's Blog, 2006).

2.6 Some examples of Agricultural Portals

2.6.1 AMITSA

AMITSA is a multi-country, web and mobile based market information system on agro-inputs for eastern and southern Africa implemented in collaboration with IFDC, Esoko, COMESA and EAC. The lack of accurate, up-to-date information on agro-inputs is one of the major constraints to agricultural productivity and to the development of business linkages and trade in the region. To address this problem, AMITSA was created to provide accessible data through an open and collaborative market information system. The AMITSA network covers eight countries – Burundi, Kenya, Malawi, Mozambique, Rwanda, Tanzania, Uganda and Zambia. Statistics, directories, publications and market news are compiled and shared via an interactive, web-based portal (*www.amitsa.org*). Monthly price reports are sent by e-mail to over 600 recipients and can be downloaded from the site's publication center. Mobile phone applications were recently integrated into the AMITSA system, which broadened availability to nearly every farmer and agro-dealer in the region by allowing data to be transmitted via

text messages. Price information, technical information, extension or marketing messages and alerts will be distributed to more than 5,000 agro-dealers and to hundreds of thousands of farmers.

AMITSA's mobile networks are managed by Esoko, a web-based tool that gives people and businesses the opportunity to share information quickly and affordably.

2.6.2 Bio-Vision Infonet

Infonet-Bio-vision is a great resource of scientifically and practically sound information for strengthening sustainable development of farmers and rural communities in Africa by allowing them to access, use and share information developed in the 4-H. The latest edition contains rich and valuable new content updates. Under Human Health you can find a brand new section on Healthy Food additional sections on nutrition related diseases and hygiene and sanitation. Under Animal Health there are essential information on animal welfare and organic certification norms for livestock husbandry that has been added and increased information on livestock health and disease management. Information on major crops, vegetables and fruits prevalent in East Africa, including crop husbandry, soil and water management, cultural methods and organic pest management, with illustrated descriptions for quick and accurate identification of crop pests and diseases.

- Information on major crop pests, diseases, weeds and natural enemies common in East Africa; common names in different languages, regional distribution maps and lots of images and illustrations for easy identification
- Many more information on medicinal plants, fruit preservation and cultural methods, soil, water and land management, animal husbandry and animal diseases etc...
- Publications and database of TOF Organic Farmer Magazine (Search by keywords or issue, audio and text versions)
- Over 3000 images allowing easy identification of major pests, diseases and illustrations of methods promoted.
- They do regularly produce an offline version of infonet for areas without Internet access and also a CD. A download of the infonet offline version can also be made from the web site. The CD versions can be ordered from infonet website or offices.

2.6.3 Access Agriculture

Access Agriculture is an international NGO which showcases agricultural training videos in local languages. From their web site you can see examples of videos, download them or order a DVD copy. The audio tracks can also be downloaded by radio stations. This is a platform for agricultural rural and development staff, service providers, extension agents, communication professionals and representatives of farmer organizations to see what training videos are available and request new language versions**.** The videos are all designed to support sustainable agriculture in developing countries

2.6.4 National Agricultural Farmers Information System (NAFIS)

NAFIS is a comprehensive information service, intended to serve farmers' needs throughout the country including the rural areas where internet access is limited. It enables farmers get critical extension information by either browsing through the internet or calling NAFIS **020-5100102** numbers. The service comprises of a detailed website (*www.nafis.go.ke*) that is easily updated by Extension Officers and a Voice-Based Service which contains summarized information which farmers' access using mobile phones. The Voice-Service is available both in English (Kenyan Local dialect) and Kiswahili. The themes covered by NAFIS relate to both general and more specific agricultural topics, from natural resource management, to processing, post-harvest preservation and marketing. Information is presented with text, graphics, audio and video in an effort to be as accessible as possible. The idea is that farmers would be able to research any agricultural theme in the format most suitable for them, and even download multimedia content for later viewing or listening.

2.7 Some Examples of Mobile Phone Based eAIS

Just like the famous MPesa, there are also other mobile phone based e-agricultural information services. MPesa, can be used by farmers to transact agricultural businesses**.** These other services include M-Kilimo, iCow, MFarm, and so on.

2.7.1 M-Kilimo

M-Kilimo service gives agricultural advice to farmers. The Global Agriculture International Development project, was funded by the Rockefeller Foundation and the GSMA and managed by KenCall in Nairobi. It uses a mobile helpline to provide thousands of small holder farmers in Kenya with specific, timely and accurate information, as well as tips to help increase their incomes and farm productivity. Burness has provided communications support for the project.

The numbers are on the entire three major networks and costing essentially the same amount as a call to a friend. Farmers can ask any agricultural question they have, on any topic such as:

- Crop information for plants, fruits, vegetables, and cereals, including which seeds to choose in a specific area, how and when to plant, how to care for the plants, how to diagnose and control disease, how to use fertilizers and pesticides, and how and when to harvest.
- Animal information about livestock, fish, bees and even butterflies. M-Kilimo's advice covers everything from where to buy baby animals, to how to feed them, build housing for them, diagnose their illnesses, and sell them.
- A weather forecast that helps a farmer to plan his or her activities.
- Information on current market prices for farmers'
- The helpline answers most questions almost immediately, for delayed answers it will be within 24 hours.

The ultimate aim: to help farmers improve their yields through better farming practices and help farmers get fair prices for their produce at the market with a better understanding of product demand by providing farmers with information they would not otherwise be able to access.

2.7.2 iCow Product

Upon subscription to Mashauri-Farmer Tips, by simply Dialing *285# and following the menu, farmers receive 3 SMS tips per week at Ksh.3 per SMS. iCow is meant for best practices in cow and chicken rearing. Tips are available on Cows, Broilers, Layers and Indigenous Chickens and Livestock Calendar. iCow is a product of (Green Dream TECH Ltd).

- Upon subscription of a Cow, Calf, Heifer, Broiler flock, Layer flock or Indigenous Chicken flock to Kalenda- You will receive customized Tips on your registered livestock at Ksh 3 per SMS
- Vetenari -Find your nearest Vet or AI (Artificial Inseminator)
- Subscription is not required to search for your nearest Vet or AI on Vetenari. Simply insert your location and receive SMS's with contacts of your nearest Vet or AI at Ksh 3 per SMS
- iCow is currently available in English and Kiswahili

2.7.3 M-Farm

According to Olivia Solon (2013), MFarm empowers Kenya's farmers with price transparency and market access. It gives up-to-date market information, link farmers to buyers through their marketplace and current agri-business trends. M-Farm Ltd is a software solution and agribusiness company. M-Farm, is a transparency tool for Kenyan farmers where they simply SMS the number 20255 (Safaricom Users) to get information pertaining to the retail price of their products, buy their farm inputs directly from manufacturers at favorable prices, and find buyers for their produce.

The service is meant for farmers who produce in low volume and that many buyers in big cities don't want the hassle of getting the volume they need from multiple different farmers. MFarm offer group selling tool, which is meant to gather farmers to team up and bring produce to certain drop off points. They then send an SMS to the system promoting what they have to sell. This makes the farmers who are too small to market to big buyers become visible because they have more products. The service also offers a group buying tool, allowing farmers to pool resources to negotiate better prices for items like fertilizer. Transactions are all handled by MFarm's integrated mobile money transfer system - drawing on mobile payment technology called MPesa but this can also be sent into people's bank accounts (if they have one).

2.8 Technology Adoption Frameworks

Although much of the research in the Information Systems discipline up to the present has emphasized individual adoption of new technologies, a broader umbrella of research is appropriate that offers rich theory about technology adoption by accounting for the relevant technological, institutional, national and historical contexts.

2.8.1 Theory of Reasoned Action (TRA)

Has Behavioral intention, Behavior as main dependent constructs / variables and Attitude toward behavior, Subjective norm, as independent variables. TRA posits that individual behavior is driven by behavioral intentions where behavioral intentions are a function of an individual's attitude toward the behavior and subjective norms surrounding the performance of the behavior. Attitude toward the behavior is the individual's positive or negative feelings about performing a behavior. It is determined through an assessment of one's beliefs regarding the consequences arising from a behavior and an evaluation of the desirability of these consequences.

The model has some limitations including a significant risk of confounding between attitudes and norms since attitudes can often be reframed as norms and vice versa. A second limitation is the assumption that when someone forms an intention to act, they will be free to act without limitation. In practice, constraints such as limited ability, time, environmental or organizational limits, and unconscious habits will limit the freedom to act. The theory of planned behavior (TPB) attempts to resolve this limitation.

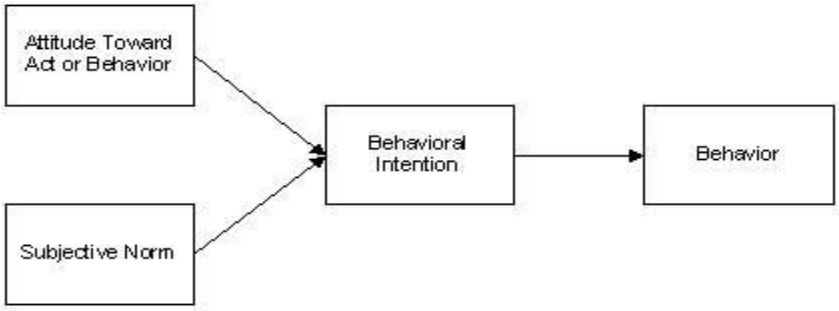

Fig 2.1 Theory of reasoned action (Fishbein, M., & Ajzen, I., 1975)

2.8.2 Theory of Planned Behavior (TPB)

The main dependent variables are intention, Behavior. Independent variables are Attitude toward behavior, Subjective norm, and Perceived behavioral control. TPB posits that individual behavior is driven by behavioral intentions where behavioral intentions are a function of an individual's attitude toward the behavior, the subjective norms surrounding the performance of the behavior, and the individual's perception of the ease with which the behavior can be performed (behavioral control).

Formally, overall attitude can be assessed as the sum of the individual consequence x desirability assessments for all expected consequences of the behavior. The contribution of the opinion of any given referent is weighted by the motivation that an individual has to comply with the wishes of that referent. Hence, overall subjective norm can be expressed as the sum of the individual perception x motivation assessments for all relevant referents. TPB views the control that people have over their behavior as lying on a continuum from behaviors that are easily performed to those requiring considerable effort, resources, etc. Although Ajzen has suggested that the link between behavior and behavioral control outlined in the model should be between behavior and actual behavioral control rather than perceived behavioral control, the difficulty of assessing actual control has led to the use of perceived control as a proxy.

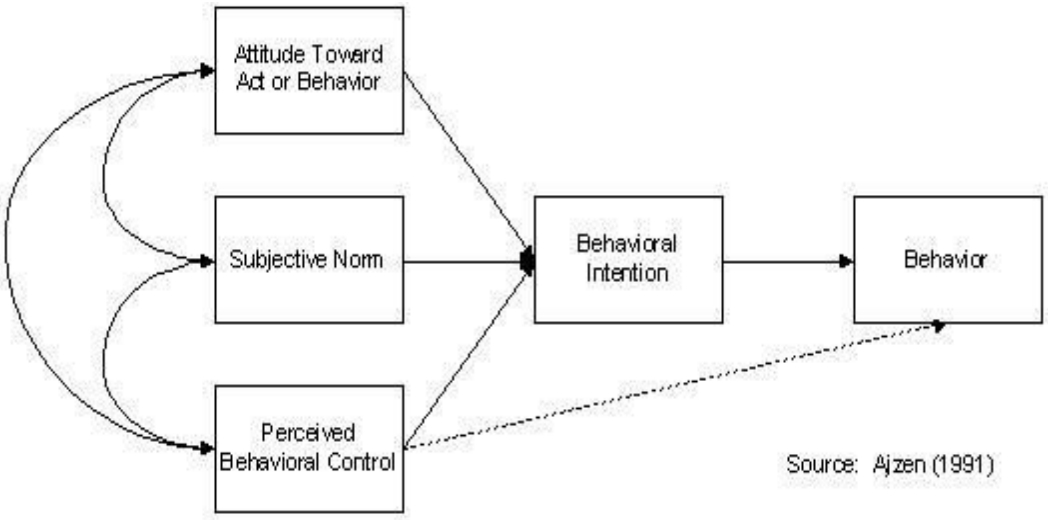

Fig 2. 2: Theory of planned behavior

2.8.3 Technology Acceptance Model

TAM is an adaptation of the Theory of Reasoned Action (TRA) to the field of IS. TAM posits that perceived usefulness and perceived ease of use determines an individual's intention to use a system with intention to use serving as a mediator of actual system use. Perceived usefulness is directly impacted by perceived ease of use.

Researchers have simplified TAM by removing the attitude construct found in TRA from the current specification (Venkatesh et. al., 2003). Attempts to extend TAM have generally taken one of three approaches: by introducing factors from related models, by introducing additional or alternative belief factors, and by examining antecedents and moderators of perceived usefulness and perceived ease of use (Wixom and Todd, 2005).

TRA and TAM, both of which have strong behavioral elements, assume that when someone forms an intention to act, that they will be free to act without limitation. In practice constraints such as limited ability, time, environmental or organizational limits, and unconscious habits will limit the freedom to act.

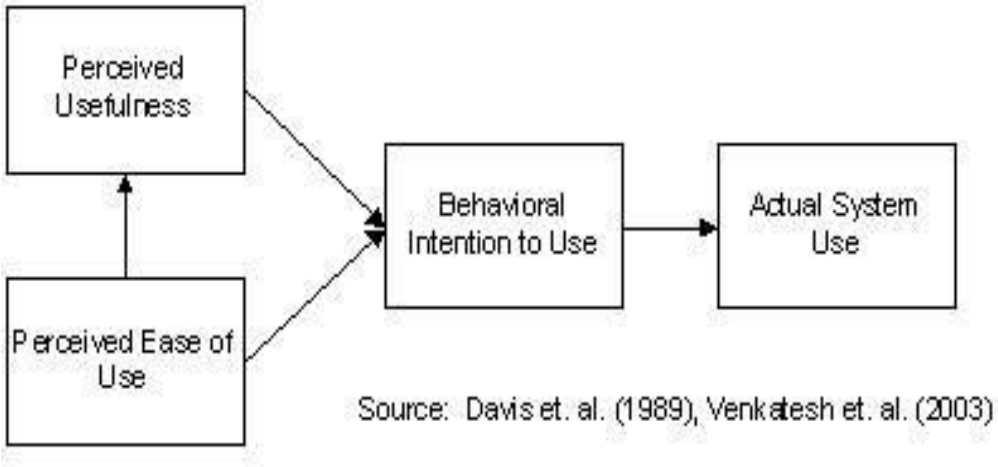

Fig 2.3 Technology acceptance model

2.8.4 Extended Technology Acceptance Model

Extended TAM incorporates into TAM social processes (subjective norm, voluntariness, and image) and the cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use).Experience and voluntariness are included as moderating factors.

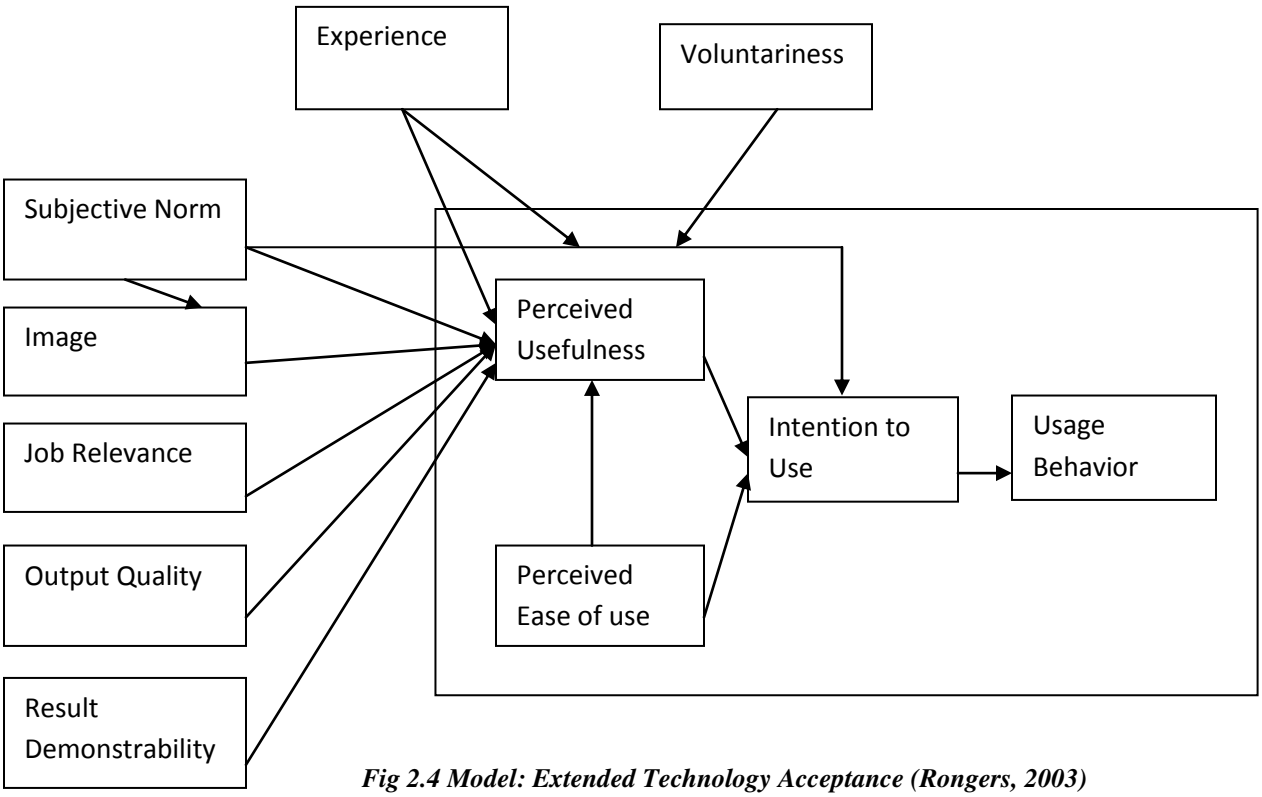

Fig 2.4 Model: Extended Technology Acceptance (Rongers, 2003)

2.8.5 Unified Theory of Acceptance and Use of Technology

The UTAUT intends to explain user intentions to use an IS and subsequent usage behavior. The theory identifies four key factors (performance expectancy, effort expectancy, social influence, and facilitating conditions) as direct determinants of usage intention and behavior. Gender, age, experience, and voluntariness of use, moderates the impact of the four key factors on usage intention and behavior (Venkatesh et. al., 2003).

The theory is as a result of review and consolidation of the factors/constructs of eight models that were earlier used to explain IS usage behavior (theory of reasoned action, technology acceptance model, motivational model, theory of planned behavior, a combined theory of planned behavior/technology acceptance model, model of PC utilization, innovation diffusion theory, and social cognitive theory (Venkatesh et. al., 2003).

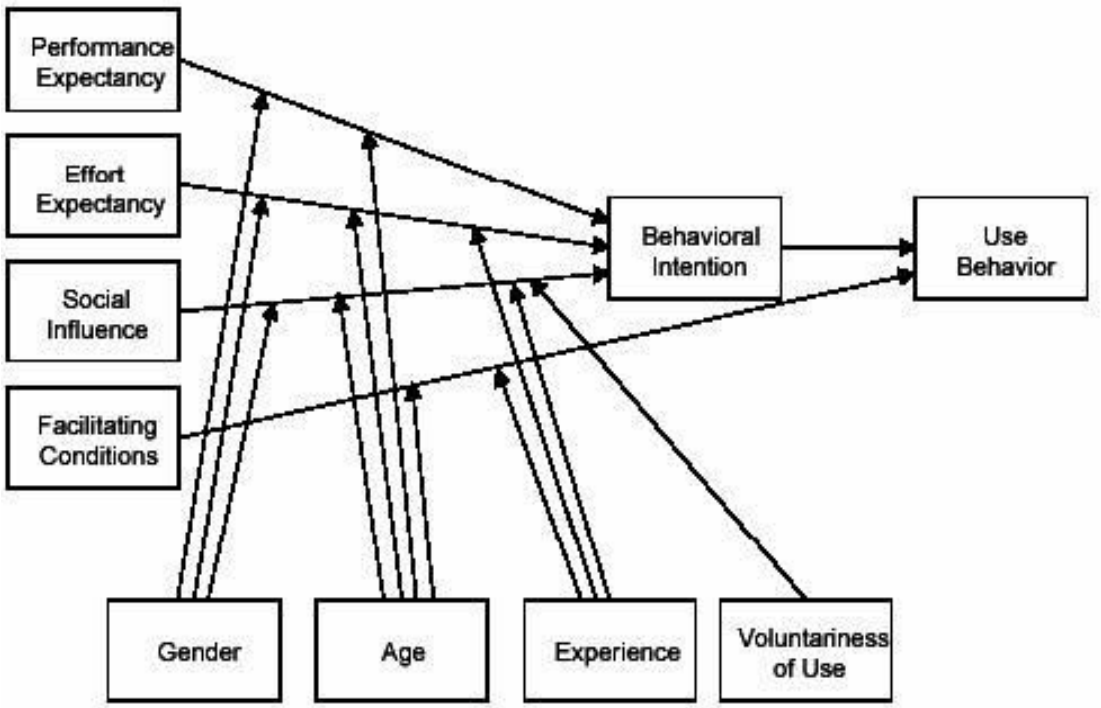

Fig 2.5 Unified theory of acceptance and use of technology (Venkatesh et al., 2003)

2.8.6 Construct Definitions. (Venkatesh and Davis, 2000)

Attitude: Individual's positive or negative feeling about executing target behavior for example using an innovation such as eAIS. It is determined through an assessment of one's beliefs regarding the consequences arising from a behavior and an evaluation of the desirability of these consequences.

Behavioral intention: The degree to which a person is conscious about plans to plans to perform or not perform some specified future behavior.

Computer anxiety: The degree of an individual's apprehension, or even fear, when she/he is faced with the possibility of using computers.

Computer self-efficacy: The degree to which an individual beliefs that he or she has the ability to perform specific task/job using computer.

Effort expectancy: The degree of ease associated with the use of the system.

Facilitating conditions: This is the perception of external control. It is the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system.

Image: The degree to which use of an innovation is perceived to enhance one's status in one's social system.

Job relevance: Individual's perception regarding the degree to which the target system is relevant to his or her job.

Objective usability: A comparison of systems based on the actual level (rather than perceptions) of effort required to complete specific tasks.

Output quality: The degree to which an individual believes that the system performs his or her job tasks well.

Performance expectancy: The degree to which an individual believes that using the system will help him or her to attain gains in job performance.

Perceived ease of use: The degree to which an individual believes that it is easy to use the system and that the system will help him or her to attain gains in job performance.

Perceived enjoyment: The extent to which the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use.

Perceived usefulness: The degree to which an individual believes that the system useful, thus worth using and that it will help him or her to attain gains in job performance.

Result demonstrability: Tangibility of the results of using the innovation.

Social influence: The degree to which an individual perceives that important others believe he or she should use the new system.

Subjective norm: Person's perception that most people who are important to him think he should or should not perform the behavior in question. Norms are the social rules about what should and should not be done.

Voluntariness: The extent to which potential adopters perceive the adoption decision to be non-mandatory.

Output quality: The degree to which an individual believes that the system performs his or her job tasks well.

Computer anxiety: The degree of an individual's apprehension, or even fear, when she/he is faced with the possibility of using computers.

Computer playfulness: The degree of cognitive spontaneity in microcomputer interactions.

Computer self-efficacy: The degree to which an individual beliefs that he or she has the ability to perform specific task/job using computer.

Objective usability: A comparison of systems based on the actual level (rather than perceptions) of effort required to complete specific tasks.

Perceived enjoyment: The extent to which the activity of using a specific system is perceived to be enjoyable in it's own right, despite any performance consequences resulting from the system use.

Behavioral control: is defined as one's perception of the difficulty of performing a behavior.

2.8.7 Construct Reliability

Test of reliability is important when variables developed from summated scales are used as predictor components in objective models. It is important to establish if the same set of items would generate the same responses should the test (the same questions) be re-administered to the same responded. Variables derived from test instruments are said to be reliable only when they provide stable and reliable responses over a repeated administration of the test

Computation of Cronbach's alpha is based on the reliability of a test relative to other tests with the same number of items, and measuring the same construct (variable) of interest (Hatcher, 1994). The essence is not only to come up with the reliability index of the construct but also managed to improve on it. For example removal of some item from the scale may make the construct more reliable for use as a predictor variable.

2.9 Conceptual Framework

A conceptual framework is a model of presentation, whereby the researcher presents graphically or diagrammatically the relationship between variables in the study. The purpose of the conceptual model is to help make visible the proposed relationships. The study is to establish the significance of the proposed relationships. After the study a reduced model may be formulated, excluding those variables and relationships which were not supported by the results (Orodho, 2004).

2.9.1 Conceptual Framework for Adoption of eAIS

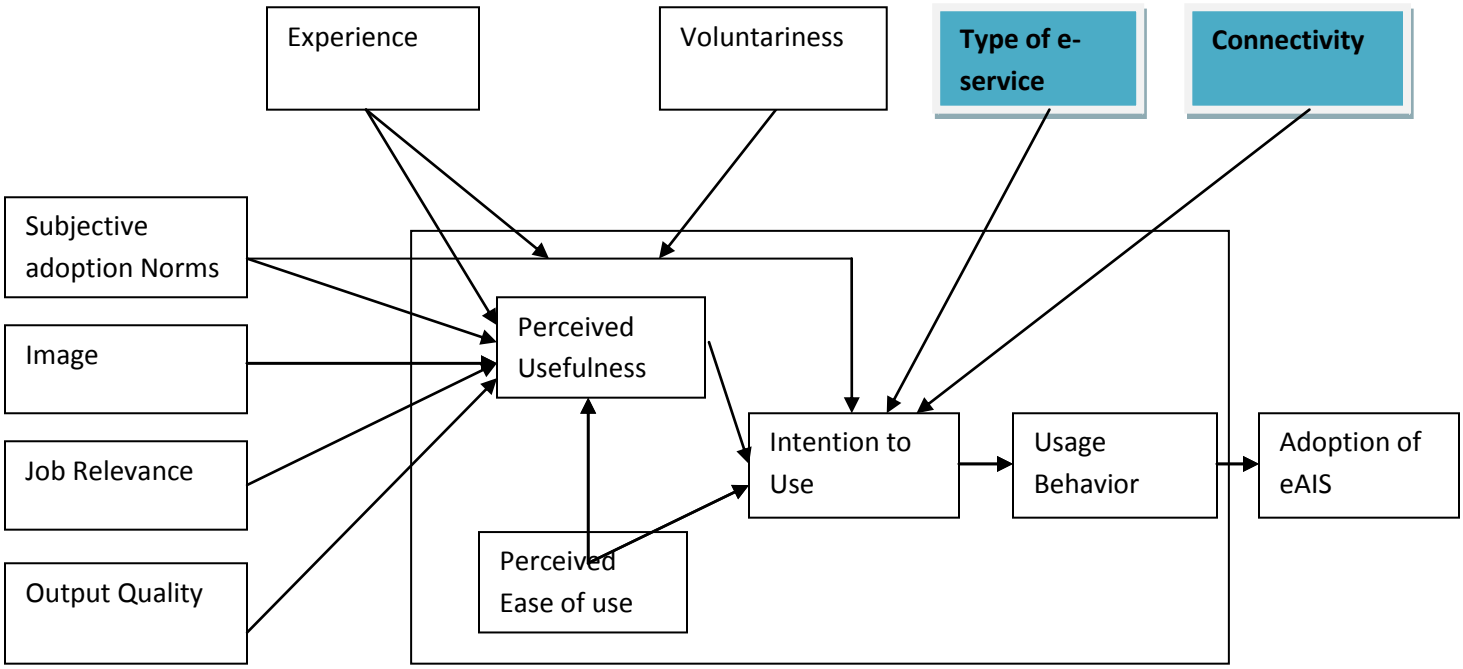

Fig. 2.6: Conceptual Framework for adoption of eAIS, Adapted from Extended TAM (Rogers, 2003)

2.9.2 Rationale for adapting extended TAM

The research literature on the adoption and diffusion of new technologies and innovations is voluminous and has identified numerous relevant factors associated with adoption across multiple levels of analysis. For instance, the popular technology acceptance model has offered a tight theory to explain individual-level adoption and use of new innovations across multiple levels of analysis. TAM has been well tested and proven to be quite reliable and robust in predicting user acceptance in business related studies.

The choice of extended TAM framework is informed by the fact that it has evolved from the famous and the much referenced Technology Acceptance Model (TAM), which is a simple and parsimonious model, a fact that has encouraged researchers to apply it widely. TAM has offered a tight theory to explain individual-level adoption and use of new innovations. According to Venkatesh, (2000), TAM is the most widely applied theories. In extended TAM, the added social processes (subjective norm, voluntariness, and image) and the cognitive instrumental processes (job relevance, output quality and perceived ease of use), can be useful in explaining the demographic differences in technology adoption by for example the entrepreneurial youth farmers. A study by Venkatesh and Davis (2000), found out that these processes significantly influenced user acceptance, thus advancing the theory.

2.9.3 Rationale for Dropping Results Demonstrability

If the young entrepreneurial farmers believe that the e-service adopted performs his or her tasks well (output quality), then there will be less need for an entrepreneurial farming youth to seek for tangibility of the results of adopting the e-agricultural information service's;. Measuring or judging the tangibility of adopting the e-agricultural information services may be a big challenge to the entrepreneurial youth farmer.

Measuring the benefit from the use of information systems is difficult (Rapley, 1997). One reason is the unavailability of quantifiable variables, although attempts to measure information have been made (Srorey and Barnett, 2000).Measuring the expected benefit of information systems is very difficult. One of the intuitively obvious variables is the return on investment but the level of investment is not necessarily correlated to profitability.

2.9.4 Rationale for Dropping Relationship between Subjective adoption Norms and Image

The direct influence of the people around the entrepreneurial young farmer or those they hold important to them on perceived usefulness of eAIS is appropriate and simple to administer on youths. The Image factor should influence the perceived usefulness directly without being influenced by the subjective adoption Norms first. These omissions are to simplify the influence relationships and to make each factor more visible to the youth entrepreneurial farmers.

2.9.5 Rationale for Adding Type of e-service

This was added by the researcher at the conceptual stage and it is the degree to which an individual belief that he or she has the ability to perform specific task (deeds, efforts or performances) whose delivery is mediated by information technology.

The concept of e-service (electronic service) represents one prominent application of utilizing the use of information and communication technologies (ICTs) in different areas. Despite the different definitions of e-service by researchers, they all agree about the role of technology in facilitating the delivery of services which make them more of electronic services. In this study we were concerned with the e-agricultural information services, relating to entrepreneurial farming youths in Kikuyu sub-county. Such services will include for example dissemination of agricultural information on production, market, livestock diseases, mPesa etc. These services influence technology adoption since they modify the young farmers' knowledge, and their efficiency.

Rowley (2006) defines e-services as: “deeds, efforts or performances whose delivery is mediated by information technology”. Such e-service includes the service element of e-tailing, customer support, and service delivery”.

This definition reflect three main components - service provider such as public e-service provider, service receiver for example the young farming entrepreneurs and the channels of service delivery. Internet is the main channel of e-service delivery while other classic channels (such as telephone, call center, public kiosk/booths, mobile phone, and television) are also considered.

2.9.6 Rationale for Adding Connectivity

This was also added by the researcher at the conceptual stage and it is the degree to which an individual beliefs that he or she has the ability to perform specific task (e-service) while connected to one of the channels of service delivery such as Internet, telephone, call center, public kiosk/booths, mobile phone or television.

Internet access connects individual computer terminals, computers, mobile devices, and computer networks to the Internet, enabling the entrepreneurial youths who subscribe to e-agricultural information services such as email, SMS and the World Wide Web access. Internet service providers offer internet access through various technologies that offer a wide range of data signaling rates, for example Dial-up Internet access, Digital subscriber line, Cable Internet access, Mobile broadband, Satellite Internet access, Wireless broadband, Cable modem, Fiber to the x, Voice over IP and such like. Reliability of the connection over these channels shall impact on the adoption of the technology. Internet is the main channel of e-service delivery while other classic channels (for example telephone, call center, public kiosk/booths, mobile phone, television) are also considered.

2.9.7 The Hypotheses that Emerged

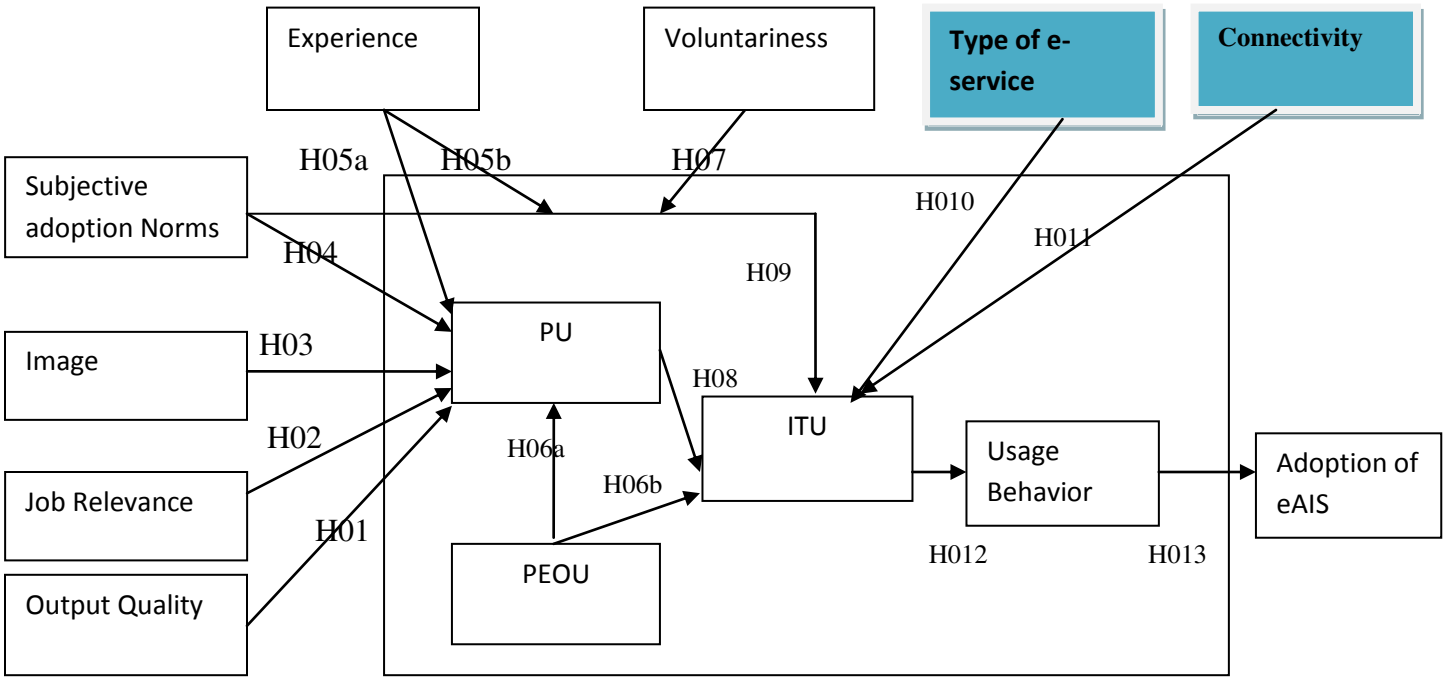

Fig 2.7 The hypotheses that emerged

H01: Output Quality does not influence Perceived Usefulness

H02: Job Relevance does not influence Perceived Usefulness

H03: Image does not influence Perceived Usefulness

H04: Subjective Adoption Norms does not influence Perceived Usefulness

H05a: Experience does not influence Perceived Usefulness

H06a: Perceived Ease of Use does not influence Perceived Usefulness

H05b: Experience does not moderate Subjective adoption Norms

H07: Voluntariness does not moderate Subjective adoption Norms

H06b: Perceived Ease of Use does not influence Intention to Use

H08: Perceived Usefulness does not influence Intention to Use

H09: Subjective adoption Norms does not influence Intention to Use

H010: Type of e-service does not influence Intention to Use

H011: Connectivity does not influence Intention to Use

H012: Intention to Use does not influence Usage Behavior

H013: Usage Behavior does not influence Adoption of eAIS

2.9.8 Operationalization of the Constructs (Variables).

The aspects of the conceptual framework are operationalized through descriptive study design to generate quantitative data for analysis. The tool of analysis for all the variables is Likert scale, as depicted in the data collection instrument of appendix 7.5

Table 2.1 Variables – Indicator Table

Dependent Variables

Variable	Borrowed from	Indicator Summary
Perceived Usefulness (PU)	TAM	Increase profits, Convenience, Confidentiality, performance, productivity, effectiveness, Usefulness, Attractiveness, Relevance
Intention To Use (ITU)	TAM	Access, usefulness, Ease of use, gains in job performance, delivery on specific tasks.
Usage Behaviour (UB)	TAM	Access when needed, Use when needed, Convenience when used, or accessed
Adoption of eAIS (Adoption)	TAM	Access to , Use of , User likes e-AIS, Convenience of eAIS

Independent Variables

Variable	Borrowed from	Indicator Summary
Subjective Adoption Norm (SAN)	Extended TAM	Influence on behavior, People important influence, Acquaintance influence
Image	Extended TAM	Prestige, high profile, Status symbol
Job Relevance (JR)	Extended TAM	Importance in the job, Relevance
Output Quality (OQ)	Extended TAM	High Value Quality, Acceptable quality
Perceived Ease Of Use (PEOU)	TAM	Ease of becoming skilled, expert help, straight forward, effort required, Ease of use.
Experience	Extended TAM	Experience with eAIS or other e-services, ease of adoption and use.
Type of e-service (TOS)	Added	Information gathering, Information exchange, ability to perform on specific tasks, empowering with information
Connectivity	Added	Aid of Information exchange, Sharing of knowledge, Gained efficiency, Reliability of connection

Moderating Variables

Variable	**Borrowed from**	**Indicator Summary**
Experience	Extended TAM	Experience with eAIS, other e-services, influence on behavior, Judgment on adoption and use, Ease of use, intension to use
Voluntariness	Extended TAM	Own volition, non mandatory, Influence of others

CHAPTER 3

METHODOLOGY

This chapter details the procedure that was followed to achieve the broad objective, specific objectives and the purpose of study**.**

3.1 Study Area

The study area was in Kikuyu, a sub-county of Kiambu county which is in the Central Province of Kenya. Kiambu County has a total population of 1,623,282, 496,244 house holds and covers an area of 2,543.4 sq. km. Youth population accounts for 29.1% of the total population of Kiambu. The county has a population density of 638 per sq. km. (Kiambu County Government Report, 2014).

Kikuyu Sub-county has a Population of 125,402 in area of 175.70 Sq. Km, distributed in 5 Wards (County assemblies). The wards are Karai with 20,420 people, Nachu, having a population of 18,655, Sigona 36,833, Kikuyu with 32,422 and Kinoo having 27,082 persons (Kenya National Census, 2009).

Kiambu County was suitable for this study due the fact that it has a high youth population and it is a peri-urban county, with both rural and urban populations. It is a county that practices intensive farming systems. Some of the young entrepreneurial farmers are already using the e-agricultural information services. The county has already identified 27,000 farmers in 47 wards targeted for e-agriculture platform. Farming and Food Processing are among the main economic activities in the county (Kiambu County Government Report, 2014). The proximity of the sub-county to Nairobi was of great value to the researcher as it helped in cost savings on costs such as transport, night outs and other costs. This research was not funded, thus costs were set to be at minimum.

3.2 Research Design

Orodho (2004), describes Research design as the structure of the study or research. Its function is to provide for the collection of relevant data for the study with minimal expenditure or effort, time and money. However, how all these are achieved is influenced by the study or research purpose. In this study descriptive research design was adopted. It sought to address the questions of how, when, what and why. There were no experiments carried out**.**

3.3 Target population

The study was carried out in Kikuyu sub-county of Kiambu, on active entrepreneurial farming youths in the sub-county, in groups spread in 5 wards, with a total of 161 members, at the time of study. The respondents were drawn from the population aged 15 to 34 years among the youth groups in the Wards of Kikuyu sub-county.

3.4 Exclusion and Inclusion Criteria

Youths in school and non-farming youths were not included in the study.

3.5 Sampling Procedure

The sampling technique used was simple random sampling method. The research focused on active farming youth group members within the wards. Respondents were selected by simple random sampling depending on their availability.

Simple random sample is a sub-set of a statistical population in which each member of the sub-set has an equal probability of being chosen. A simple random sample was meant to be an unbiased representation of the entrepreneurial farming youths in this study. This method was best in this study because the researcher knew little about the population, This was to avoid sampling errors of, for example choosing all men or all women from a population having all genders (Mugenda & Mugenda, 2003).

3.5.1 Sample Size

According to Mugenda and Mugenda (2003), a good sample population should be 10% to 30% of the entire population. The following sampling formulae was used to calculate the sample size

$n=P(1-P)\left\{\frac{Z}{d}\right\}\text{^}2$

n = required Sample size,

z = the table value (z-value) for level of confidence for instance 95% level of confidence has standard value of 1.96, 90% has standard value of 1.645

d = margin of error

p = proportion to be estimated

Note: Mugenda and Mugenda, (2003), recommends that if the value of p is not known to you then use p=0.5

The study used confidence level of 95% and 10% margin of error. Thus it implied that n=0.5(1-0.5) (1.96/0.10)^2=96

3.5.2 Target Sample

At the time of data collection there were 161 active farming youth group members in Kikuyu Sub-county Wards. This study however, targeted a sample of 120 which was 75% of the target population, and this was above the recommended threshold of 10 to 30%. The aim was to provide for any poor responses and to cater for wider representation of the entrepreneurial farming youth population within Kikuyu Sub-county. Simple random sampling was then used to select 120 youths, across the farming youth groups depending on their availability.

3.5.3 The Simple Random Sampling Algorithm

An encounter with any group of youths in Ward required a proportionate selection of 75% of the members. The respondents were assigned numbers from 1 to n (n=number of youths in the group met). The numbers were then drawn randomly one at a time. The respondent whose number was drawn was then given the questionnaire. The process was repeated until 75% of the respondents were selected across the active entrepreneurial farming youths. Group populations from each of the five wards were selected based on the 75% selection criteria (Table 3.1). Random sampling was done typically without replacement. The researcher deliberately avoided choosing any member of the population more than once. This method was a variant of naive algorithm which is a draw-by-draw algorithm, where at each step respondents were removed from the set with equal probability and put in the sample. The algorithm was repeated in all the Wards until the desired sample of 120 was selected. The unbiased random selection of individuals was important so that the sample could accurately represent the population.

Conceptually, simple random sampling is the simplest of the probability sampling techniques that is free of classification errors, and requires minimum advance knowledge of the population other than the frame, which in this case was known to be 161. The simplicity of Simple random sampling made it to the researcher relatively easy to interpret the data collected. Simple random sampling was therefore best suited for this situation where not much information was available about the population and data collection could be efficiently conducted randomly on respondents and at low cost. Completed

questionnaires were then collected from the respondents. 111 questionnaires were successfully completed and returned to the researcher. This gave a response rate of 92.5%

Table 3.1 Illustrate proportionate sampled youths

Wards	Groups	Members	Proportion	Sampled
Nachu	1	23	75%	17
Karai	2	47	75%	35
Kikuyu	3	39	75%	29
Kinoo	1	25	75%	19
Sigona	1.	27	75%	20
TOTAL		**161**	**75%**	**120**

Source: KCGR (2015).

3.6 Research Instrument

The study was done by use of self administered semi-structured questionnaires to collect data from respondents through interviews and focus group discussions.

3.7 Reliability and Validity of the Research instruments

A Pilot test (pre-test) on the semi-structured questionnaire was done on 10 selected youths aged 15-34 at the county and who were not to be respondents in the study. Quantitative data from the pre-test results were exposed to reliability test done by use of statistical tests before the tool was used in the actual study. Reliability questionnaires were evaluated through Cronbach's alpha, which measured their internal consistency, that is, how closely related a set of items were as a group. Cronbach's alpha is an index of reliability. Alpha coefficient ranges in value from 0 to 1 and may be used to describe the reliability of factors extracted from dichotomous (that is, questions with two possible answers) and/or multi-point formatted questionnaires or scales (for example, rating scale: 1 = Strongly Disagree, 5 = Strongly Agree). The higher the score, the more reliable the generated scale is. Nunnaly (1978) has indicated 0.7 to be an acceptable reliability Coefficient. Cronbach's alpha was established for all objectives to determine if each scale(objective) will produce the same results, should the research be done sometimes later on. For the instruments to be said to be reliable therefore, the alpha coefficient obtained was compared against the threshold of 0.7, and it should be found to be higher. This study

found, from the pre-test data, a Cronbach alpha of 0.857 which was above the threshold value of 0.7, hence acceptable as recommended by Nunnaly (1978). The results of the cronbach alpha test was used to determine which items to be deleted from each and every objective as depicted in the data collection tool in order to increase on their reliability. The results also helped the researcher to correct inconsistencies arising from the instrument which ensured that they measured what was intended. Test of reliability is important when variables developed from summated scales are used as predictor components in objective models. It is important to establish if the same set of items would generate the same responses should the test (the same questions) be re-administered to the same respondent. Values derived from test instruments are said to be reliable only when they provide stable and reliable responses over a repeated administration of the test. Computation of Cronbach's alpha is based on the reliability of a test relative to other tests with the same number of items, and measuring the same construct (variable) of interest (Hatcher, 1994). The essence was not only to come up with the reliability index of the construct but also managed to improve on it.

3.8 Data Collection Techniques

The study was conducted through face to face interviews, questionnaires, and focus group discussions to collect primary facts. Secondary data was collected by reviewing credible sources such as the portals and other available documentation in agriculture and the youth enterprises.

3.9 Data Analysis

Once the questionnaires were filled in, the completed questionnaires were cleaned and/or edited, for completeness and consistency. Both content and descriptive methods of analysis were used. Content analysis was used to analyze respondents' views on the Framework for adoption of e-agricultural information services by entrepreneurial youths in Kikuyu sub-county. The responses were classified or grouped into various categories. The collected data were coded and keyed into SPSS. Data was analyzed and hypotheses tested by the use of Statistical Package for Social Sciences (SPSS), version 17 and Partial Least Squares Structural Equation Modeling (PLS-SEM) Techniques, using SmartPLS version 2 M3. Descriptive statistics such as frequencies, means, modes and standard deviations were generated from the collected data by the SPSS and the Smart PLS to aid in data analysis. Presentations such as Charts, graphs, frequency tables were used as appropriate. Microsoft Office 2007 was used for word processing, Excel worksheet calculations and PowerPoint presentations were also executed. All the demographic and descriptive statistics analysis were done using SPSS. The SPSS data file was then transferred to Smart PLS in CSV (comma separated values) format, for the frame work modeling.

Smart PLS algorithm was used. PLS algorithm is essentially a sequence of regressions in terms of weight vectors. The basic PLS algorithm, as suggested by Lohmöller (1989), included the following three stages:

Stage 1: Iterative estimation of latent variable scores, consisting of a 4-step iterative procedure that is repeated until convergence is obtained or the maximum number of iterations is reached:

a) Outer approximation of the latent variable scores,
b) Estimation of the inner weights,
c) Inner approximation of the latent variable scores, and
d) Estimation of the outer weights.

Stage 2: Estimation of outer weights/loading and path coefficients

Stage 3: Estimation of location parameters

Bootstrapping algorithm was executed to test the significance of estimated path coefficients in PLS-SEM. During bootstrapping run, the algorithm created sub-samples, of randomly drawn observations from the original set of data (with replacement). The essence of data analysis was to investigate or find the interactions between the independent and dependent variables (factors). Possible associations were investigated and/or established.

3.10 Formulate eAIS Adoption Framework

The essence of the study was to formulate a framework for e-agricultural information services that will guide the youths of Kikuyu Sub-county of Kiambu into adopting e-agricultural information services. The conceptual framework was re-adjusted in accordance with the results of the analysis. It was modified to fit into the framework for adoption of e-agricultural information services based on the results of analysis of the data collected from the entrepreneurial youth farmers. The framework is meant to influence the adoption of technology for improved knowledge sharing and efficiency and to entice the youths into agriculture through the adoption and use of eAIS.

3.11 Logical and Ethical Considerations

The study was done after seeking letter of Introduction from the director of the school. The office of the Governor at the sub-county was visited for rapport and direction before conducting the study. Respondents were made to participate voluntarily in the study. Consent of the respondents was sought before the interview was conducted. Anonymity was kept for the respondents by allocating numbers to the questionnaires instead of their names or group names.

CHAPTER 4

RESULTS AND DISCUSSION

4.0 The Introduction

The purpose of the study was to design a framework for adoption of e-agricultural information services (eAIS) by the entrepreneurial youths. The analysis presented in this chapter involved the use of descriptive analysis where frequencies, percentages, and modes were considered. The study also conducted inferential analysis to measure the suitability of the variables.

4.1 The demographic results

This section contains the results of demographics characteristics of the respondents. Charts were used to represent results on demographic characteristics. The charts contain percentages showing how the respondents answered the questions.

4.1.1 Gender

Majority of the respondents were female at 52% while male respondents were 48% of the total respondents. This was in line with Kenya Population Census Survey (2009) which states that women are almost twice as much as men in Kenya

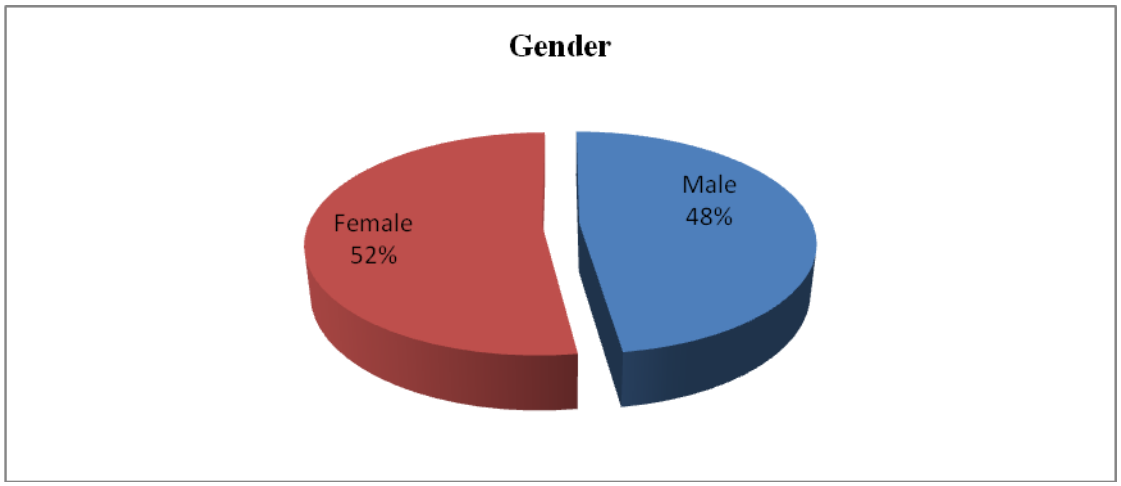

Figure 4.1: Showing the Gender of the Respondents

4.1.2 Age Group

Majority (34%) of the respondents that participated in the study were between 20 and 24 years, 29% were between age 25 and 29 while 30 to 34 years and 15 to 19 years was represented by 28% and 9% respectively. The result agreed with Kenya's population figures (2009) where youths below 24 years

were the highest in the population. The CIA world fact book (2014) also put the population of this age group to be accounting for more than 20% of the population in Africa.

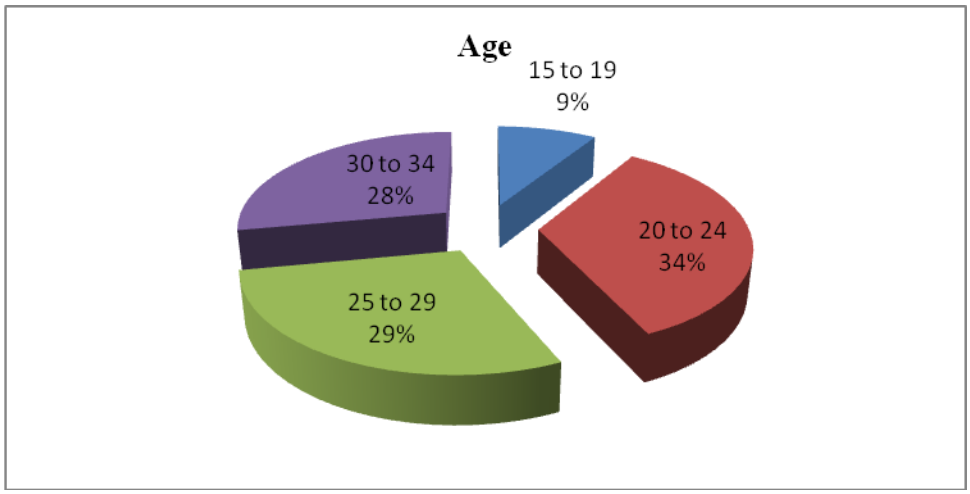

Figure 4.2; Showing the Age Group of the Respondents

4.1.3 Religion

Majority (99%) of the respondent were Christian as shown by the result in the figure below. This is acceptable since the constituency is nearly 100% Christian as started in the Census figures of 2009.

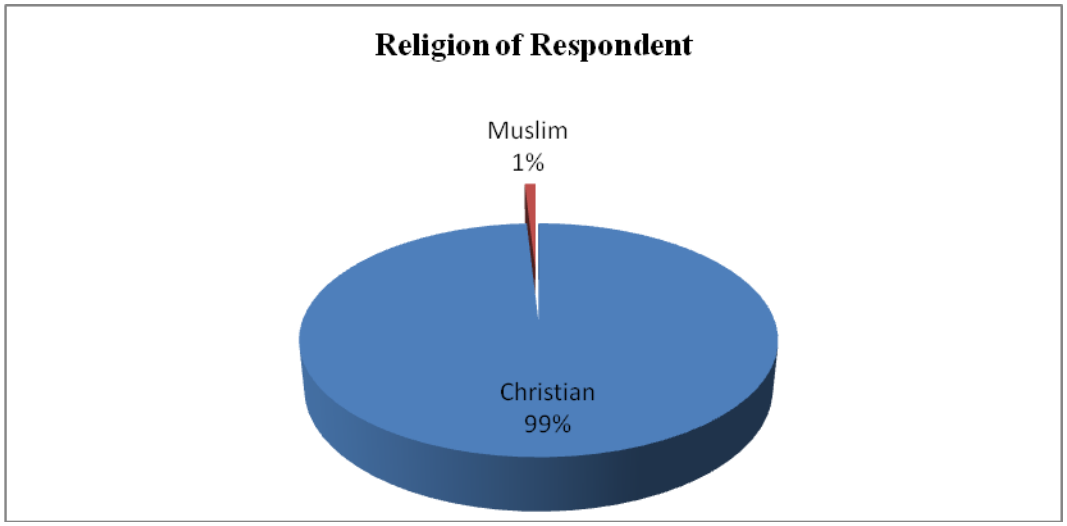

Figure 4.3: Showing the Religion of Respondents

4.1.4 Residence

All the respondents were residents of Kikuyu Sub-county as was expected from the planning of the study.

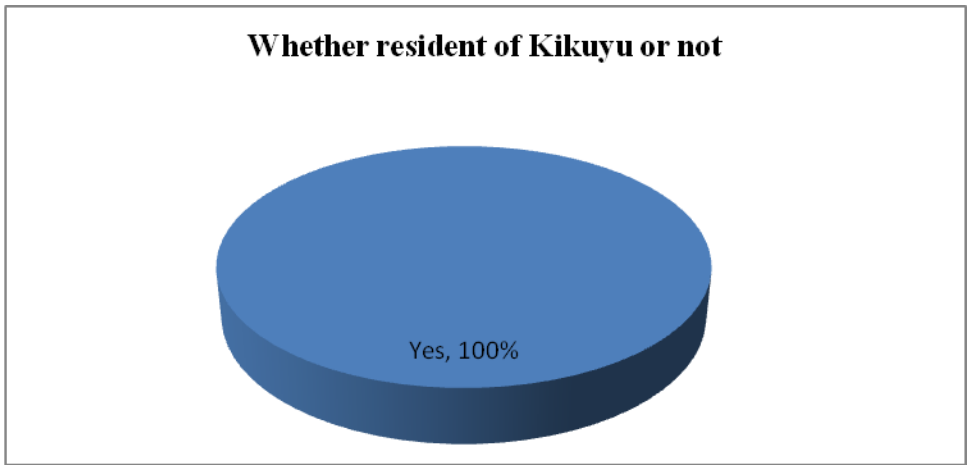

Figure 4.4: Showing the Residence of the Respondents

4.1.5 Engagement

The study sought to establish the mode of engagement in agriculture by the respondents. The results indicate that 72% of the respondents engaged in agriculture as a part time job. Those who had full time mode of engagement were 28% as shown below. MOALF report (2012) indicates that only 10% of youths in Kenya are in full time agriculture and therefore the result was not surprising. In other reports it is indicated that youth potential in Agriculture is not yet fully utilized. Moreover, Heeks and Molla (2009) find in their ICT evaluation compendium that ICT is not fully utilized in agriculture.

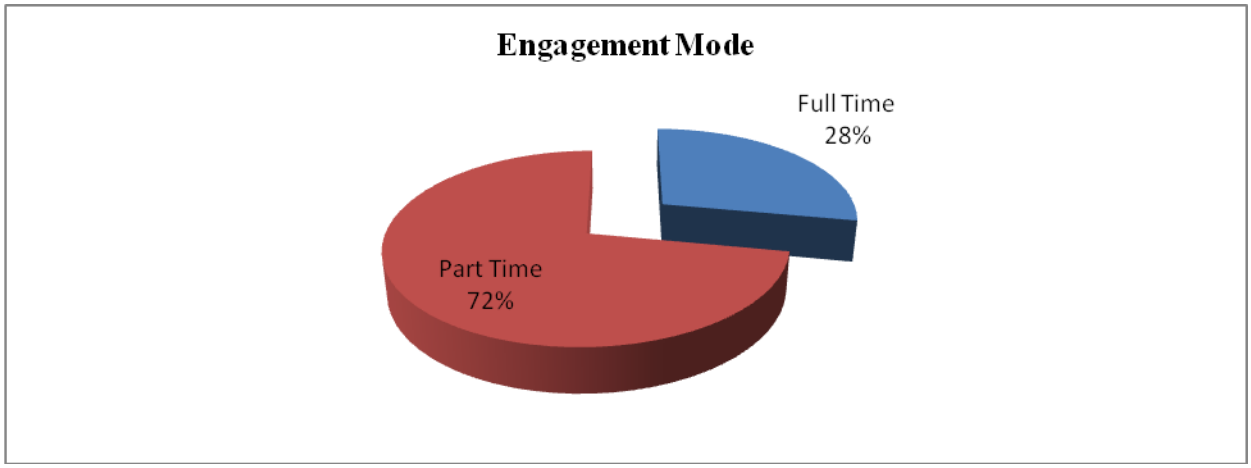

Figure 4.5: Showing Agriculture Engagement Mode of the respondents

4.1.6 Years in Agriculture

Majority represented by 76% indicated they have been in agriculture for between 1 and 5 years. Those in 6 and 10 years categories were 16% while 11 to 15 years and above 16 years had a representation of 2%

and 6% respectively. There were no findings to refute or support these results and therefore could still be investigated.

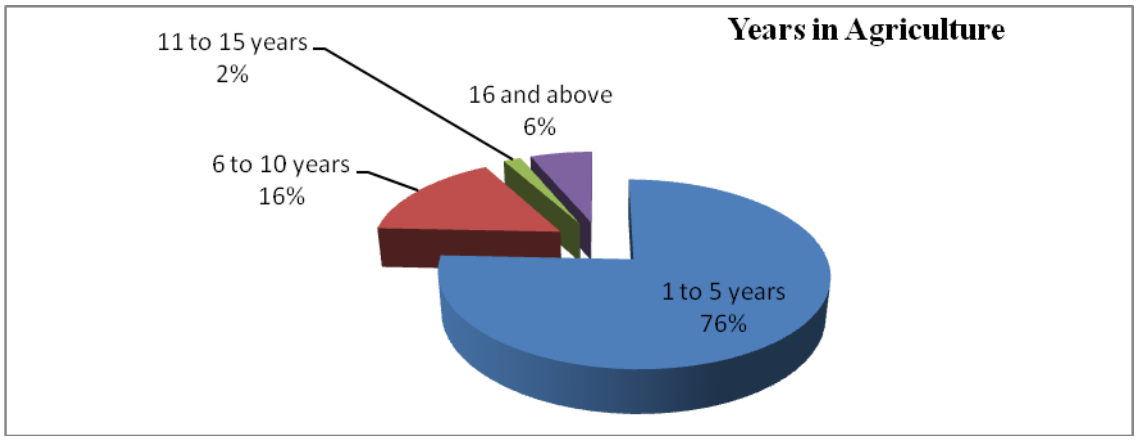

Figure 4.6: Showing Years in Agriculture

4.1.7 Other Engagements

Apart from agriculture, the study sought to find out other engagements that the respondent's participated in. The results indicate that majority of the respondents represented by 66% were self employed; those employed were represented by 14%, house wife at 8% as shown below. Youth in Kenya (15 – 34 year olds), who form 35% of the Kenyan population, have the highest unemployment rate of 67%, (Kaane, 2014). This has been confirmed in this study.

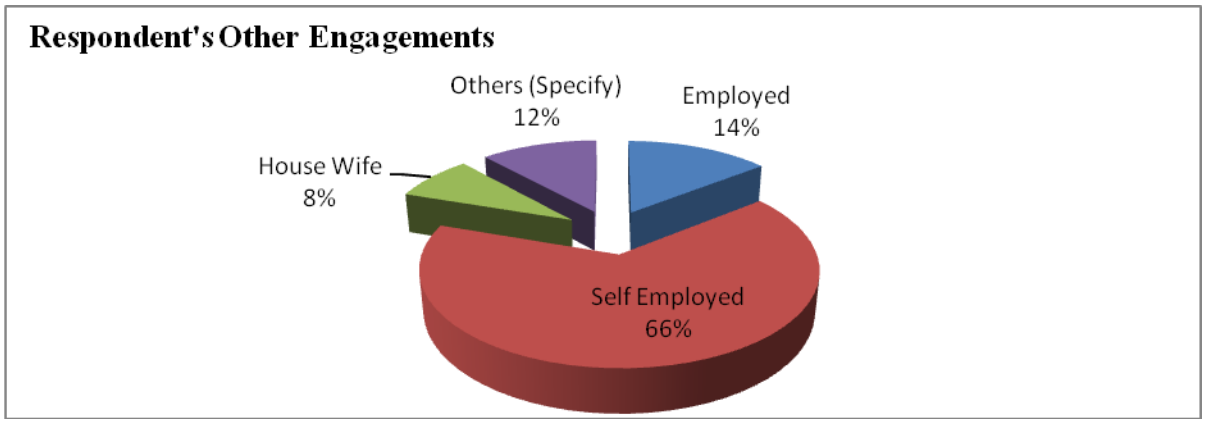

Figure 4.7: Shows Respondent's Other Engagements

4.1.8 Marital Status

This section had four categories which included; married, divorced, separated and single. The results show that in the single category were the majority represented by 62% followed by 32% for those in

marriage. Divorced and separated categories had 4% and 2% representation respectively. This is as expected, since the study targetted the youth, and majority are in age group 20 to 24. This may explain majority singles.

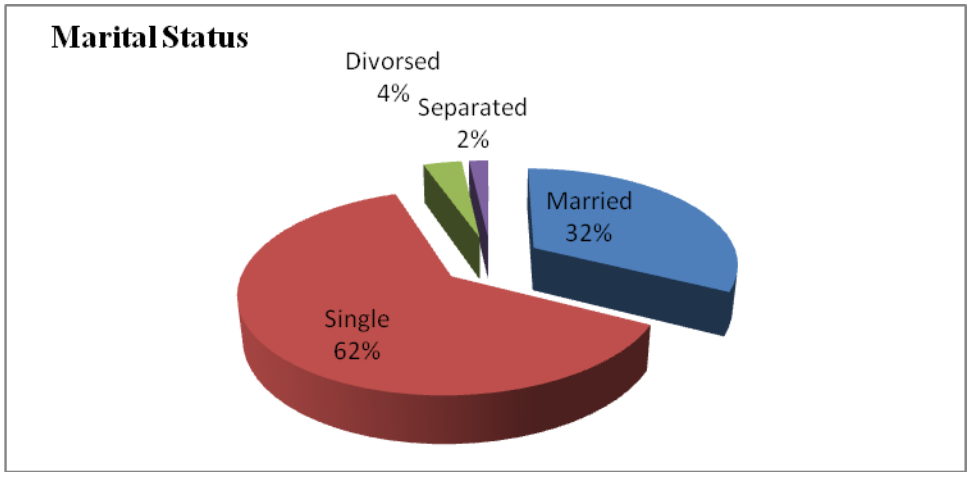

Figure 4.8: Shows Respondents' Marital Status

4.1.9 Level of education

The study also sought to find out the level of education of the respondents. The result below indicate that majority (32%) of the respondents had university education followed by secondary education at 27%. College and primary level had a representation of 23% and 18% respectively. Nobody interviewed was totally illiterate and this was expected since the study targetted youths who were active members of youth groups. Perhaps this was also influenced by Kikuyu constituency proximity to the city of Nairobi where literacy level is high.

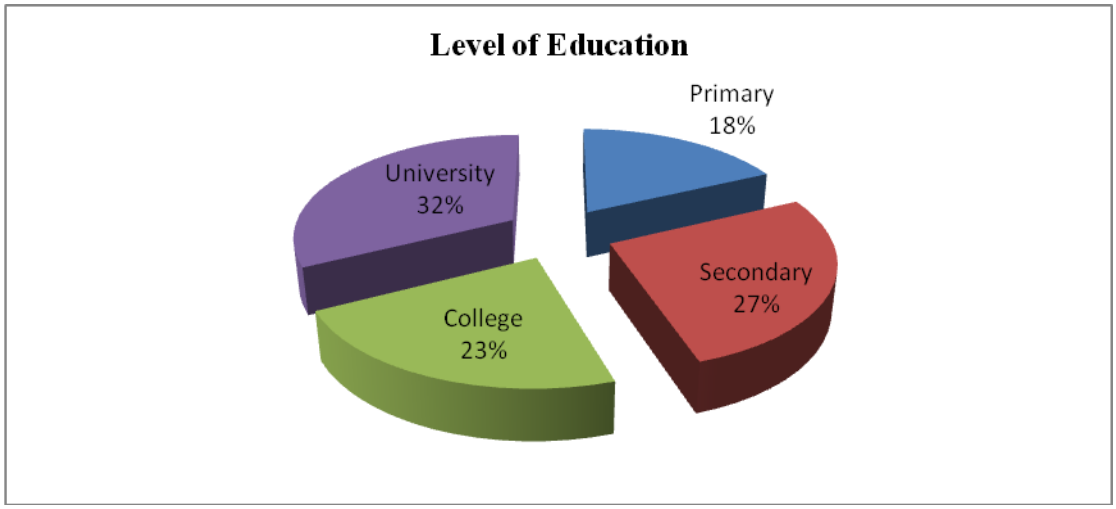

Figure 4.9: Shows Respondents' Level of Education

4.1.10 Level of Disposable Income

The result indicate that majority (27%) of the respondents had a disposable income level of between 2001 and 3000 and that of above 5001, those in 4001 to 5000 category were represented by 20% while 1000 to 2000 were represented by 15% and finally 3001 to 4000 represented by 11%. Income figures are normally not accurate, but with the results found the youths were low income earners even for those who were employed.

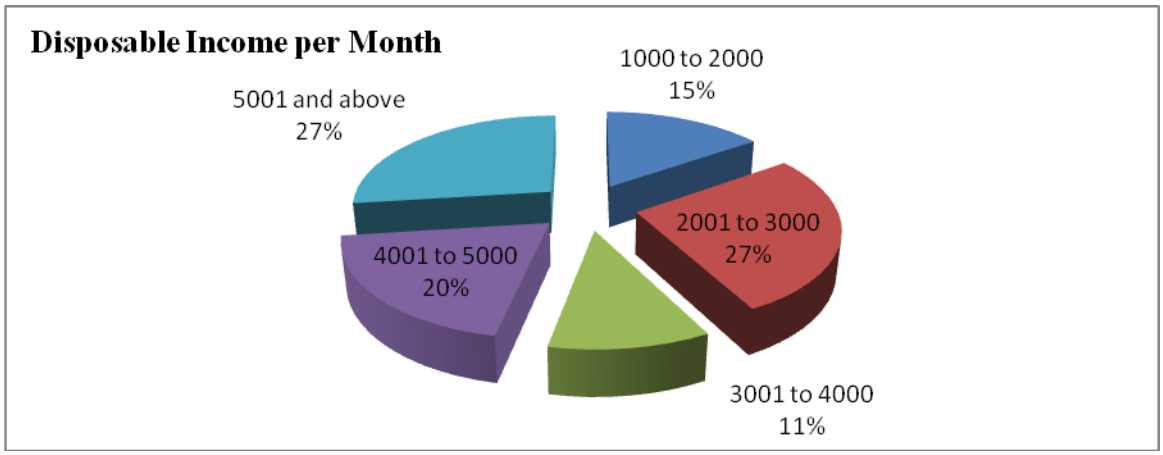

Figure 4.10: Shows Respondents' Level of Disposable Income

4.1.11 Respondent's Access to Internet Access

The results indicate that majority (91%) of the respondents had access to internet. This finding was acceptable since most of the respondents were literate and most likely they were interested in updated

information from the internet. Furthermore internet resource have been made available by mobile phone internet providers such as Safaricom, Airtel and Orange Limited companies.

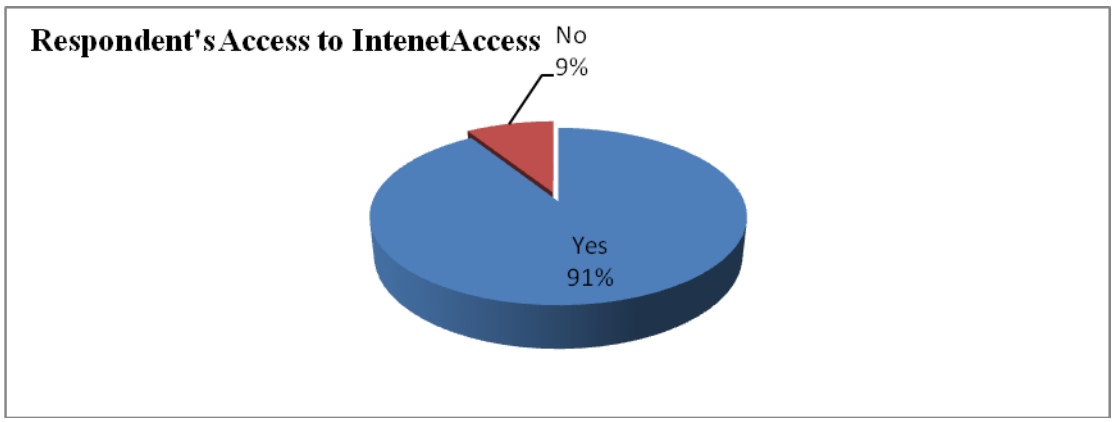

Figure 4.11: Shows Respondents Access of the Internet

4.1.12 What the Respondent Mostly Use To Connect To the Internet

For those respondents that access the internet, the study sought to find out what they mostly use to connect to the internet. The results indicate that most of the respondents use mobile phone which was represented by 65% followed by those that use laptop at 24% then those that use cyber connections at 7% and finally those that use home computers at 4%.

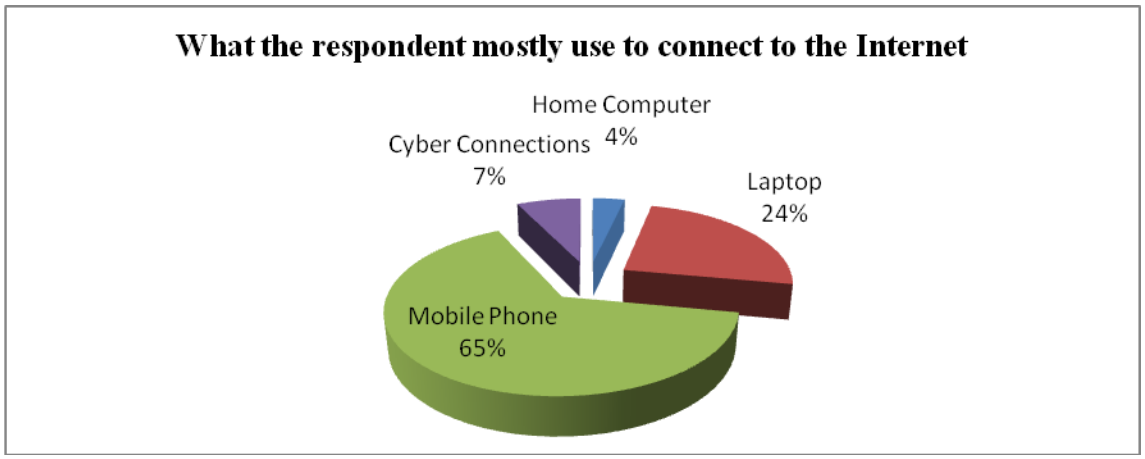

Figure 4.12: Shows Devices used by Respondents to Connect to the Internet

4.1.13 e-Agricultural Information Services Platform Mostly Used

The study also sought to find out the e-agricultural information platforms mostly used by the respondents. The result indicates that most of the respondents (54%) use mobile phones as their eAIS platform; face book was second at 23% and finally web portals at 23%. This is because mobile phones are affordable and internet access options provided by the service providers such as Safaricom.

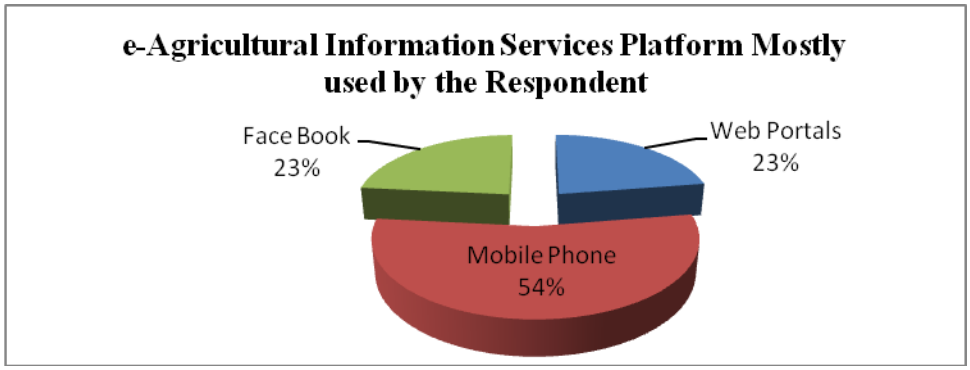

Figure 4.13: Shows Respondents eAIS Platforms

4.1.14 Youth View - Is There Need for Adopting eAIS

The study also sought to find out if the youth felt there was a need to adopt eAIS. The results indicate that all the respondents agreed that the there was a need to adopt eIAS. Mishra and Williams (2006), suggested that adoption of computers with internet access allowed website surfing activity and it is positively related to age and educational level of the operator, off-farm business income, presence of a spouse and regional location of the farm and this is supported by a research done by Burke and Sewake (2008), who claimed that those with higher education level prefer to own and surf website for their enterprises.

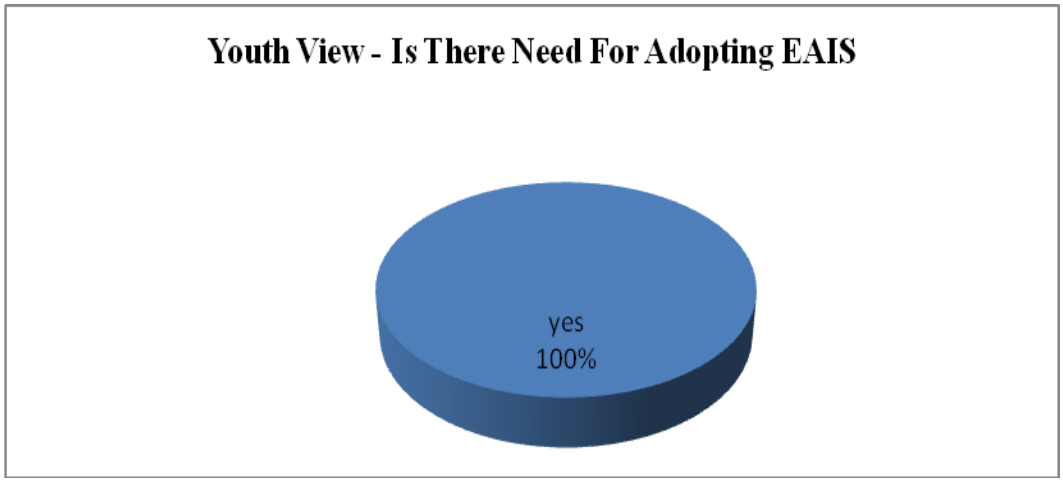

Figure 4.14: Shows Youth View on Need for Adopting eAIS

4.1.15 Youth View - Agricultural Information Services Dissemination Satisfactory?

The study sought to find out the views from the youth on whether agricultural information services dissemination was satisfactory. The results show that 72% agreed that it was satisfactory against 28% who felt it was not satisfactory.

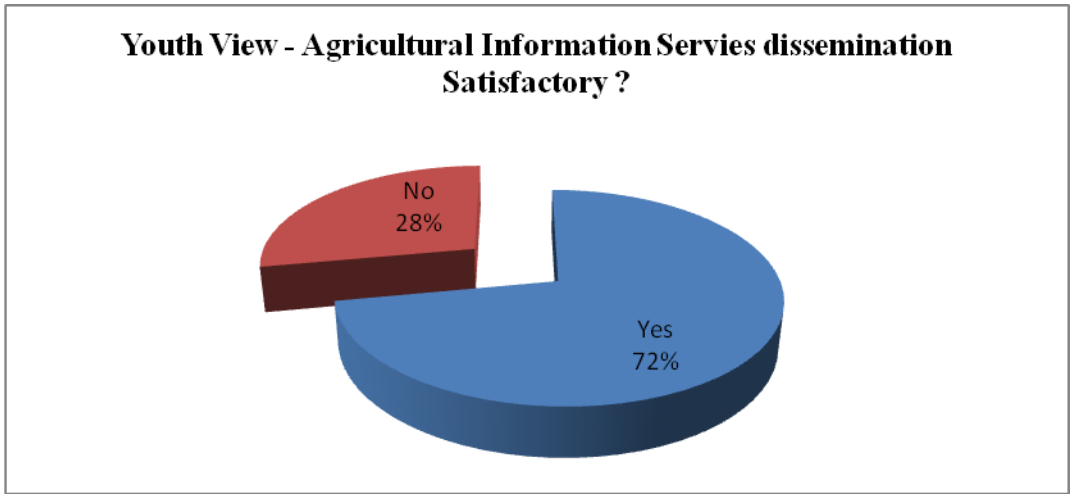

Figure 4.15: Shows Youth Views on Agricultural Information Services Dissemination

4.1.16 Youth View - Are There Challenges That Affect Information Dissemination

The result shows that 86% agreed that indeed there are challenges that impede information dissemination while 14% felt there were no challenges affecting dissemination of information.

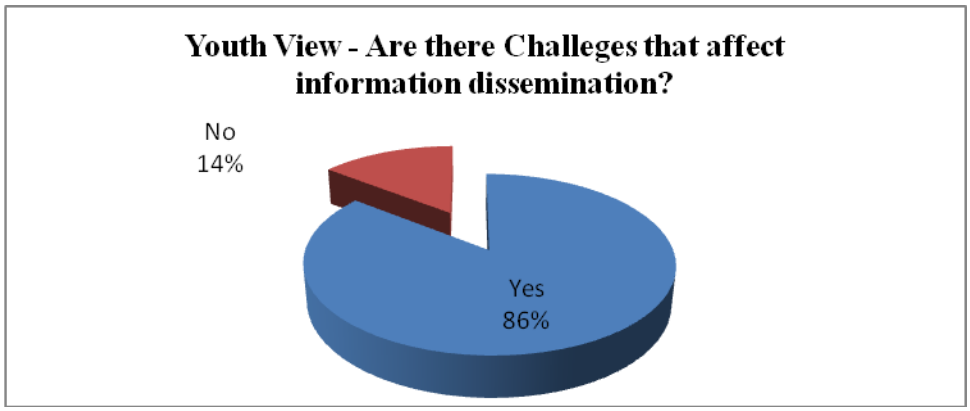

Figure 4.16: Youth Views on challenges that affect Dissemination Satisfactory

4.1.17 Benefits Expected

The figure below shows some of the benefits the respondent expected or get from adoption of eAIS. Majority represented by 35% felt there would be increased networking; those who expect improved agriculture due to adoption were 18%, whereas 24% of the respondents expected increased information availability.

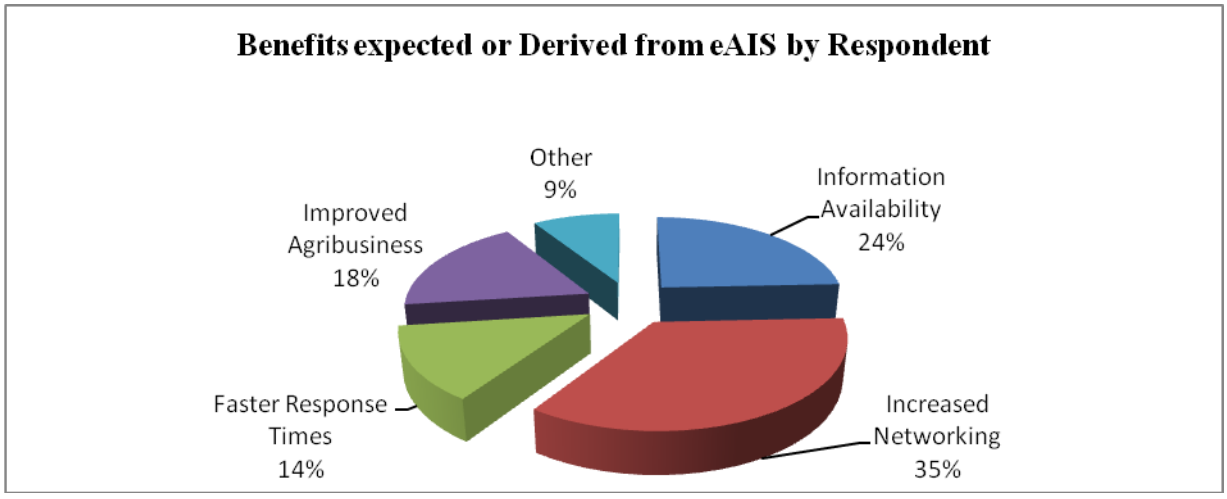

Figure 4.17: Shows Suggestion on Expected Benefits

4.1.18 Challenges Faced By the Respondent

The study also sought to establish some of the most common challenges the respondents faced in their agricultural activities in regard to Information Services. The result below indicate that a good number (34%) of the respondents felt finance availability was their major challenges, followed by travelling to get information at 21%, then lack of markets or information at 14%, land for farming at 5% and finally pests and diseases at 3%. The results are shown in the figure below. The respondents formed their

groups based on income generating farm enterprises and most of them were not employed so funding is an issue. They also were discussing passionately about the youth Development funds that had been created by the Government since 2013.

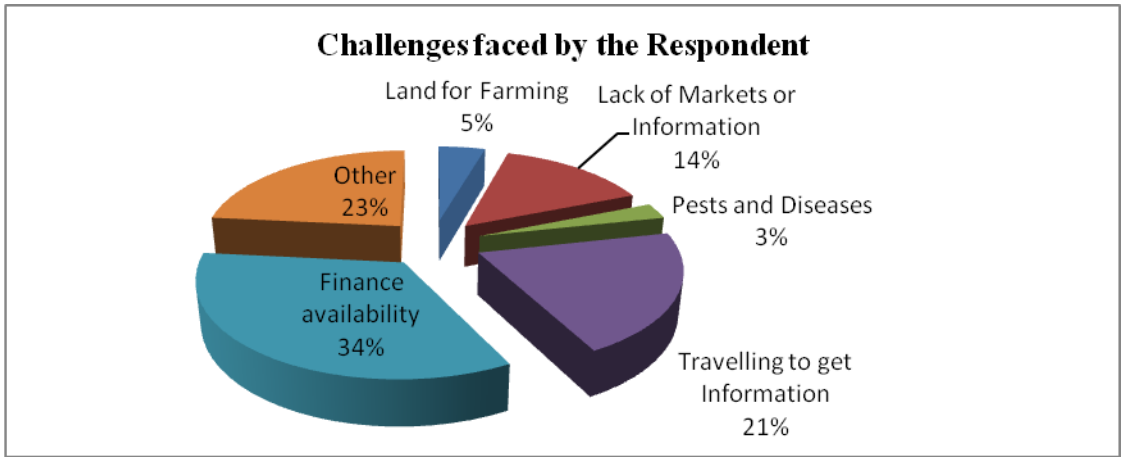

Figure 4.18: Shows Challenges Faced By the Respondent

4.1.19 Suggested Remedial Actions by the Respondent

The respondents suggested the following remedial actions. Those who suggested freely available eAIS were 25%, while 21% suggested government subsidies for ICT use. Those who suggested affordable internet were 11% as shown below. Resource Centres at Ward level and Market provision were suggested by 12% and 4% respectively. Other options such as provision of computers and smart phones to farmers , provision funds and trainings on internet use, were suggested by 27% of the respondents.

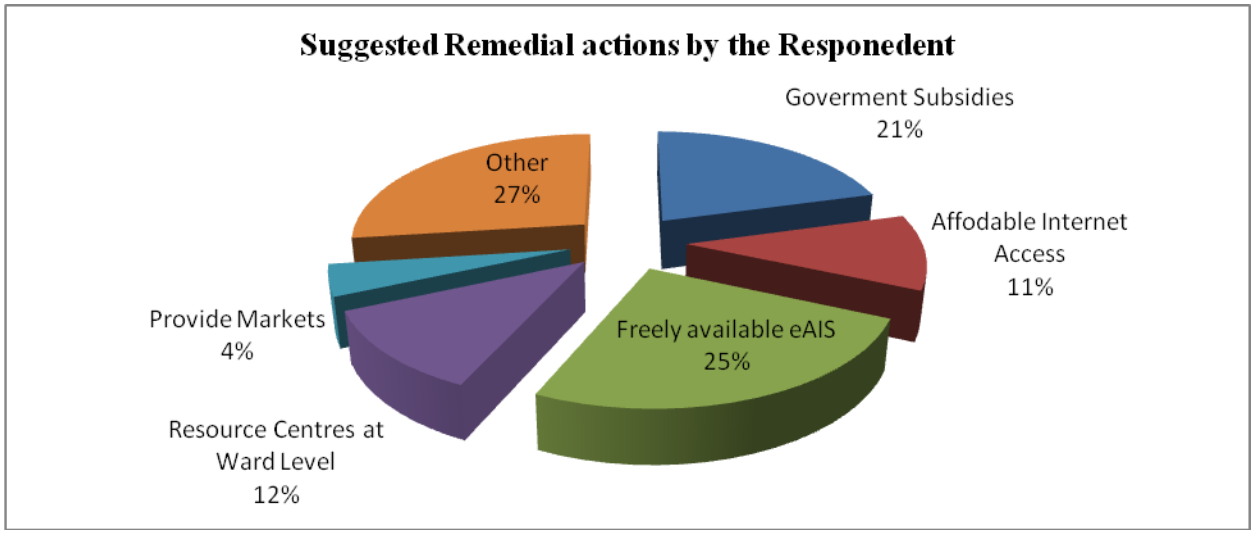

Figure 4.19: Shows Suggested Remedial Actions by the Respondent

4.2 The descriptive results

4.2.1 Perceived Usefulness

The results in the table below shows that most of the respondents agreed and strongly agreed on the indicators on perceived usefulness. The frequencies confirm that majority of the respondents agreed which is shown by the high percentages. The scale thus leans towards Agreed and strongly agreed. PU1. PU2, PU6 and PU7 were strongly agreed on at 59.5%, 51.4%, 55.9% and 45.9% respectively and PU3, PU4, PU5 and PU8 were agreed on at 55.0%, 51.4%, 51.4% and 56.8% respectively.

Table 4.1 Illustrating Frequencies of Response for Perceived Usefulness

Perceived Usefulness	Rating										Total
	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		
	N	%	N	%	N	%	N	%	N	%	N
PU Indicators											
PU1 - of eAIS adoption will increase my profits	2	1.8	1	0.9	0	0	42	37.8	66	59.5	111
PU2 - of eAIS adoption is more Convenient	0	0	0	0	1	0.9	53	47.7	57	51.4	111
PU3 - of eAIS adoption will improve performance	0	0	3	2.7	4	3.6	61	55.0	43	38.7	111
PU4 - of eAIS adoption will improve productivit	0	0	0	0	4	3.6	57	51.4	50	45.0	111
PU5 - of AIS adoption will improve effectivenes	0	0	0	0	4	3.6	57	51.4	50	45.0	111
PU6 - of eAIS adoption will be useful in job	0	0	0	0	1	0.9	48	43.2	62	55.9	111
PU7 - of eAIS adoption will be more attractive	0	0	0	0	11	9.9	49	44.1	51	45.9	111
PU8 - of eAIS adoption will be relevant to Need	0	0	0	0	8	7.2	63	56.8	40	36.0	111

4.2.2 Perceived Ease of Use

The results in the table below shows that majority of the respondents agreed and strongly agreed on most of the indicators on PEOU. This implies that respondents have the perception of ease of eAIS use. The respondents strongly agreed to the indicator PEOU1 at rating of 59.5%. Respondents agreed on PEOU2, PEOU3, PEOU4 and PEOU5 with frequencies of 55.0%, 54.1%, 47.7% and 51.4% respectively.

Table 4.2 Illustrating Frequencies of Response for Perceived Ease of Use

Perceived Ease of Use	Rating								Total
	Disagree		Neutral		Agree		Strongly Agree		
	N	%	N	%	N	%	N	%	N
PEOU Indicators									
PEOU1 - It easy to become skillful in eAIS	0	0	3	2.7	42	37.8	66	59.5	111
PEOU2 - It does not require Much expert help	3	2.7	16	14.4	61	55.0	31	27.9	111
PEOU3 - eAIS is straight forward and easy to understand	0	0	18	16.2	60	54.1	33	29.7	111
PEOU4 - Adoption and use of eAIS does not require much effort	4	3.6	12	10.8	53	47.7	42	37.8	111
PEOU5 – Adoption and use of eAIS is easy to do	0	0	8	7.2	57	51.4	46	41.4	111

4.2.3 Intention to Use

The results in the table below shows that majority of the respondents agreed and strongly agreed on most of the indicators on intention to use. This implies that respondents have the willingness to use eAIS. The respondents strongly agreed to the indicators of suppose the Respondent has access and if eAIS will be useful in respondent's job and it is easy to use then the respondent intends to adopt and use. These were approved at 62.2% and 51.4%, 44.1% respectively. All the remaining indicators were agreed on at a rating of 54.1% and 52.3% respectively.

Table 4.3 Illustrating Frequencies of Response for Intention to Use

Intention to Use	Rating								Total
	Disagree		Neutral		Agree		Strongly Agree		
	N	%	N	%	N	%	N	%	N
ITU Indicators									
ITU1 - Suppose the Respondent has access will adopt and use	0	0	3	2.7	39	35.1	69	62.2	111
ITU2 - If eAIS will be useful in Respondent's job, intends adopt	3	2.7	5	4.5	46	41.4	57	51.4	111
ITU3 - If eAIS is easy to use in Respondent's job, intends adopt	2	1.8	13	11.7	47	42.3	49	44.1	111
ITU4 - If eAIS helps to attain gains in job Performance	0	0	1	0.9	60	54.1	50	45.0	111
ITU5 - If eAIS helps to improve delivery on specific tasks	0	0	2	1.8	58	52.3	51	45.9	111

4.2.4 User Behavior

The results in the table below shows that majority of the respondents agreed and strongly agreed towards intention to adopt and use eAIS on most of the indicators on user behavior. This implies that respondents have the willingness to develop intention for use of eAIS. UB1, UB2, UB3 and UB4 were strongly agreed on at rates of 60.4%, 55.0%, 49.5% and 45.0% respectively.

Table 4.4 Illustrating Frequencies of Response for User Behavior

User Behavior	Rating								Total
	Disagree		Neutral		Agree		Strongly Agree		
	N	%	N	%	N	%	N	%	N
UB Indicators									
UB1 - The respondent gets Data or Information when needed	0	0	11	9.9	33	29.7	67	60.4	111
UB2 - The Respondent Uses eAIS when needed	0	0	14	12.6	36	32.4	61	55.0	111
UB3 - The Respondent Accesses eAIS when needed	3	2.7	11	9.9	42	37.8	55	49.5	111
UB4 - Its convenient for the Respondent to access and use	3	2.7	12	10.8	46	41.4	50	45.0	111

4.2.5 Adoption of eAIS

The results in the table below shows that majority of the respondents agreed and strongly agreed on most of the indicators on adoption of eAIS. Adoption1, Adoption3 and Adoption4 were strongly agreed on at 47.7%, 63.1% and 49.5 respectively. Adoption2 was agreed on at 51.4%. This confirms the respondents' willingness to adopt and use eAIS.

Table 4.5 Illustrating Frequencies of Response for Adoption of eAIS.

Adoption of eAIS	Rating										Total
	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		
	N	%	N	%	N	%	N	%	N	%	N
Adoption of eAIS Indicators											
Adoption1- The Respondent has or will have access to eAIS	3	2.7	2	1.8	3	2.7	50	45.0	53	47.7	111
Adoption2 - The Respondent is using or will use eAIS	3	2.7	2	1.8	3	2.7	57	51.4	46	41.4	111
Adoption3 - The Respondent likes eAIS	0	0	0	0	2	1.8	39	35.1	70	63.1	111
Adoption4 - Its Convenient for the Respondent to access	0	0	0	0	7	6.3	49	44.1	55	49.5	111

4.2.6 Subjective Adoption Norms

The results in the table below shows that shows that majority of the respondents agreed and strongly agreed on most of the indicators on Subjective Adoption Norms. This implies that respondents have the willingness to use eAIS, as influenced by subjective adoption Norms. This table clearly shows that majority of the respondents either strongly agreed or agreed to indicators on subjective adoption norms. SAN1, SAN2 and SAN3 were agreed on at 39.6%, 45.0% and 50.5% respectively.

Table 4.6 Illustrating Frequencies of Response for Subjective Adoption Norms

Subjective Adoption Norms	Rating										Total
	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		
	N	%	N	%	N	%	N	%	N	%	N
SAN Indicators											
SAN1 - People around the Respondent thinks She/he should adopt and use eAIS	3	2.7	6	5.4	18	16.2	44	39.6	40	36.0	111
SAN2 - People important to the Respondent thinks She/he should adopt and use	3	2.7	1	0.9	25	22.5	50	45.0	32	28.8	111
SAN3 - People acquitted with the Respondent thinks She/he should adopt and use	0	0	4	3.6	19	17.1	56	50.5	32	28.8	111

4.2.7 Image

The respondents agreed to most indicators on image. This table clearly depicts that majority of the respondents either strongly agreed or agreed to indicators on image. Both Image1 and Image2 were agreed on at frequencies of 61.3%. Image 3 was agreed on at frequency rate of 53.2%.

Table 4.7 Illustrating frequencies of response for Image

Image	Rating								Total
	Disagree		Neutral		Agree		Strongly Agree		
	N	%	N	%	N	%	N	%	N
Image Indicators									
Image1 - Enterprises which have adopted and use eAIS have got more prestige	9	8.1	14	12.6	68	61.3	20	18.0	111
Image2 - Enterprises which have adopted and use eAIS have got high profile	5	4.5	16	14.4	68	61.3	22	19.8	111
Image3 - Enterprises which have adopted and use eAIS have got high status symbol	9	8.1	13	11.7	59	53.2	30	27.0	111

4.2.8 Job Relevance

The results in the table below show that most of the respondents agreed and strongly agreed on the indicators on job relevance. The figure illustrates clearly that majority of the respondents either strongly agreed or agreed to indicators on job relevance. JR1 was strongly agreed on at frequency of 55.0%. JR2 and JR3 were agreed on at frequencies of 53.2% and 45.0% respectively.

Table 4.8 Illustrating Frequencies of Response for Job Relevance

Job Relevance	Rating								Total
	Disagree		Neutral		Agree		Strongly Agree		
	N	%	N	%	N	%	N	%	N
JR Indicators									
JR1 - Adopting and using eAIS would be important in respondent's job	0	0	0	0	50	45.0	61	55.0	111
JR2 - Adopting and using eAIS would be relevant to the Respondent	0	0	2	1.8	59	53.2	50	45.0	111
JR3 - Adopting and using eAIS would help the Respondent attain objectives	1	0.9	15	13.5	50	45.0	45	40.5	111

4.2.9 Output Quality

The results in the table below show that most of the respondents agreed or strongly agreed on the indicators on output quality. The figure illustrates clearly that majority of the respondents either strongly agreed or agreed to indicators on Output Quality. OQ1 was agreed on at frequency of 49.5%. OQ2 and OQ3 were strongly agreed on at frequencies of 51.4% and 44.1 % respectively.

Table 4.9 Illustrating frequency of response for Output Quality

Output quality	Rating								Total
	Disagree		Neutral		Agree		Strongly Agree		
	N	%	N	%	N	%	N	%	N
OQ Indicators									
OQ1 - The Quality the Respondent gets from eAIS is of high value	0	0	4	3.6	55	49.5	52	46.8	111
OQ2 - The Quality the Respondent gets from eAIS is acceptable	3	2.7	5	4.5	46	41.4	57	51.4	111
OQ3 - The Respondent has no problem with the Quality got from eAIS	2	1.8	13	11.7	47	42.3	49	44.1	111

4.2.10 Type of e-service

The results in the table below show that most of the respondents agreed and strongly agreed on the indicators on regarding type of e-service. The figure illustrates majority frequency responses. This table clearly shows that majority of the respondents either strongly agreed or agreed to indicators on type of e-service. TOS1, TOS2 and TOS3 were agreed on at frequency rates of 54.1%, 62.2% and 48.6% respectively.

Table 4.10: Illustrating Frequencies of Response for Type of e-service

Type of Service	Rating								Total
	Disagree		Neutral		Agree		Strongly Agree		
	N	%	N	%	N	%	N	%	N
TOS Indicators									
TOS1 - Adoption and use of eAIS will influence the way the Respondent gathers information from other organisations	0	0	1	0.9	60	54.1	50	45.0	111
TOS2 - Adoption and use of eAIS will influence the way the Respondent exchanges information with other organisatio	0	0	1	0.9	69	62.2	41	36.9	111
TOS3 - Adoption and use of eAIS improves the ability to perform specific tasks by the Respondent	1	0.9	6	5.4	54	48.6	50	45.0	111

4.2.11 Connectivity

The results in the table below show that most of the respondents agreed and strongly agreed on the indicators regarding Connectivity. This table clearly shows that majority of the respondents either strongly agreed or agreed to indicators on Connectivity with Connectivity1, Connectivity2 and Connectivity3 being strongly agreed on at frequency rates of 56.8%, 58.6% and 56.8% respectively. Connectivity4 was agreed on at 56.8%

Table 4.11 Illustrating Frequencies of Response for connectivity

Connectivity	Rating						Total
	Neutral		Agree		Strongly Agree		
	N	%	N	%	N	%	N
Connectivity Indicators							
Connectivity1 - Adoption of eAIS will aid Respondent's information exchange with other enterprises.	0	0	48	43.2	63	56.8	111
Connectivity2 - Adoption and use of eAIS or connection to eAIS will aid Respondent's knowledge sharing	0	0	46	41.4	65	58.6	111
Connectivity3 - Adoption and use of eAIS or connection to eAIS will aid Respondent gain improved efficiency	3	2.7	45	40.5	63	56.8	111
Connectivity4 - Adoption and use of eAIS will be impacted by reliability of internet	7	6.3	63	56.8	41	36.9	111

4.2.12 Experience

The results in the table below show that most of the respondents agreed and strongly agreed on indicators regarding Connectivity. This table clearly shows that majority of the respondents either strongly agreed or agreed to indicators on Experience with Experience 1, Experience 2 and Experience 3 were agreed on at 48.6%, 55.9 and 42.3 respectively.

Table 4.12: Illustrating Frequencies of Response for Experience

Experience	Rating										Total
	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		
	N	%	N	%	N	%	N	%	N	%	N
Experience Indicators											
Experience1 - Adoption and use of eAIS is or will be easy to the respondent with experience	3	2.7	7	6.3	13	11.7	54	48.6	34	30.6	111
Experience2 - Adoption and use of eAIS helps or will help the respondent judge on what to learn	0	0	9	8.1	7	6.3	62	55.9	33	29.7	111
Experience3 - Adoption and use of eAIS helps or will help the respondent not to rely on others alot	3	2.7	7	6.3	22	19.8	47	42.3	32	28.8	111

4.2.13 Voluntariness

The result in this table also shows that majority of the respondents agreed and strongly agreed on voluntariness. Voluntariness1, Voluntariness2 and Voluntariness3 agreed on at frequency rates of 55.9%, 60.4% and 49.5% respectively.

Table 4.13: Illustrating Frequencies of Response for Voluntariness

Voluntariness	Rating										Total
	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		
	N	%	N	%	N	%	N	%	N	%	N
Voluntariness Indicators											
Voluntariness1 - The respondent chose the adoption and use of eAIS on own volition	0	0	0	0	1	0.9	62	55.9	48	43.2	111
Voluntariness2 - The choice of adoption and use of eAIS is non mandatory (not a mu	0	0	3	2.7	5	4.5	67	60.4	36	32.4	111
Voluntariness3 - The Respondent not influenced by anyone to adopt and use eAIS	3	2.7	0	0	13	11.7	55	49.5	40	36.0	111

4.3 The Description of the Conceptual Model

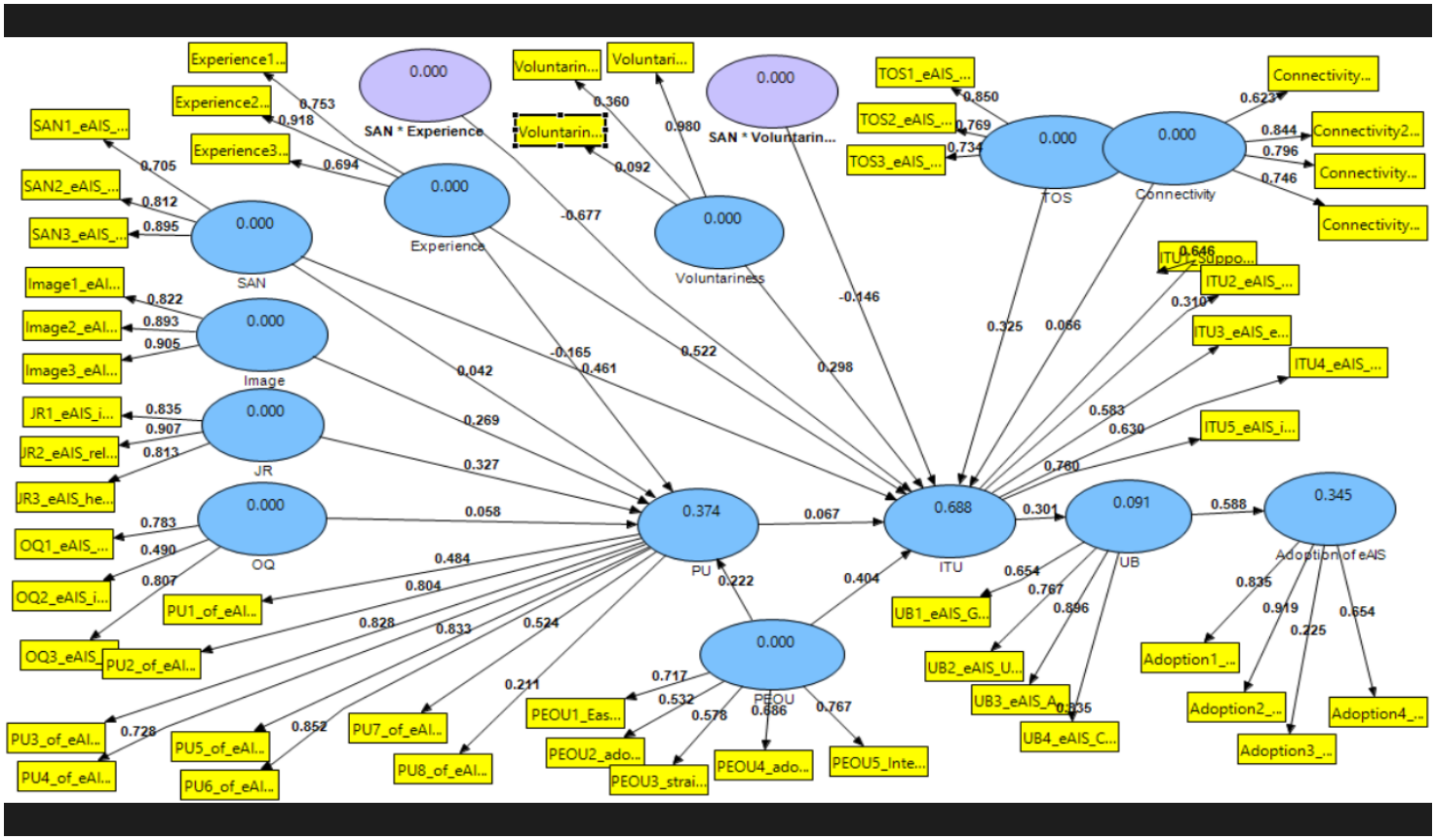

Figure 4.20: PLS Algorithm Outer Loadings, Path Coefficients and R Square

Source: Smart PLS 2.0 M3 Study generated Reports, (2015).

4.3.1 PLS SEM Algorithm (model estimation)

The results that emerged from the PLS algorithm (figure 4.20) show Outer Loadings, Path Coefficients and R2. These are shown on the model, Figure 4.20. The structural model results enabled the determination of effects among latent variables.

4.3.1.1 Outer Loadings - In a structural equation modeling (SEM) analysis, the inner model is the part of the model that describes the relationships between the latent variables that make up the model. The outer model is the part of the model that describes the relationships between the latent variables and their indicators. The inner and outer models are also frequently referred to as the structural and measurement models, respectively.

4.3.1.2 Path coefficients - Are standardized versions of linear regression weights which can be used in examining the possible causal linkage between statistical variables in the structural equation modeling approach.

4.3.1.3 R Square

R Square is a statistic that will give some information about the goodness of fit of a model. In regression, the R Square coefficient of determination is a statistical measure of how well the regression line approximates the real data points. An R2 of 1.0 indicates that the regression line perfectly fits the data. In statistics, the coefficient of determination R Square is the proportion of variability in a data set that is accounted for by a statistical model. In this definition, the term "variability" is defined as the sum of squares.

4.3.1.4 Effect Strengths on PU

JR had the strongest effect on PU (0.327). Image follows with an effect of (0.269). PEOU (0.222), OQ (0.058), SAN (0.042), Experience (-0.165) had the least effect on the dependent variable (PU). The six independent (exogenous) variables (constructs) together explain 37.4% of variance of the dependent (endogenous) construct (Variables) PU (R2 = 0.374), as indicated by the value in the variable circle.

4.3.1.5 Effect Strengths on ITU

PU (0.067)

PEOU (0.404)

SAN (0.461)

SAN moderated by experience (-0.677)

SAN moderated by voluntariness (-0.146)

TOS (0.326)

Connectivity (0.066)

All these seven independent variables together explain 68.8% of variance of the dependent variable ITU (R2=0.688) as indicated by the value in the variable circle.

4.3.1.6 Effect Strengths on UB

ITU had effect on AIS of 0.301.This explains 9.1% of variance of the dependent variable UB (R2=0.091) as indicated by the value in the variable circle.

4.3.1.7 Effect Strengths on eAIS

UB had effect on eAIS of 0.588. This explains 34.5% of variance of the dependent variable. Adoption of eAIS (R2=0.345) as indicated by the value in the variable circle

4.3.2 Summary of PLS-SEM findings (Path Coefficients)

i. The direct path from: OQ to PU is 0.058, JR to PU is 0.327, Image to PU is 0.269, SAN to PU is 0.042, Experience to PU is -0.165, PEOU to PU is 0.222

ii. The direct path from: PU to ITU is 0.067, PEOU to ITU is 0.404, SAN to ITU is 0.461, Moderated SAN by Experience to ITU is -0.677, Moderated SAN by Voluntariness to ITU is -0.146, TOS to ITU is 0.325, Connectivity to ITU is 0.066

iii. The direct path from ITU to UB is 0.301.

iv. The direct path from UB to adoption of eAIS is 0.588

Averagely the model predicts 37.4% of the variance in PU. The model also predicts 68.8% of the variance in ITU, 9.1% of the variance in UB and 34.5% of the variance in adoption of eAIS.

4.3.2 Bootstrapping in Smart PLS

4.3.2.1 Significance Testing

The essence of running the bootstrapping procedure or algorithm was to allow for significance testing. PLS-SEM does not assume that the data is normally distributed, which implies that parametric significance tests (such as used in regression analyses) could not be applied to test whether coefficients such as outer weights, outer loadings and path coefficients were significant. PLS-SEM relies on a nonparametric bootstrap procedure (Efron and Tibshirani, 1986; Davison and Hinkley, 1997) to test the significance of estimated path coefficients in PLS-SEM.

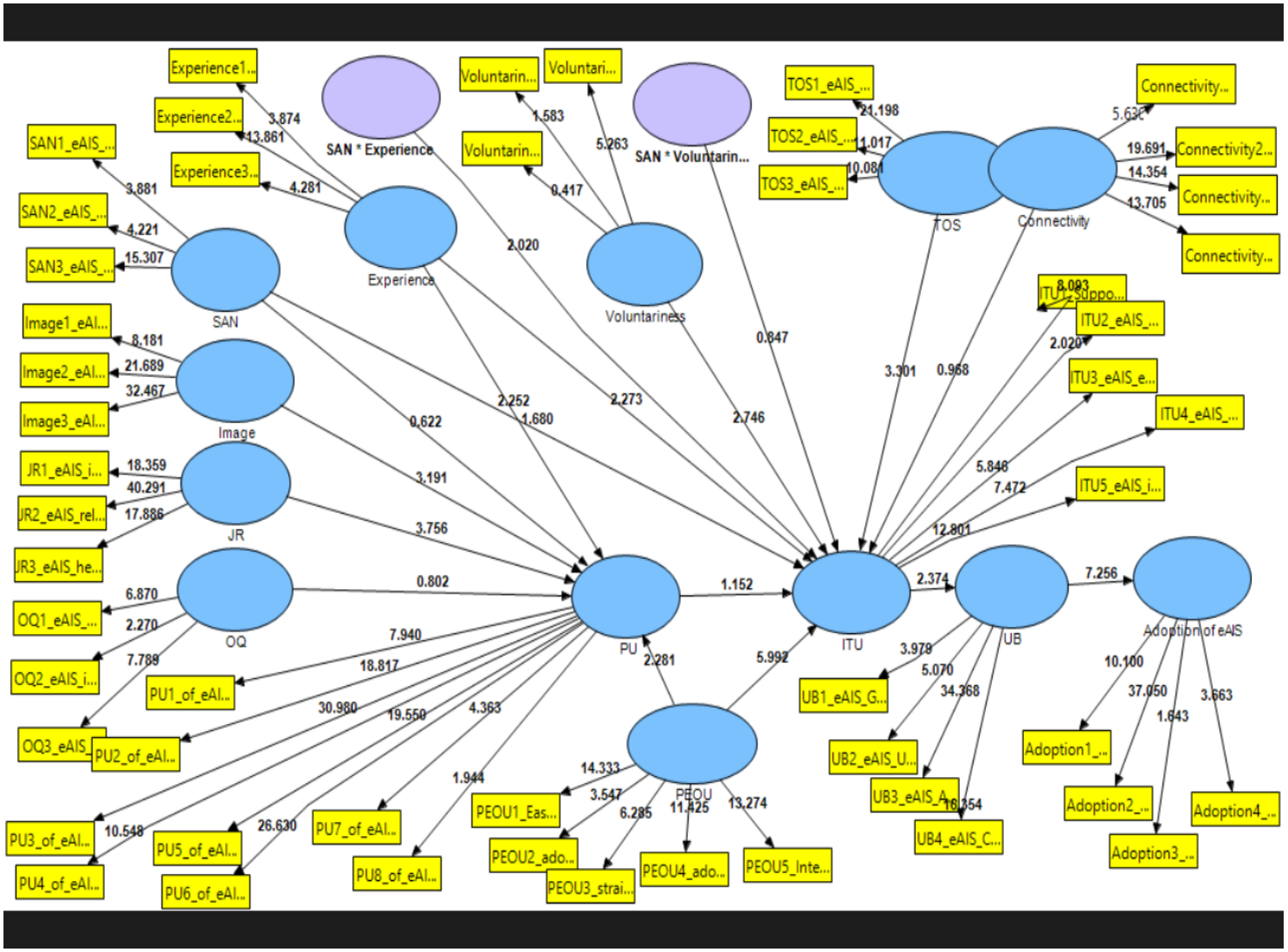

Figure 4.21: Bootstrapping Results of Calculated T-Values

Source: Smart PLS 2.0 M3 Study generated Reports, (2015).

4.3.2.2 Subsamples

During bootstrapping run, the algorithm created subsamples, of randomly drawn observations from the original set of data (with replacement). Replacement means that each time an observation was drawn at random from the sampling population, it was returned to the sampling population before the next observation was drawn(that means that the population from which the observations are drawn always contain all the same elements) . The subsample was then used to estimate the PLS path model. This process was repeated until a large number of random subsamples was created. This must be equal to or higher than the original sample (cases). Typically 5,000 is the recommended number of bootstrap samples. (Hair et al. 2011, p. 145). However, according to Chin (2003) and Chin (2010) bootstrap samples of 200 to 1000 tend to provide reasonable standard error estimates, (or the default of 100). This study thus used 500 bootstrap subsamples. Figure 4.21 above illustrates the t-values generated after the bootstrapping. The values were used to calculate the p-values for hypothesis testing. Bootstrapping generated the t-values for all the paths in the model. These t-values were then converted to p-values for significance tests.

4.3.2.3 Sign Changes

The study used Individual sign changes parameter. The option reverses signs if an estimate for a bootstrap sample results in a different sign compared to that resulting from the original sample. Thus, the signs in the measurement and structural models of each bootstrap sample are made consistent with the signs in the original sample. All the other parameters were left at default settings of the Smart PLS SEM modeling tool. See appendix 7.14 for the parameter settings.

4.3.3 The Hypotheses

4.3.3.1 Hypotheses testing

Hypothesis testing assesses whether data support a given hypothesis rather than being an effect of random fluctuations or some other process described by an alternative hypothesis

4.3.3.2 T-Values or Test

The t-value measures the size of the difference relative to the variation in the sample data. In other words, T is simply the calculated difference represented in units of standard error. The greater the magnitude of T (it can be either positive or negative), the greater the evidence against the null

hypothesis that there is no significant difference. The closer T is to 0, the more likely there isn't a significant difference..

T-test was used to find evidence of a significant difference between the population mean and a hypothesized value. A t-test compares the observed t-value to a critical value on the t-distribution with (n-1) degrees of freedom to determine whether the difference between the estimated and hypothesized values of the population parameter is statistically significant. This study used significance levels of $t > 1.96$. T and P are inseparably linked

4.3.3.3 P-Value

The level of marginal significance within a statistical hypothesis test representing the probability of the occurrence of a given event. The p-value is used as an alternative to rejection points to provide the smallest level of significance at which the null hypothesis would be rejected. The smaller the p-value, the stronger the evidence is in favor of the alternative hypothesis.
P-values are calculated using p-value tables, or spreadsheet/statistical software. In this study an excel spreadsheet was used to calculate the p-values from t-values that were generated from a bootstrapping run. The function =TDIST (t-value, df, 2) was used in excel spreadsheet. df is the degree of freedom, given by n-1(n is the sample size). 2 denotes two tailed significance testing. Table 4.14 illustrates the calculated p-values. In statistics, the p-value is a function of the observed sample results (a statistic) that is used for testing a statistical hypothesis. Before the test is performed, a threshold value is chosen, called the significance level of the test, This study chose the traditional 5% ($0 < p < 0.05$, $t > 1.96$) and is denoted as alpha (α).

4.3.3.4 Degree of Freedom

The degree of freedom was used in the calculation of p-value from t-value. In many statistical problems we are required to determine the degrees of freedom. This refers to a positive whole number that indicates the lack of restrictions in our calculations. The degree of freedom is the number of values in a calculation that we can vary, usually given by n-1.This was used in the study to calculate p-values from the t-values generated after the Bootstrapping run

4.3.3.5 Regression

Techniques for analyzing the relationship between one (or more) "dependent" variables and "independent" variables. In statistics, regression analysis is a statistical process for estimating the relationships among variables. It includes many techniques for modeling and analyzing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables (or 'predictors'). In this study regression was run automatically through the bootstrap run.

Table 4.14: Calculated P-Values from T-Values

Inner Model T-Statistic														9E-11	Pvalues			
	PU	Adoption of eAIS	Connectivity	Experience	ITU	Image	JR	OQ	PEOU	SAN	SAN * Experience	SAN * Voluntariness	TOS	UB	Voluntariness	PU	eAIS	ITU	UB
PU					1.151601													0.252230964	
Adoption of eAIS																			
Connectivity					0.967737													0.335510439	
Experience	2.251939				2.273144											0.0265128		0.025156354	
ITU														2.374193					0.019496
Image	3.190501															0.00189772			
JR	3.755818															0.000290477			
OQ	0.801682															0.424637834			
PEOU	2.280627				5.991613											0.024692446		3.2952E-08	
SAN	0.622172				1.679501											0.53524482		0.096176305	
SAN * Experience					2.020256													0.046031039	
SAN * Voluntariness					0.846582													0.399249556	
TOS					3.301412													0.001334556	
UB		7.256119															8.694E-11		
Voluntariness					2.745535													0.007164138	

Source: Smart PLS 2.0 M3 Study generated Reports, (2015).

4.3.3.6 Standard Deviation

The standard deviation was used to measure the "average" deviations from the means.

4.4 The Study Generated Reports

4.4.1 PLS

a) Quality Criteria Overview

i). Composite Reliability

Composite reliability is a measure of the overall reliability of a collection of heterogeneous but similar items. Individual item reliability of items is tested using Cronbach Alpha while composite reliability is of the construct, the latent variable. Composite reliability is like the reliability of a summated scale.

In this study the majority of individual item reliabilities were above the Nunnally's of 1978, cronbach of 0.7. Cronbach is described as a lower bound estimate for Composite reliability, which is evident from this report, since corresponding composite reliabilities were higher.

ii). AVE

Average variance extracted is the variance in the indicators explained by the common factor. AVE varies from 0 to 1, and it represents the ratio of the total variance that is due to the latent variable. The composite reliability estimates the extent to which a set of latent construct indicators share in their measurement of a construct, whilst the average variance extracted is the amount of common variance among latent construct indicators (Hair et al., 1998).

iii). Communalities

The communalities for the ith variable is computed by taking the sum of the squared loadings for that variable.

iv). Redundancy

The redundancy for a generic endogenous block j is computed as the product of the communality of block j with the R-square of block j.

b). Correlation - Correlation is a statistical technique that can show whether and how strongly pairs of variables are related.

The main result of a correlation is called the correlation coefficient (or "r"). It ranges from -1.0 to +1.0. The closer r is to +1 or -1, the more closely the two variables are related. If r is close to 0, it means there is no relationship between the variables. If r is positive, it means that as one variable gets larger the other gets larger. If r is negative it means that as one gets larger, the other gets smaller (often called an "inverse" correlation).

Correlation report Appendix 7.12 depicts that the majority of the latent variables are positively related in this study, except for the following relationships which have inverse relationships. TOS to Adoption of eAIS, UB to JR, Voluntariness to Adoption of eAIS, Voluntariness to Experience and Voluntariness to UB.

c) Total Effects - Depicts all the paths' weights, (see appendix 7.13)

d) Path Coefficients - Depicts all the directly connected paths' weights, (see appendix 7.11)

e) Outer Model (Weights or Loadings) Weights or Loadings - Depicts all what was gathered from the respondents by the indicators.

4.4.2 Bootstrapping Reports - Examples

- Outer Weights - All the weights that were assigned to all the samples(500)
- Inner Model T-Statistics - Depicts all the inner paths t-statistics (Refer to appendix 7.15), portion marked Inner Model T-Statistics. The table also illustrates how p-values are calculated in excel.
- Path Coefficients - Lists all the path coefficients of the all the 500 samples
- Outer Model T-Statistics – Depicts the t-Statistics of the indicators.
- Path Coefficients (Mean, Standard Deviation, T-Values) – Depicts mean, standard deviation and the T-Values of the original sample.
- Outer Model - Depicts mean, standard deviation and T-Values of all the indicators
- Total Effect - Depicts all the possible paths by all the 500 samples
- Outer Loadings - Depicts all the indicators by all the 500 samples
- Outer Loading (mean, standard deviation and T-Values). Depicts mean, standard deviation and T-Values of all the indicators
- Manifest Variable Scores (Original) - Depicts the original indicators scores

4.5 The Hypotheses testing

The study chose the traditional 5% thresh hold significance level testing, hence the relationship is significant if $0 < p < 0.05$ at $t > 1.96$.

H01: Output Quality does not influence Perceived Usefulness – From table 4.14, the P-Value is not less than 0.05 accept the hypothesis.

H02: Job Relevance does not influence Perceived Usefulness – From Table 4.14, the P-Value is less than 0.05 reject the hypothesis.

H03: Image does not influence Perceived Usefulness – From Table 4.14, the P-Value is less than 0.05, reject the hypothesis.

H04: Subjective Adoption Norms does not influence Perceived Usefulness – From table 4.14, the P-Value is not less than 0.05 accept the hypothesis.

H05a: Experience does not influence Perceived Usefulness – From Table 4.14, the P-Value is less than 0.05 reject the hypothesis.

H06a: Perceived Ease of Use does not influence Perceived Usefulness – From Table 4.14, the P-Value is less than 0.05, reject the hypothesis.

H05b: Experience does not moderate Subjective adoption Norms – From Table 4.14, the P-Value is less than 0.05 reject the hypothesis.

H07: Voluntariness does not moderate Subjective adoption Norms – From table 4.14, the P-Value is not less than 0.05 accept the hypothesis.

H06b: Perceived Ease of Use does not influence Intention to Use – From Table 4.14, the P-Value is less than 0.05, reject the hypothesis.

H08: Perceived Usefulness does not influence Intention to Use – From table 4.14, the P-Value is not less than 0.05, accept the hypothesis.

H09: Subjective adoption Norms does not influence Intention to Use – From table 4.14, the P-Value is not less than 0.05 accept the hypothesis.

H010: Type of e-service does not influence Intention to Use – From Table 4.14, the P-Value is less than 0.05 reject the hypothesis.

H011: Connectivity does not influence Intention to Use – From table 4.14, the P-Value is not less than 0.05 accept the hypothesis.

H012: Intention to Use does not influence Usage Behavior – From Table 4.14, the P-Value is less than 0.05 reject the hypothesis.

H013: Usage Behavior does not influence Adoption of eAIS – From Table 4.14, the P-Value is less than 0.05 reject the hypothesis.

According to Venkatesh and Davis (2000) in their research on the theoretical extension of the TAM, commonly referred to as TAM2, they found out that both social influence processes (subjective norm, voluntariness, and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use) significantly influenced user acceptance. This study similarly found out that Image, Job relevance and PEOU influenced respondents' acceptance to adopt and use eAIS in an extended TAM model.

This study attempted to include into TAM two constructs, Connectivity and Type of e-service. TOS was found to influence respondents' intension to adopt and use eAIS. Davis et al. (1989), in their review of TAM concluded that the TAM was appropriate for examining acceptance of any technology by individuals with different characteristics in various organizations. They said that TAM seemed to be a useful model, but it is essential to extend and modify it with other relevant variables and theories. This holds for this study, since TAM was applied and was used to explain the adoption of eAIS with modification on factors and relationships. Within the available time, the researcher could not find more justifications for or against this inclusion and/or exclusions.

4.6 The Emerging Model

4.6.1 The Model PLS SEM Algorithm (model estimation)

Figure 4.22 illustrates the model Outer Weights, Path Coefficients and R2. A model estimation algorithm generated results.

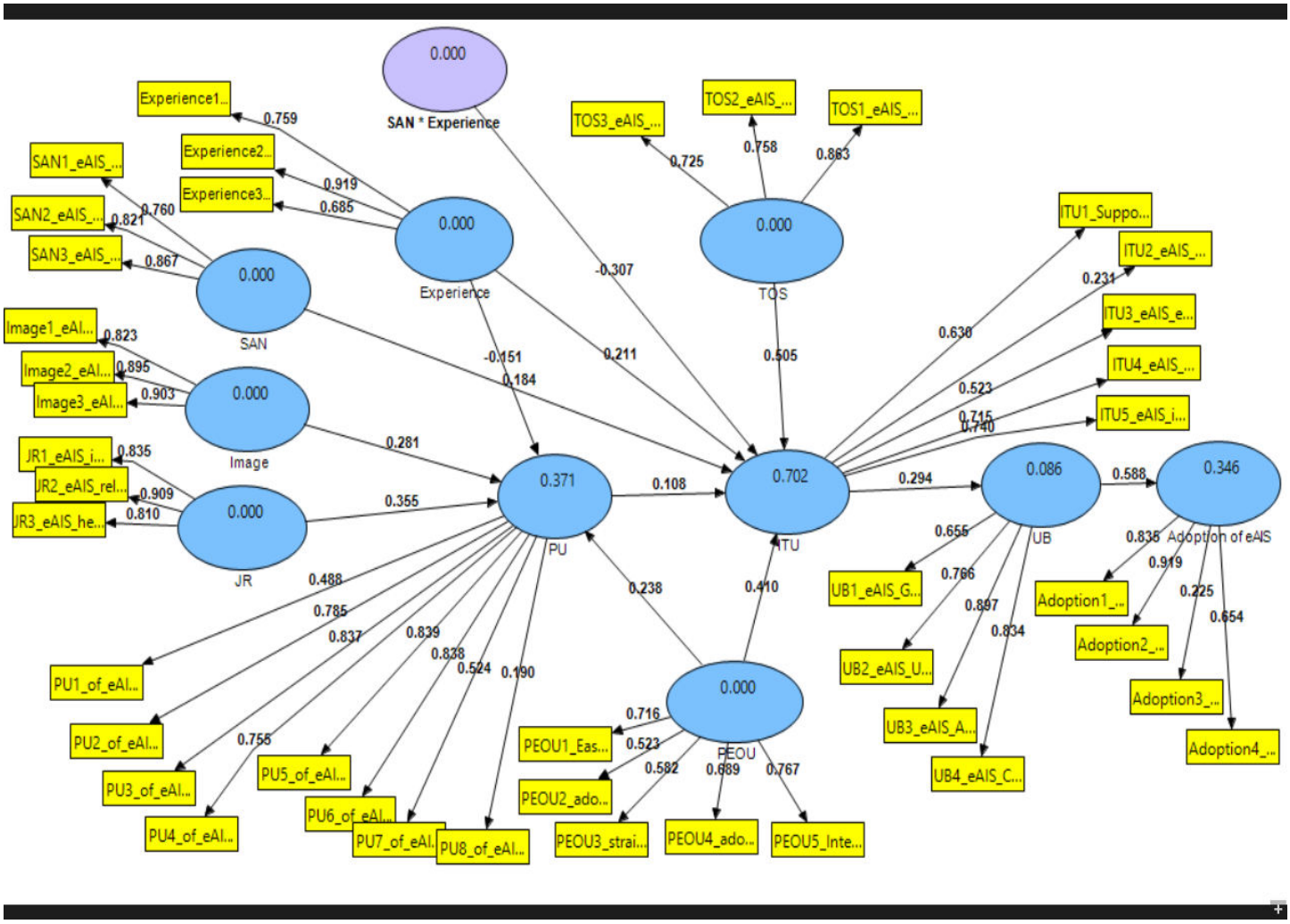

Figure 4.22: PLS SEM Algorithm (model estimation) results

4.6.2 Effect Strengths

4.6.2.1 Effect Strengths on PU

JR had the strongest effect on PU (0.355). Image follows with an effect of (0.281). PEOU (0.238), Experience (-0.151) had the least effect on the dependent variable (PU). The four independent (exogenous) variables (constructs) together explain 37.1% of variance of the dependent (endogenous) construct (Variables) PU (R2 = 0.371), as indicated by the value in the variable circle.

4.6.2.2 Effect Strengths on ITU

TOS (0.505)

PEOU (0.410)

SAN (0.184)

PU (0.108)

SAN moderated by experience (-0.307)

All these five independent variables together explain 70.2% of variance of the dependent variable ITU (R2=0.702) as indicated by the value in the variable circle.

4.6.2.3 Effect Strengths on UB

ITU had effect on UB of 0.294.This explains 8.6% of variance of the dependent variable UB (R2=0.086) as indicated by the value in the variable circle.

4.6.2.4 Effect Strengths on eAIS

UB had effect on eAIS of 0.588. This explains 34.6% of variance of the dependent variable. Adoption of eAIS (R2=0.346) as indicated by the value in the variable circle

4.6.3 Summary of PLS-SEM findings (Path Coefficients)

i. The direct path from: JR to PU is 0.355, Image to PU is 0.281, Experience to PU is -0,151, PEOU to PU is 0.238

ii. The direct path from: PU to ITU is 0.108, PEOU to ITU is 0.410, SAN to ITU is 0.184, Moderated SAN by Experience to ITU is -0.307, TOS to ITU is 0.505 (SAN and Experience paths are included to ITU for the determination of the moderating effect as depicted in figure 4.22)

iii. The direct path from ITU to UB is 0.294.

iv. The direct path from UB to adoption of eAIS is 0.588

Averagely the model predicts 37.1% of the variance in PU. The model also predicts 70.2% of the variance in ITU, 8.6% of the variance in UB and 34.6% of the variance in adoption of eAIS.

4.6.4 The formulated Model

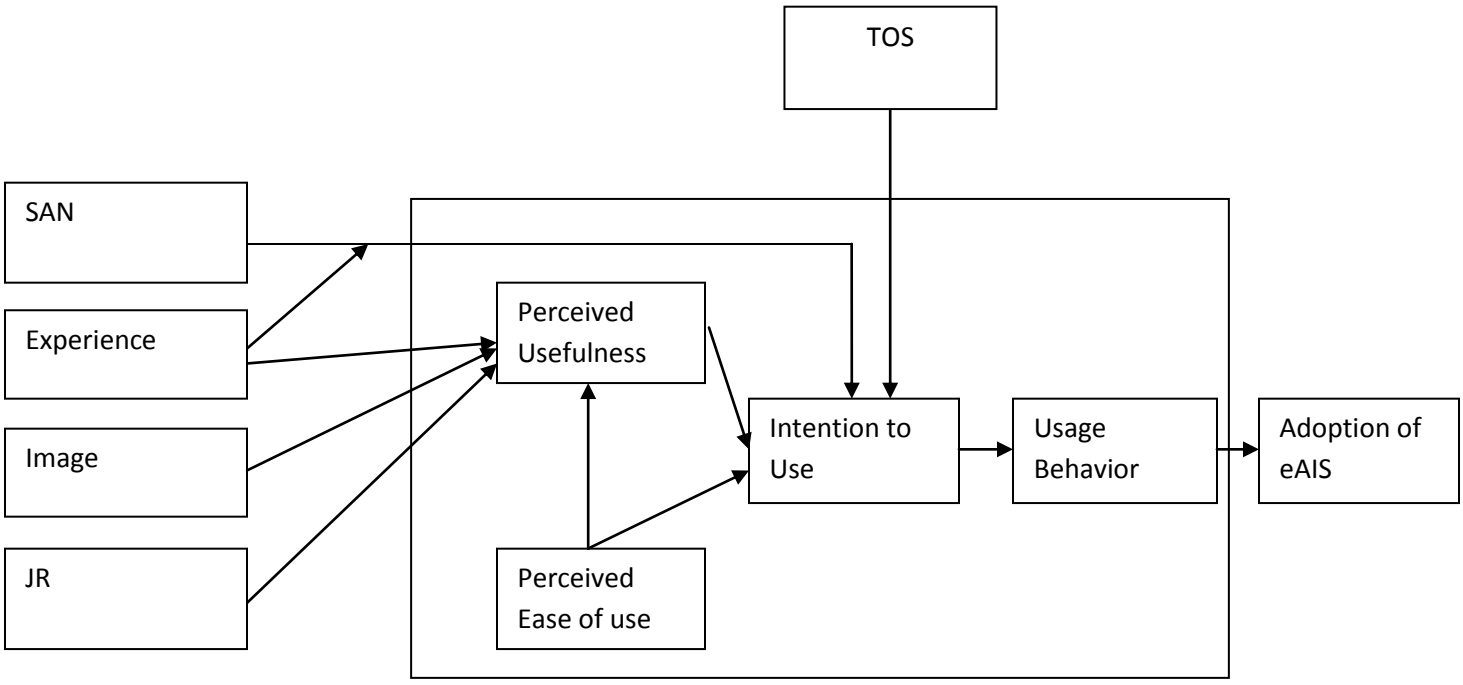

Figure 4.23: The formulated Model

4.6.5 Description of the formulated Model (PLS SEM)

The proposed model is variation of the extended TAM. It incorporates subjective Adoption Norms and image from among the social processes in extended TAM leaving out only voluntariness. From among the conceptual framework's cognitive instrumental processes (job relevance, output quality, and perceived ease of use), the model adopted Job Relevance and PEOU. And from the moderating factors of the extended term the model incorporates Experience as a moderating factor to the Subjective Adoption Norm. The model retains TAM with variants of extended TAM. From the conceptual frame work the proposed model leaves out Constructs, OQ and Connectivity. The relations that are left out are SAN to PU, SAN to ITU. A new Construct, TOS was introduced into the Extended TAM and was retained as it was found to influence ITU ($p<0.05$). The relationship between PU and ITU was retained in the model to make the model complete, even though the hypothesis **H08:** Perceived Usefulness does not influence Intention to Use as $P>0.05$. The retention of this relationship can be justified due to the fact that PU has a positive correlation to ITU, so had time allowed to collect more data PU could have most likely influenced ITU at $p < 0.05$.

What was expected can not be substantiated by the empirical data. During literature review, the researcher did not come across a similar scenario.

4.6.6 The formulated model bootstrapping

The scope of testing the significance of the inner T-Statistics for the formulated model is out of scope of this study. This bootstrap was executed using the same data values of the study.

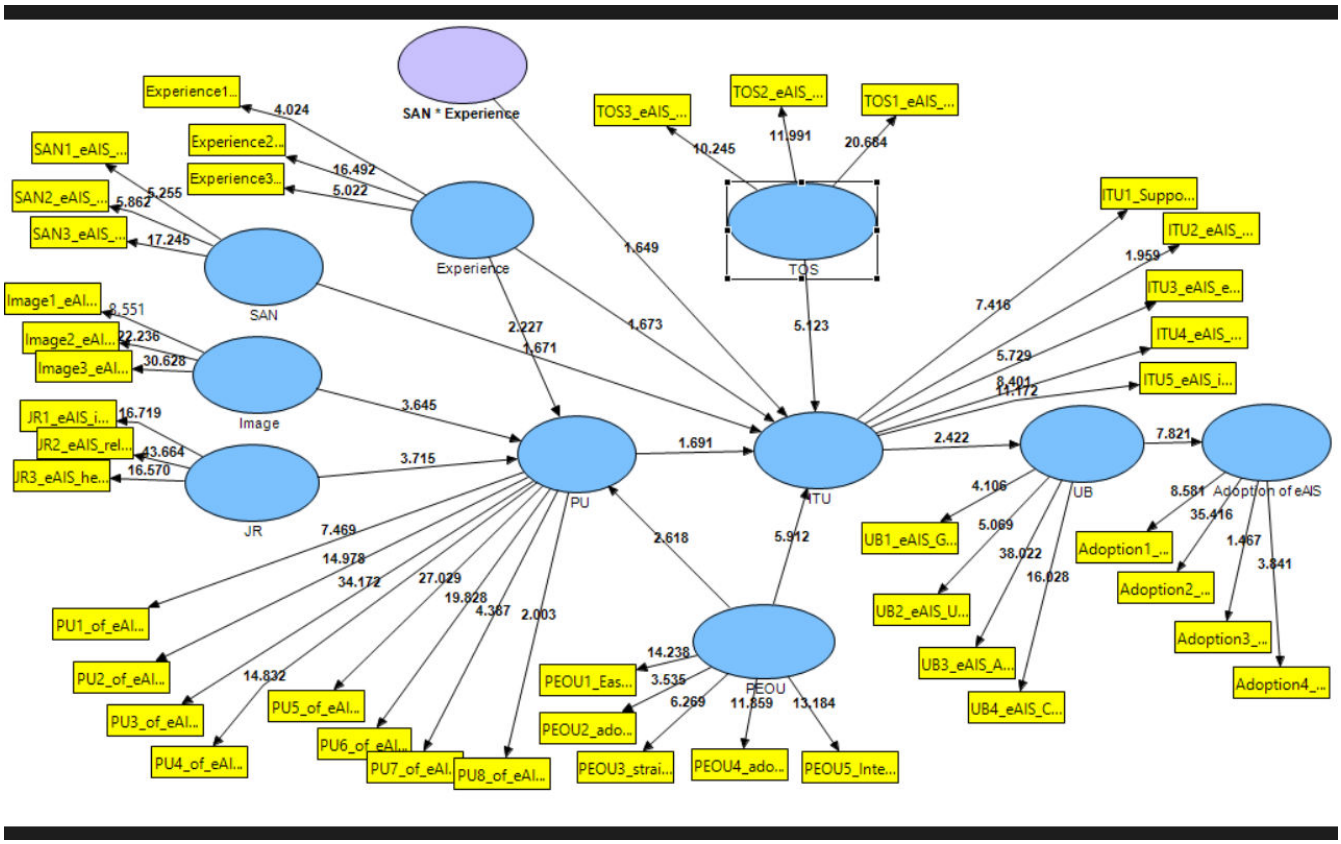

Figure 4.24: The Formulated Model Bootstrapping Results (Calculated T-Values).

Source: Smart PLS 2.0 M3 Study generated Reports (2015).

CHAPTER 5

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

Youth unemployment is a major challenge to many developing Nations like Kenya, yet the youths have little interest in agriculture, and there is little or no effort to entice them towards agriculture using technological innovations. There is need to harness their interests and energy by re-directing it towards agricultural production. The main objective of the study was to formulate a framework for adoption of e-agricultural information services (eAIS) by the youths out of school, aged 15 to 34 years. The intention was to attract their passions towards agriculture with enhanced knowledge and efficiency by use of e-resources. ICT related challenges facing the entrepreneurial youth farmers of Kikuyu, Kiambu County were identified by this study as travelling far distances in order to get the information and lack of availability of market information. The research also established that there was need for adopting and using eAIS. All the respondents attested to this. The existing agricultural information services dissemination were faced with challenges as indicated by the respondents.

The introduction of the Internet and online services has introduced new methods of carrying out many activities, which can be described as “e-computing”. These include for example the e-Agricultural Information Services. Corresponding to this, is also the innovative porting of such applications to mobile devices such as smart phones and Tablet devices called “m-computing” hence m-commerce, m-banking and so on. These applications have tremendously changed the way things are done. The application of these concepts to traditional farming and agricultural activities can also be described as e-farming or e-agriculture (hence m-farming and m-agriculture). The term "e-Farming" or "e-Agriculture" has been described as the integration and utilization of information technology in farming or agriculture related operations (Scott's Blog, 2006).

The study adopted descriptive research design and Extended Technology Acceptance Model by Rongers (2003). The factors that influence the entrepreneurial youths into adoption of eAIS are Experience moderated SAN, Experience, Image, JR, TOS and PEOU. ICT have become one of the most important infrastructural elements for SMEs such as the youth agricultural enterprises. These small firms or enterprises are showing specific characteristics and behaviors with regard to adopting and assimilating

ICT or ICT enabled services. These specificities have not been taken into account however, in formulating a framework or programme for the adoption and assimilation of ICT enabled information services in agriculture (e-Agricultural Information Services) for a Sub-county like Kikuyu or little is known of any development in that direction. This study therefore was to fill this void, by developing a framework for adoption of e-agricultural information services, for the entrepreneurial youths in Kikuyu sub-county.

The literature was reviewed on: adoption frameworks, Information Services, Agricultural Information Services, e-Agricultural Information Services, Entrepreneurial youths in agriculture and Conceptual frameworks. The study area was Kikuyu Sub-County of Kiambu County. Kiambu was chosen because of its high youth population. It's a peri-urban and practices intensive farming systems. Farming is one of the main economic activities of Kiambu (Kiambu county report, 2014) and its proximity to the city centre was a convenience to the researcher.

The study design generated quantitative and qualitative data for analysis. Data was obtained by the secondary methods and pre-tested semi structured questionnaire instrument. The sampling technique used was simple random sampling method across the entrepreneurial farming youths in the sub-county depending on their availability. The focus was on age 15 to 34, within five wards in Kikuyu sub- county. Primary data was collected by a pre-tested semi structured questionnaires on 111 youths. Secondary data was gathered from reliable sources such as government agricultural reports, journals and e-resources.

The data gathered was cleaned, edited and coded for analysis by SPSS. Demographic and descriptive data was extracted and analyzed by SPSS. PLS SEM was used to model and to establish associations between dependent and independent variables. Content analysis was used to analyze respondent's views on the Framework for adoption of eAIS. Descriptive statistics such as frequencies were generated using SPSS. Presentations were done in charts, graphs and frequency tables as appropriate. Complete coded data-set in SPSS was transferred to Smart- PLS- SEM, a Partial List Square Structural Equation Modeling tool. The tool was used to model the framework, to estimate path coefficient or weights, to investigate the interactions between dependent and independent variables and to determine the possible associations between variables.

Statistical testing of the relationships between variables and/or the hypotheses revealed that, for $0<p<0.05$, the following hypotheses were rejected. **H02:** JR does not influence PU, **H03:** Image does not influence PU, **H05a:** Experience does not influence PU, **H06a:** PEOU does not influence PU, **H05b:** Experience does not moderate SAN, **H06b:** PEOU does not influence ITU, **H010:** TOS does not influence ITU, **H012:** ITU does not influence UB and **H013:** UB does not influence Adoption of eAIS. The following hypotheses were accepted for $p>0.05$: **H01:** OQ does not influence PU, **H04:** SAN does not influence PU, **H07:** Voluntariness does not moderate SAN, **H08:** PU does not influence ITU, **H09:** SAN does not influence ITU and **H011:** Connectivity does not influence ITU. The resulting framework was composed of experience moderated SAN, Experience, Image, JR and TOS and all the TAM constructs as indicated in figure 4.22. The study further attempted to add the constructs, Connectivity and Type of e-service into the extended TAM. Type of e-service construct was found to influence respondents' intention to adopt and use eAIS, thus this study added into TAM a new construct TOS.

5.2 Conclusion

The study concluded that from the eAIS adoption conceptual framework's output quality, moderating factor voluntariness, connectivity, the relationship between SAN and PU and the relationship between SAN and ITU were eliminated. The study further found out that Experience moderated SAN, Experience, Image, JR and PEOU influenced respondents' acceptance to adopt and use eAIS in an extended TAM model. The study attempted to include the constructs, Connectivity and Type of e-service into the extended TAM. The study found that TOS influenced respondents' intention to adopt and use eAIS. The study also concluded that TAM can be used to explain eAIS adoption in an SME setting, though with variations on the extended TAM. There was an additional construct and exclusions of some factors and/or relationships.

The study further concluded that there were challenges that face the entrepreneurial youth farmers necessitating the adoption of eAIS. These challenges were travelling to get information on agriculture from the agricultural resource centers or to sub-county head quarters and market information was scarce and sometimes totally unavailable. The adoption and use of eAIS however, can be impeded by lack of funding for the youths as well as non- availability of accessible or affordable loan facilities. The study established that possible solutions to the challenges faced by the entrepreneurial youths were government subsidies for affordable internet, to make the eAIS largely available at low cost "freely available" and the County government planning to put in place ICT resource centers at ward levels.

There were also challenges that faced this study such as the short duration for the research that was not enough to prove some of the hypotheses beyond reasonable doubt. The research findings were based on the data gathered from one sub-county, and therefore the replication of the results to the other sub-counties or Counties should be done with careful interpretation, since the results may not necessarily represent the interests of the other youth farmers elsewhere in Kenya.

5.3 Recommendations

Entrepreneurial youths of Kikuyu sub-county and youths in Kenya

In this study a framework for the adoption of e-Agricultural Information Services was formulated. The framework was built based on the existing ICT infrastructure such as access to the Internet, the GSM service and web-browsing using computers and mobile devices. Internet is the main channel of e-service delivery though other channels such as call center, public kiosk/booths, television are sometimes used based on availability and convenience.

The County Agricultural Officers

The findings can be useful in the dissemination of agricultural information, for strategic planning and development by the Kikuyu sub-county and/or other Counties in Kenya.

The academia and researchers

The research recommends further studies to validate the inclusion of TOS into the framework. There is need to investigate the elimination of some of the constructs and relationships from the extended TAM variant conceptual framework with respect to the eAIS model that emerged. The relationship PU to ITU should be verified or researched on further. The elimination of Voluntariness as a moderating factor to SAN, relationships SAN to PU and SAN to ITU should also be investigated further.

Kiambu County government, National government, policy makers and NGOs

In some cases new infrastructural facilities may be needed or be in place for the development and/or maintenance of the agricultural databases. Also, there is need for software applications that can be ported onto mobile phone devices and web portals for disseminating information to farmers and agricultural extension workers. Examples include NAFIS, iCOW, mFarm and so on. The increasing amount of IT education and the increasing spread of wireless communication technology will also positively affect the adoption of e-agriculture techniques in the farming sector. Youth farmer's

agricultural literacy level should be addressed since the framework proposed is meant to compliment and not replace the extension service. On the role of government, the extension services at all levels should be empowered to do their work. Adequate provision of logistic support, training opportunities and provision of funds for the development of ICT infrastructure where not available, may be needed to aid the youths in these programmes.

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7.0 APPENDICES

7.1 Project Plan

		Start	End	Feb	Mar	Apr	May	Jun	Jul	Aug
		01-02-15	31-08-15							
1	Project Prep and Planning	01-02-15	28-02-15							
2	Proposal Development	01-03-15	15-04-15							
3	Visiting Study Area	15-04-15	30-04-15							
4	Pilot Test	01-05-15	15-05-15							
5	Data Collection	15-05-15	15-06-15							
6	Data Analysis	15-06-15	15-07-15							
7	Report writing	01-07-15	31-07-15							
8	Presentation and Binding	01-08-15	31-08-15							

7.2 Resources Required

The researcher used the following items to be able to carry out the study. Access to:

- Typing and Printing
- Photocopying and Binding facilities.
- Transport
- Lunches
- Internet
- Computer and Printer
- Stationery

7.3 Budget of the study

Proposal Development and Writing expenses	
Typing 1 Copy of 30 pages @ 30ksh per page	900
Photocopying of 20 copies of 30 pages @ 3ksh per page	1,800
Photocopying of 20 Summary copies of 10 pages @3 a	900
Binding 20 copies @ 100ksh per copy	2,000
Pre-testing research instruments	
Transport to and from the centers, two trips @ 2000ksh	2,000
Data Collection, Analysis and report Writing	

120 copies of 10 pages research instruments @3ksh	3,600
Lunch and transport for researcher for 30 days @ 2000	60,000
IT/ Computer related expenses	25,000
Computer Data entry and analysis	10,000
Project report writing per page	6,000
Binding 10 sets of the project report @ 100 each	1,000
Contingencies	12,000
Grand Total	**125,200**

7.4 Introduction and Consent

My name is Patrick Oduor Owino, I am a student at University of Nairobi in the School of Computing and Informatics. I am conducting a study for a partial fulfillment of Masters of Science degree and I would like you to voluntarily participate in this study. I shall ask you a few general questions and some will relate to the **adoption of e-Agricultural Information Services (eAIS).** The information you give shall be confidential and meant for this study only. Are you willing to participate in this study?

If [YES], Continue. **If [NO], Stop**

7.5 The General Questionnaire

SECTION A:

THE GENERAL QUESTIONAIRE

Name of interviewer _____ **Date of interview**_____

Youth Name_____ Ward_____ **Group Name**_____

Questionnaire No._____ Code No. _____

SECTION B:

DEMOGRAPHIC AND SOCIO-ECONOMIC STATUS OF THE RESPONDENTS

GENDER

1. Gender [1] Male [2] Female

AGE

2. What age bracket do you fall in?

15-19	[1]
20-24	[2]
25-29	[3]
30-34	[4]

RESIDENCE

3. Do you reside within Kikuyu sub-county? Yes [1] OR No [2]

RELIGION

4. What is your religion?

Christian	[1]
Muslim	[2]
Budhist	[3]
Others (Specify)	[4]

OCCUPATION

5. How are you engaged in agriculture? Full time? [1] OR Part time? [2] ?.

6. How Many Years have you been in Agriculture?

1 to 5 years [1]

6 to 10 years [2]

11 to 15 years [3]

16 and above [4]

7. A part from being engaged in agriculture, what else are you doing for a living?

Employed [1]

Self-employed [2]

House wife [3]

Others [specify] [4] _____

MARITAL STATUS

8. What is your marital status?

Married [1]

Single [2]

Divorced [3]

Divorced [3]

Widow(er) [5]

Separated [5]

INCOME

9. What is your approximate expenditure per month?

1000-2000 [1]

2001- 3000 [2]

3001-4000 [3]

4001-5000 [4]

5001and above [5]

EDUCATION

10. What is your Level of Education?

Primary [1]

Secondary [2]

College [3]

University [4]

None [5]

WEALTH

11. Do you access internet? Yes [1] or No [2]

12 What do you mostly use to connect to the internet?

Home Computer [1]

Laptop [2]

Mobile Phone [3]

Cyber connections [4]

Others (specify) [5] _____

13. What e-agricultural information services platform do you mostly use?

Web portals (Web Sites) [1]

Mobile phone for SMSs, Mpesa [2]

Face book [3]

Audio Visual [4]

Others (specify) [5] _____

SECTION C:

THE YOUTH FARMER'S VIEW OF AGRRICULTURAL INFORMATION SERVICES

14. Are the agricultural information dissemination practices satisfactory to you as a youth farmer?

Yes [1] No [2]

15. Are there external challenges that affect the agricultural information dissemination to you as a youth farmer?

Yes [1] No [2]

16. Is there need for adopting e-agricultural information services or continue using it?

Yes [1] No [2]

17. What benefits do you derive or expect from e-agricultural information services?

_____

_____

18. What challenges do you face as an entrepreneurial youth farmer, in accessing agricultural information services?

_____

_____

19. What possible remedies do you think can be recommended to address the current challenges facing entrepreneurial youth farmers in accessing agricultural information services?

_____

_____

SECTION D:

FRAMEWORK FOR ADOPTION OF E-AGRIULTURAL INFORMATION SERVICES (eAIS)

20. Perceived usefulness (Your opinion on perceived usefulness of eAIS)	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Adoption of eAIS can make or will make me **increase my profits**					
Adoption of eAIS is or will be **more convenient** to me as a youth farmer					
Adoption of eAIS does or will **improve performance** in my job					
Adoption of eAIS does or will **improve productivity** in my job					
Adoption of eAIS does or will **improve effectiveness** in my job					
The way I see it eAIS is or will be **useful in my** job					
The adoption and use of eAIS is or will be **more attractive** to me as a youth farmer					
The information available through eAIS is **relevant to my needs** as a youth farmer					

21. Perceived ease of use (Your opinion on perceived ease of use of eAIS)	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
I think it is easy for me **to become skillful** at adopting and using eAIS					
I think that it is possible to adopt and use eAIS without much expert help					
My interaction with eAIS is or will be **straight forward** and easy to understand					
My interacting with eAIS does not or will not require a **lot of my mental effort**					
In my own judgment, adoption and use of eAIS **is easy to do**					

22. Intention to use (Your opinion on intention to use eAIS)	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Suppose I have **access** to eAIS, I will adapt and use it					
eAIS is or will be **useful in my** job, I intend to adopt and use it					
eAIS is or will be **easy to use** in my job, I intend to adopt and use it					
eAIS does or will help me **attain gains in my job performance** , I intend to adopt and use it					
eAIS does or will **improve my delivery on specific tasks** in my job. I intend to adopt and use it					

23. Usage Behavior (Your opinion on Usage behavior of eAIS)	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
I **get data or information** when I need it					
I **use eAIS** when I need it					
I **get access** of eAIS when I need it					
It is **convenient** for me to access and use eAIS					

24. Adoption of eAIS (Your opinion on Adoption of eAIS)	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
I have **access** or **will have access** to eAIS,					
I am **using** eAIS or **will use** if l have access to it,					
I **like** eAIS					
It is **convenient** for me to Access or Use eAIS					

25. Subjective Norm (Your opinion on Subjective Norm of eAIS)	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
People around me who **influence my behavior** think that I should adopt and use eAIS					
People **who are important to me** think that I should adopt and use eAIS					
People **who are acquainted with me** have influence on my intention to adopt and use eAIS in					

26. Image (Your opinion on Image of eAIS)	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Youth farmers in Enterprises which have adopted and use eAIS **have got more prestige**					
Youth farmers in Enterprises which have adopted and use eAIS **have high profile**					
Adopting eAIS is or **would be a status symbol** for me in my enterprise					

27.Job Relevance (Your opinion on Job Relevance of eAIS)	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Adopting and using eAIS is or will be **important in my job**					
In my job adopting and using eAIS is or would be **relevant**					
Adopting and using eAIS is or will help me **attain my objectives**					

28.Output Quality (Your opinion on Output Quality of eAIS)	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
The quality I get or will get from eAIS is of **high value**					
The quality I get from eAIS **is acceptable**					

According to me there is **no problem with the quality** of eAIS					

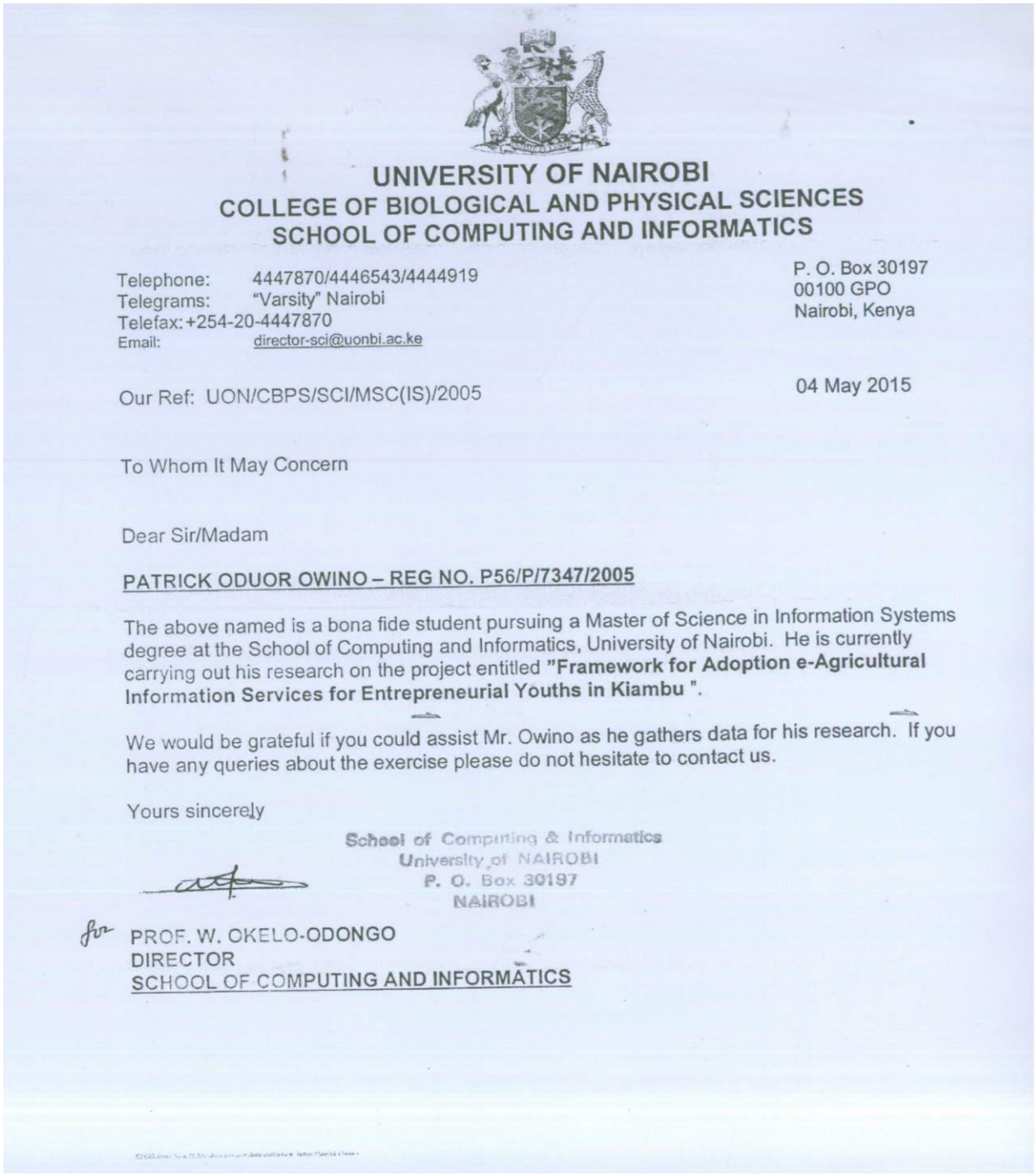
29.Type of e-service (Your opinion on Type of e-service of eAIS)	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Adoption of eAIS does or will **influence the way I gather information** from other enterprise or organizations					
Adoption of eAIS does or will **influence the way I exchange information with other enterprise** or organizations					
Adoption of eAIS does or will **improve the ability to perform** specific tasks in my job					

30. Connectivity (Your opinion on Connectivity to eAIS)	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Adoption of eAIS does or will **aid information exchange** with other enterprises or organizations					
I am or will be able to **share knowledge** while connected to a channel of delivery (**such as Internet**)					
I am able to **gain improved efficiency** while connected to a channel of delivery (**such as Internet)**					
Adoption of eAIS is or will be **affected by reliability of the connection** over channels of service delivery (**such as internet**)					

31. Experience (Your opinion on Experience with eAIS)	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Adoption and use of eAIS is **easy** for me because I have **experience of eAIS**					
My experience with eAIS **helps me judge** on what to learn from others					
Since I have experience, I **do not or will not rely on others a lot**					

32. **Voluntariness (Your opinion on Voluntariness to adopt eAIS)**	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
I chose or will choose to adopt eAIS on my **own volition**					
The decision to adopt and use eAIS is / will be non mandatory (**Voluntary**)					
The decision to adopt and use eAIS is/was not influenced by any one close or important to me (**it is my own decision**)					

7.6 The Introduction Letter from the School of Computing and Informatics, UON.



UNIVERSITY OF NAIROBI
COLLEGE OF BIOLOGICAL AND PHYSICAL SCIENCES
SCHOOL OF COMPUTING AND INFORMATICS

Telephone: 4447870/4446543/4444919
Telegrams: "Varsity" Nairobi
Telefax: +254-20-4447870
Email: director-sci@uonbi.ac.ke

P. O. Box 30197
00100 GPO
Nairobi, Kenya

Our Ref: UON/CBPS/SCI/MSC(IS)/2005

04 May 2015

To Whom It May Concern

Dear Sir/Madam

PATRICK ODUOR OWINO – REG NO. P56/P/7347/2005

The above named is a bona fide student pursuing a Master of Science in Information Systems degree at the School of Computing and Informatics, University of Nairobi. He is currently carrying out his research on the project entitled **"Framework for Adoption e-Agricultural Information Services for Entrepreneurial Youths in Kiambu "**.

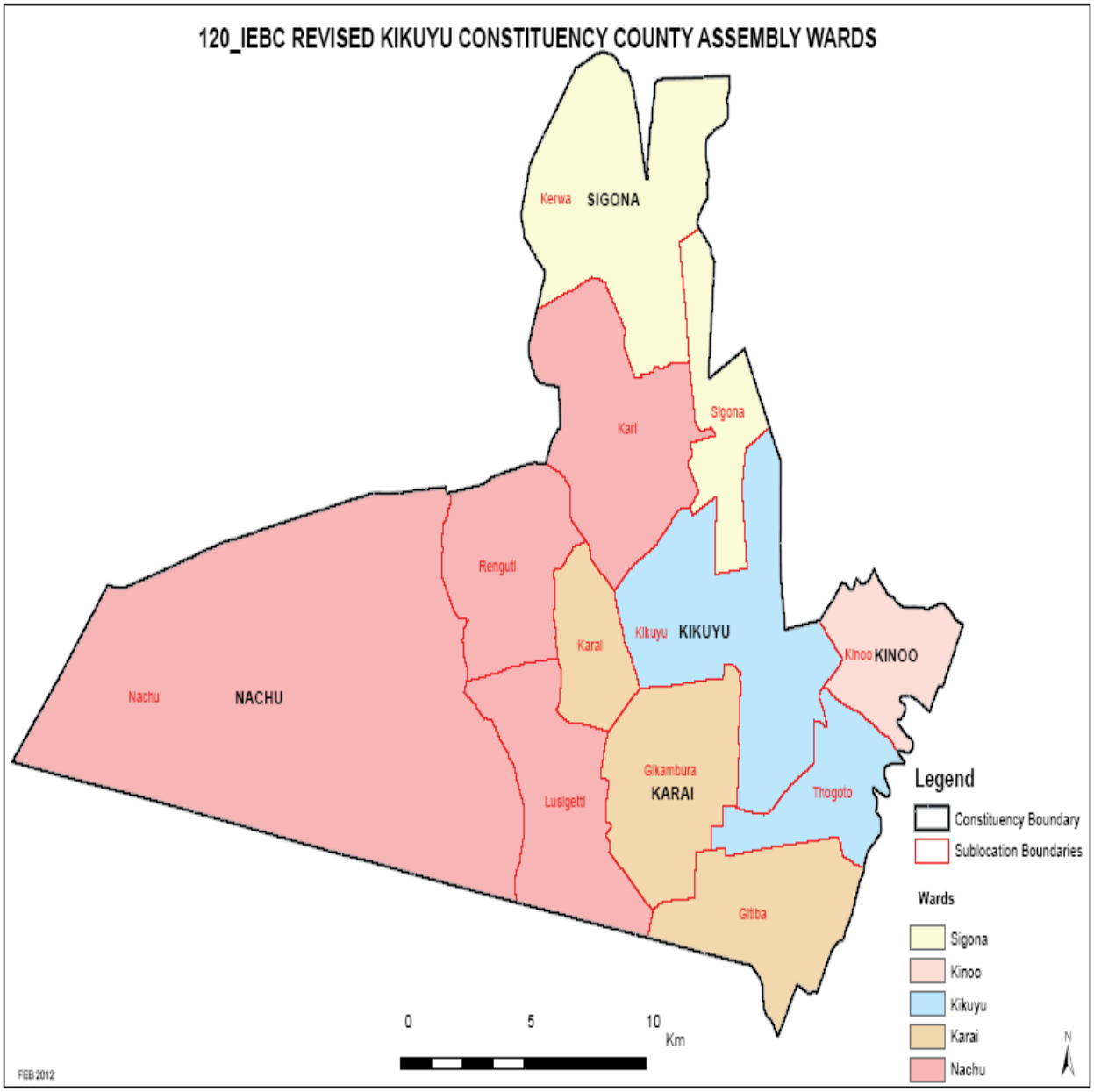
We would be grateful if you could assist Mr. Owino as he gathers data for his research. If you have any queries about the exercise please do not hesitate to contact us.

Yours sincerely

School of Computing & Informatics
University of NAIROBI
P. O. Box 30197
NAIROBI

for PROF. W. OKELO-ODONGO
DIRECTOR
SCHOOL OF COMPUTING AND INFORMATICS

7.7 Map of Kikuyu Sub-county



7.8 Frequency Tables

Gender

Valid	1	53	47.7	47.7	47.7
	2	58	52.3	52.3	100.0
	Total	111	100.0	100.0	

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	10	9.0	9.0	9.0
	2	38	34.2	34.2	43.2
	3	32	28.8	28.8	72.1
	4	31	27.9	27.9	100.0
	Total	111	100.0	100.0	

Residence

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	111	100.0	100.0	100.0

Religion

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	110	99.1	99.1	99.1
	2	1	.9	.9	100.0
	Total	111	100.0	100.0	

Engagement_mode

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	31	27.9	27.9	27.9
	2	80	72.1	72.1	100.0
	Total	111	100.0	100.0	

Years_in_Agriculture

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	84	75.7	75.7	75.7
	2	18	16.2	16.2	91.9
	3	2	1.8	1.8	93.7
	4	7	6.3	6.3	100.0
	Total	111	100.0	100.0	

Other_Engagements

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	16	14.4	14.4	14.4
	2	73	65.8	65.8	80.2
	3	9	8.1	8.1	88.3
	4	13	11.7	11.7	100.0
	Total	111	100.0	100.0	

Marital_Status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	36	32.4	32.4	32.4
	2	69	62.2	62.2	94.6
	3	4	3.6	3.6	98.2
	5	2	1.8	1.8	100.0
	Total	111	100.0	100.0	

Income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	17	15.3	15.3	15.3
	2	30	27.0	27.0	42.3
	3	12	10.8	10.8	53.2
	4	22	19.8	19.8	73.0
	5	30	27.0	27.0	100.0
	Total	111	100.0	100.0	

Education_Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	20	18.0	18.0	18.0
	2	30	27.0	27.0	45.0
	3	25	22.5	22.5	67.6
	4	36	32.4	32.4	100.0
	Total	111	100.0	100.0	

Wealth_Internet_Access

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	99	89.2	89.2	89.2
	2	10	9.0	9.0	98.2
	3	2	1.8	1.8	100.0
	Total	111	100.0	100.0	

Wealth_Connect_to_Internet_using

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	4	3.6	3.6	3.6
	2	27	24.3	24.3	27.9
	3	72	64.9	64.9	92.8
	4	8	7.2	7.2	100.0
	Total	111	100.0	100.0	

eAIS_Platform_Mostly_Used

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	25	22.5	22.5	22.5
	2	60	54.1	54.1	76.6
	3	26	23.4	23.4	100.0
	Total	111	100.0	100.0	

Youth_view_Information_dissemination_practices

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	80	72.1	72.1	72.1
	2	31	27.9	27.9	100.0
	Total	111	100.0	100.0	

Youth_view_External_Challeges

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	95	85.6	85.6	85.6
	2	16	14.4	14.4	100.0
	Total	111	100.0	100.0	

Youth_view_need_for_adoption_of_eAIS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	111	100.0	100.0	100.0

Benefits

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	27	24.3	24.3	24.3
	2	37	33.3	33.3	57.7
	3	15	13.5	13.5	71.2
	4	20	18.0	18.0	89.2
	5	10	9.0	9.0	98.2
	6	2	1.8	1.8	100.0
	Total	111	100.0	100.0	

Challeges_Faced

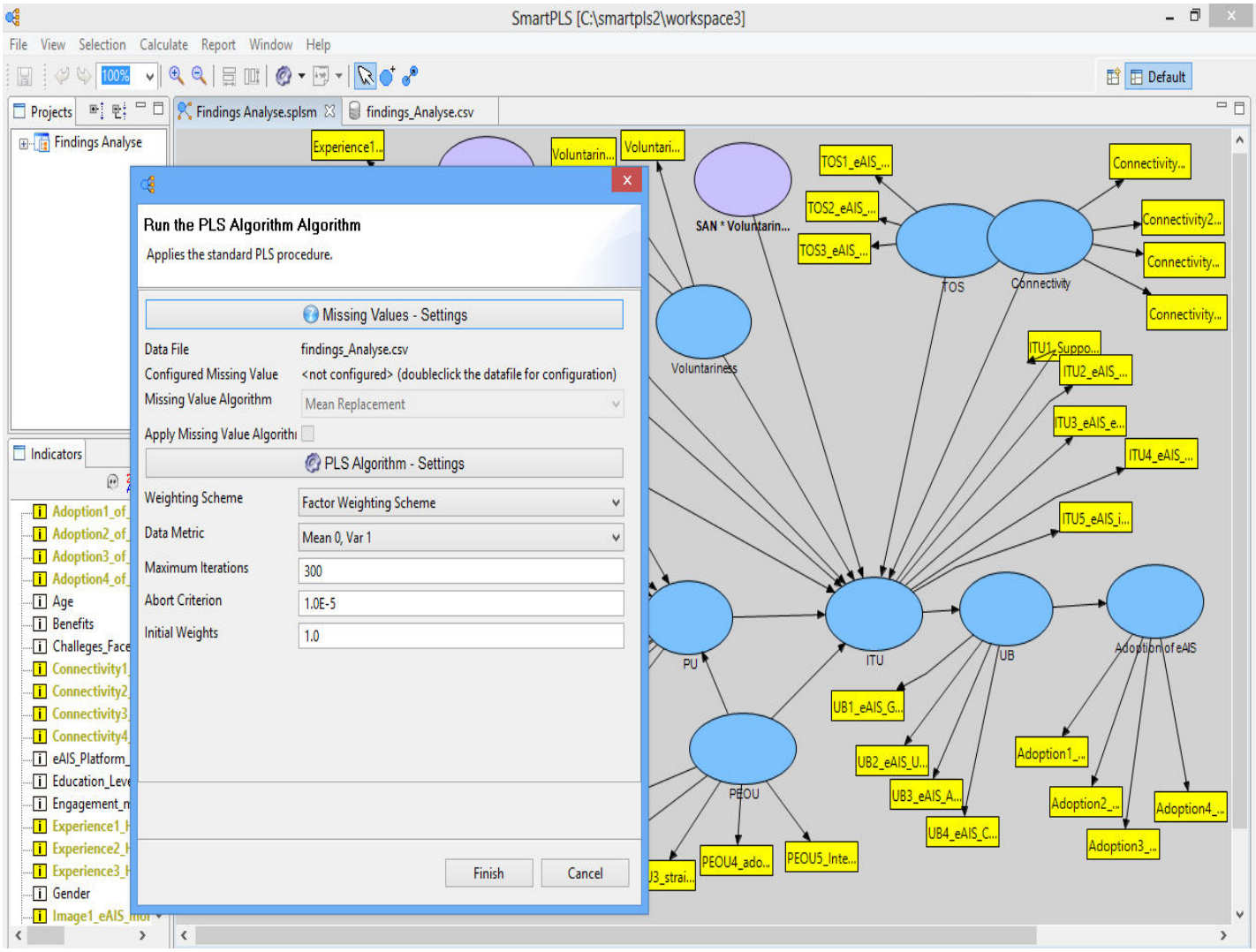
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	5	4.5	4.5	4.5
	2	16	14.4	14.4	18.9
	3	3	2.7	2.7	21.6
	4	23	20.7	20.7	42.3
	5	38	34.2	34.2	76.6
	6	26	23.4	23.4	100.0
	Total	111	100.0	100.0	

Possible_Remedies

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	23	20.7	20.7	20.7
	2	12	10.8	10.8	31.5
	3	28	25.2	25.2	56.8
	4	13	11.7	11.7	68.5
	5	5	4.5	4.5	73.0
	6	30	27.0	27.0	100.0
	Total	111	100.0	100.0	

Source: SPSS Version 17 Study Generated Report, (2015).

7.9 Run PLS Algorithm (Model Estimation) – Parameters



Source : Smart PLS 2.0 M3 Study generated Reports, (2015).

7.10 PLS Quality Criteria Overview

	AVE	Composite Reliability	R Square	Cranach's Alpha	Communality	Redundancy
PU	0.479351	0.869318	0.373993	0.827827	0.479351	-0.022483
Adoption of eAIS	0.505239	0.778026	0.345492	0.660662	0.505239	0.15846
Connectivity	0.572508	0.841114		0.748165	0.572508	
Experience	0.630127	0.834384		0.701979	0.630127	
ITU	0.365515	0.730006	0.688021	0.555152	0.365515	0.023601
Image	0.764159	0.906573		0.848832	0.764159	
JR	0.727354	0.888712		0.820122	0.727354	
OQ	0.501197	0.742926		0.53468	0.501197	
PEOU	0.437713	0.792692		0.681367	0.437713	
SAN	0.652315	0.84794		0.776692	0.652316	
SAN * Experience	0.730552	0.960406		0.953342	0.730552	
SAN * Voluntariness	0.689572	0.951997		0.944597	0.689572	
TOS	0.617208	0.828139		0.695463	0.617207	
UB	0.628776	0.869931	0.09079	0.807206	0.628776	0.067527
Voluntariness	0.365964	0.518496		0.515066	0.365964	

Source: Smart PLS 2.0 M3 Study generated Reports, (2015).

7.11 Path Coefficients

Path Coefficients

	PU	Adoption of eAIS	Connectivity	Experience	ITU	Image	JR	OQ	PEOU	SAN	SAN * Experience	SAN * Voluntariness	TOS	UB	Voluntariness
PU					0.067408										
Adoption of eAIS															
Connectivity					0.066157										
Experience	-0.1655				0.521787										
ITU														0.301314	
Image	0.268941														
JR	0.326605														
OQ	0.058131														
PEOU	0.221673				0.40428										
SAN	0.042015				0.461107										
SAN * Experience					-0.677										
SAN * Voluntariness					-0.14574										
TOS					0.325239										
UB		0.587786													
Voluntariness					0.297602										

Source: Smart PLS 2.0 M3 Study generated Reports, (2015).

7.12 Latent Variable Correlation

Latent Variable Correlations

	PU	Adoption of eAIS	Connectivity	Experience	ITU	Image	JR	OQ	PEOU	SAN	SAN * Experience	SAN * Voluntariness	TOS	UB	Voluntariness
PU	1														
Adoption of eAIS	0.055681	1													
Connectivity	0.379634	0.182337	1												
Experience	0.080482	0.408836	0.16298	1											
ITU	0.523757	0.206562	0.474839	0.343447	1										
Image	0.363059	0.013077	0.012051	0.35253	0.338481	1									
JR	0.50337	0.018007	0.353048	0.143181	0.490054	0.22264	1								
OQ	0.297364	0.173794	0.262159	0.392523	0.643433	0.33602	0.316734	1							
PEOU	0.425565	0.326877	0.318552	0.269033	0.634858	0.190868	0.475162	0.407612	1						
SAN	0.324774	0.258736	0.171608	0.522384	0.43629	0.426049	0.400843	0.476497	0.433124	1					
SAN * Experience	0.226917	0.414451	0.191898	0.838631	0.417106	0.414021	0.306562	0.446643	0.382537	0.87064	1				
SAN * Voluntariness	0.287023	0.29068	0.254049	0.449026	0.411591	0.225686	0.366109	0.403454	0.34781	0.884431	0.812509	1			
TOS	0.495268	-0.0235	0.498834	0.336546	0.649252	0.274379	0.485754	0.308724	0.31745	0.361603	0.380222	0.365755	1		
UB	0.096335	0.587786	0.134268	0.521472	0.301314	0.341902	-0.13406	0.297374	0.357751	0.466841	0.554371	0.429125	0.188101	1	
Voluntariness	0.342097	-0.05771	0.318668	-0.06872	0.387976	0.066401	0.3331	0.240752	0.158408	0.319126	0.225703	0.569752	0.328156	1	1

Source: Smart PLS 2.0 M3 Study generated Reports, (2015).

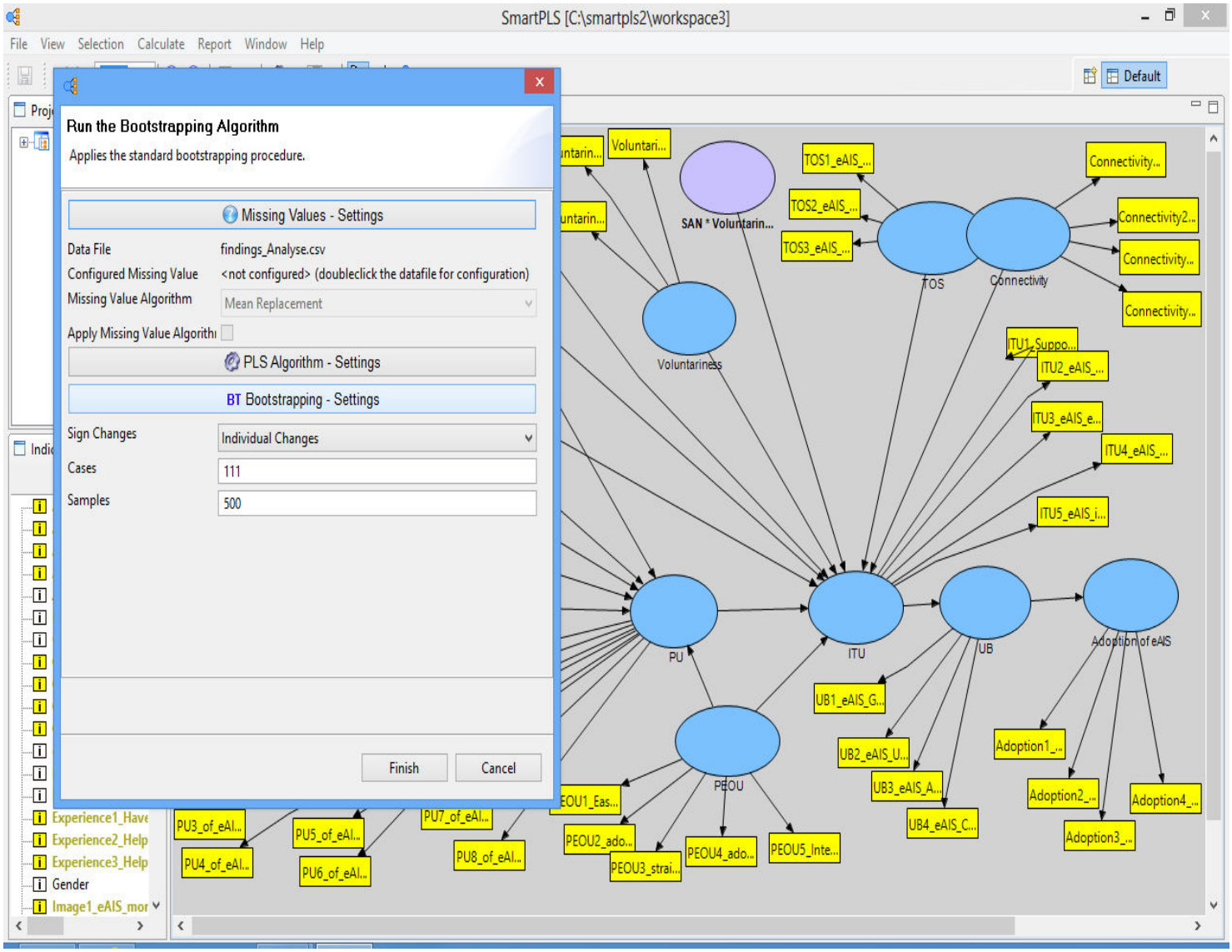
7.13 Total Effects

Total Effects

	PU	Adoption of eAIS	Connectivity	Experience	ITU	Image	JR	OQ	PEOU	SAN	SAN * Experience	SAN * Voluntariness	TOS	UB	Voluntariness
PU		0.011939			0.067408									0.020311	
Adoption of eAIS															
Connectivity		0.011717			0.066157									0.019934	
Experience	-0.1655	0.090437			0.510631									0.153861	
ITU		0.177108												0.301314	
Image	0.268941	0.003211			0.018129									0.005463	
JR	0.326605	0.003899			0.022016									0.006634	
OQ	0.058131	0.000694			0.003919									0.001181	
PEOU	0.221673	0.074248			0.419223									0.126318	
SAN	0.042015	0.082168			0.463939									0.139792	
SAN * Experience		-0.1199			-0.677									-0.20399	
SAN * Voluntariness		-0.02581			-0.14574									-0.04391	
TOS		0.057603			0.325239									0.097999	
UB		0.587786													
Voluntariness		0.052708			0.297602									0.089672	

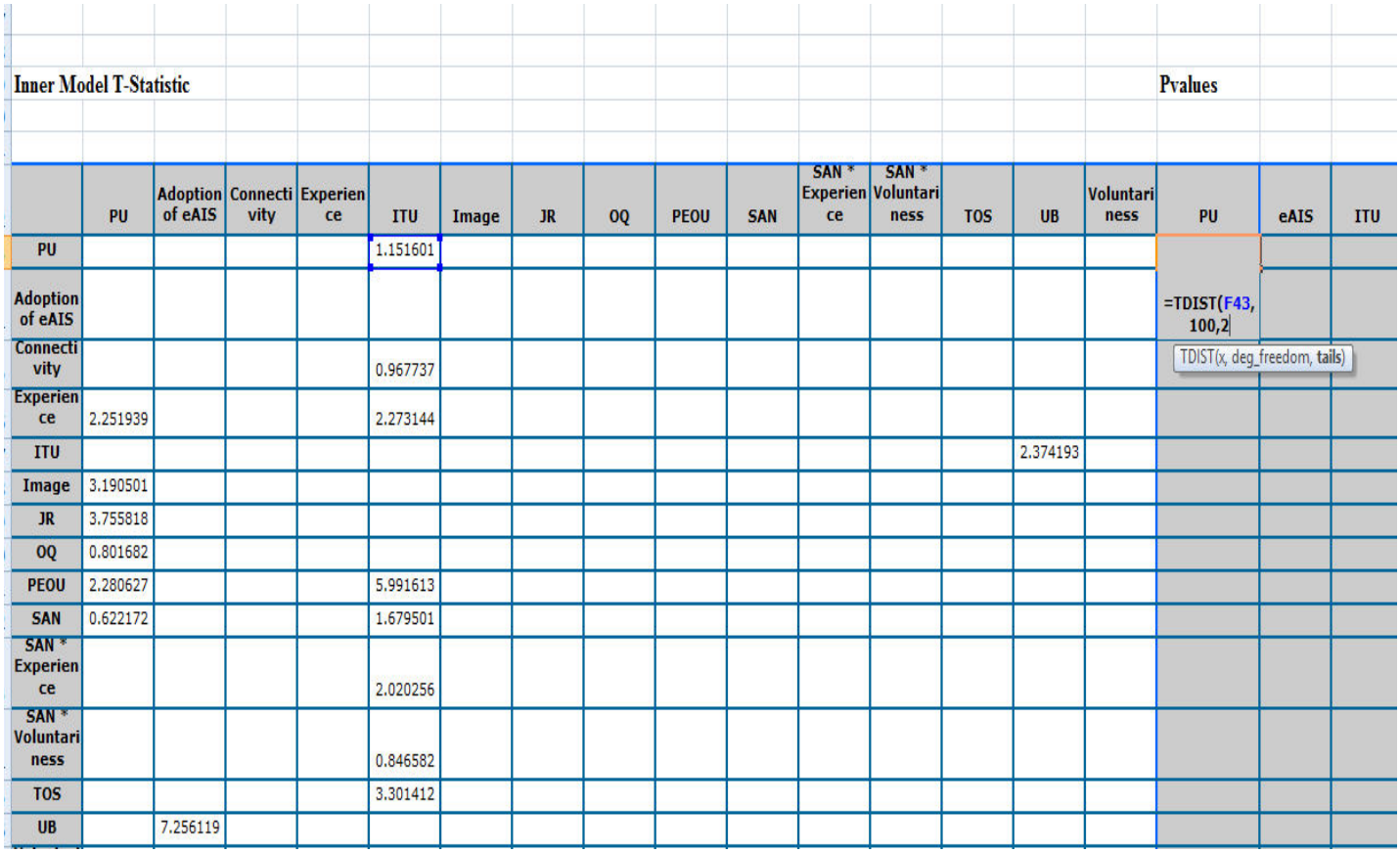
Source: Smart PLS 2.0 M3 Study generated Reports, (2015).

7.14 PLS SEM Bootstrapping (for significance testing) - Parameters



Source: Smart PLS 2.0 M3 Study generated Reports, (2015).

7.15 Converting t-Values to p-Values in Excel



Inner Model T-Statistic

	PU	Adoption of eAIS	Connectivity	Experience	ITU	Image	JR	OQ	PEOU	SAN	SAN * Experience	SAN * Voluntariness	TOS	UB	Voluntariness
PU					1.151601										
Adoption of eAIS															
Connectivity					0.967737										
Experience	2.251939				2.273144										
ITU														2.374193	
Image	3.190501														
JR	3.755818														
OQ	0.801682														
PEOU	2.280627				5.991613										
SAN	0.622172				1.679501										
SAN * Experience					2.020256										
SAN * Voluntariness					0.846582										
TOS					3.301412										
UB		7.256119													

Pvalues

PU	eAIS	ITU
=TDIST(F43, 100,2		

TDIST(x, deg_freedom, tails)

Source: Smart PLS 2.0 M3 Study generated Reports, (2015).

7.16 P-Values from T-Values

Inner Model T-Statistic														9E-11		Pvalues			
	PU	Adoption of eAIS	Connectivity	Experience	ITU	Image	JR	OQ	PEOU	SAN	SAN * Experience	SAN * Voluntariness	TOS	UB	Voluntariness	PU	eAIS	ITU	UB
PU					1.151601													0.252230964	
Adoption of eAIS																			
Connectivity					0.967737													0.335510439	
Experience	2.251939				2.273144											0.0265128		0.025156354	
ITU														2.374193					0.019496
Image	3.190501															0.00189772			
JR	3.755818															0.000290477			
OQ	0.801682															0.424637834			
PEOU	2.280627				5.991613											0.024692446		3.2952E-08	
SAN	0.622172				1.679501											0.53524482		0.096176305	
SAN * Experience					2.020256													0.046031039	
SAN * Voluntariness					0.846582													0.399249556	
TOS					3.301412													0.001334556	
UB		7.256119															8.694E-11		
Voluntariness					2.745535													0.007164138	

Source: Smart PLS 2.0 M3 Study generated Reports (2015).