SMALL AND MEDIUM ENTERPRISE INNOVATIONS: DETERMINANTS IN THE AGRI-FOOD VALUE CHAIN IN CENTRAL AND EASTERN UGANDA

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DECLARATION

I Basil Ajer (Reg. **A99EA/28789/2019)**, declare that this thesis is my original work and has not been presented for the award of a degree in any other university or any other award.

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DEDICATION

I dedicate this dissertation to my wife and children for their unending love and support during the long years of my doctoral studies.

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TABLE OF CONTENTS

DECLARATION ..... **i**
DEDICATION ..... **ii**
ACKNOWLEDGEMENTS ..... **iii**
TABLE OF CONTENTS ..... **v**
LIST OF TABLES ..... **viii**
LIST OF FIGURES ..... **x**
LIST OF ABBREVIATIONS AND ACRONYMS ..... **xi**
ABSTRACT ..... **xii**
CHAPTER ONE: INTRODUCTION **1**
1.0 Introduction 1
1.1 Background 1
1.1.1 SME Innovation Landscape in Uganda 4
1.2 Statement of the Problem 6
1.3 Objectives of the study 7
1.3.1 General Objectives 7
1.3.2 Specific Objectives 7
1.4 Research Hypotheses 8
1.5 Significance of the study 13
1.6 Theoretical Background and Conceptual Framework 13
1.6.1 Theoretical perspectives 13
1.6.2 Conceptual Framework 17
CHAPTER TWO: LITERATURE REVIEW **20**
2.0 Introduction 20
2.1 Definition of Key concepts 20
2.1.1 Market Orientation in the agri-food SME context 20
2.1.2 Entrepreneurial Orientation in the agri-food SME context 22
2.1.3 Innovation in the agri-food SME context 23
2.1.4 Value chain in the context of Agri-food SME 25
2.2 Market Orientation and Innovation in the agri-food SME 27
2.3 SMEs innovation and Entrepreneurial Orientation in the agri-food sector 31
2.4 Conclusion 33
CHAPTER THREE: METHODOLOGY **34**

3.0 Introduction....34
3.1 Study Area....34
3.2 Research Design....35
3.3 Study population....36
3.4 Sampling Design....36
3.5 Data types and sources, data collection methods, and instruments....37
3.6 Data Reliability and Validity....39
3.6.1 Validity Test....39
3.6.2 Reliability Test....39
3.6.3 Addressing common method bias....40
3.7 Data Analysis....40
3.7.1 Investigating factors influencing the level of agri-food SME innovation....40
3.7.2 The relationship among marketing orientation, innovation attitude and firm innovativeness....46
3.7.3 The relationship among enterpreneurial orientation, learning orientation, cost focus and level of innovation....47
3.7.4 Model Specification for the CB-SEM....48
3.8 Ethical Considerations....50
CHAPTER FOUR: RESULTS....52
4.0 Introduction....52
4.1 Summary Statistics....52
4.2 Level of SME Innovation....54
4.3 Hierarchical regression results for factors influencing innovation....55
4.4 Market orientation and firm innovativeness....58
4.4.1 Reliability and Validity of MO, innovation attitude and firm innovativeness constructs....58
4.4.2 The relationship among MO, innovation attitude and agri-food innovativeness....61
4.4.3 Mediation Results for effects of Market Orientation on Innovation....65
4.5 Enterpreneurial orientation and agri-food SME innovation....66
4.5.1 Reliability and Validity of EO, cost focus, learning orientation and innovation constructs....66
4.5.2 The relationship among enterprenuerial orientaion, cost focus, learning orientation and innovation in Agri-food SME....70
4.5.3 Mediation Results for effects of Enterprenuerial Orientation on Innovation....75

CHAPTER FIVE: DISCUSSIONS 77
5.0 Introduction 77
5.1 Agri-food SME innovation 77
5.2 Determinants of Agri-food SME innovation 79
5.3 The relationship among Market orientation, innovation attitude and innovation 82
5.4 The relatinship among entreprenual orientation on learning orienation, cost focus and innovation 85
5.5 Intervening roles of atttitude towards innovation, learnig orientation and cost focus 88
CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS 90
6.0 Introduction 90
6.1 Conclusions 90
6.2 Recommendations 91
6.2.1 Recommendations for Policy and Practice 91
6.2.2 Recommendation to the practitioners 92
6.2.3 Recommendations for further studies 93
REFERENCES 94
APPENDICES 115

LIST OF TABLES

Table 1: Constructs adopted for measuring customer focused and systems focused innovation 42

Table 2: Factor Analysis for innovation 45

Table 3: Summary Statistics 53

Table 4: Level of innovation of agro-food SME 54

Table 5: Comparing level of innovation by SME turnover 54

Table 6: Hierarchical regression results for factors influencing customer focused innovation 56

Table 7: Hierarchical regression results for factors influencing Systems focused innovation 58

Table 8: Means, standard deviations and internal consistency of scale items 60

Table 9: Construct Validity for the MO-Innovativeness model 61

Table 10: Pooled model results for the effect of MO on innovation attitude and firms innovativeness 62

Table 11: Group level analysis for business location and the effect of MO on innovation attitude and firms innovativeness 63

Table 12: Group level analysis for business size typology and the effect of MO on innovation attitude and firms innovativeness 64

Table 13: Multivariate group level analysis for type of agri-food SME and the effect of MO on innovation attitude and firms innovativeness 65

Table 14: Means, standard deviation and internal consistency of scale items 67

Table 15: Construct Validity of the EO-Innovation model 69

Table 16: Pooled model results for the effects of EO on learning orientation, cost focus and overall innovation 71
Table 17: Group level analysis for business size typology and the effects of EO on learning orientation, cost focus and overall innovation 72
Table 18: Group level analysis education level of owner and manager and the effects of EO oin learning orientation, cost focus and overall innovation 73
Table 19: Group level analysis for type of agri-food SME and the effects of EO on learning orientation, cost focus and overall innovation 74
Table 20: Group level analysis for gender of agri-food SME owner and the effects of EO on learning orientation, cost focus and overall innovation 75

LIST OF FIGURES

Figure 1: Study Conceptual framework, ...19

Figure 2: Map of Study Area.....35

Figure 3: Structural model for assessing the relationship among MO, innovation attitude and firm innovativeness 47

Figure 4: Structural model for assessing the relationship among EO, learning orientation, cost focus and overall innovation 48

LIST OF ABBREVIATIONS AND ACRONYMS

AVE	Average Variance Extracted
CFI	Comparative Fit Index
CR	Composite Reliability
DC	Dynamic Capabilities
EFA	Exploratory Factor Analysis
EO	Entrepreneurial Orientation
EPRC	Economic Policy Research Centre
GDP	Gross Domestic Product
MO	Market Orientation
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PCA	Principal Component Analysis
RBV	Resource-Based View
RMSEA	Root Mean Square Error of Approximation
SEM	Structural Equation Modelling
SMEs	Small and Medium Enterprises
SSA	Sub-Saharan Africa
TLI	Tucker–Lewis index
UBOS	Uganda Bureau of Statistics
UGX	Uganda Shillings
UN	United Nations

ABSTRACT

The Small and Medium Enterprises (SMEs) play a significant role in agri-food value chain, through adding value to primary agricultural produce and acting as a linkage between the consumers and producers. However, for the SMEs to remain continuously relevant and competitive in the agrifood value chain, they need to innovate. There is limited studies on determinants to SME innovation in the agri-food value chain for developing economies. Most of the available studies on factors driving SME innovation are either focused to a developed country context, or in a non-agricultural based context. This study was set up to bridge this gap, specifically, the study was set up to: (1) assess the level of agri-food SME innovation in central and eastern Uganda, (2) analyze the factors that influence the level of agri-food SME innovation in central and eastern Uganda**,** (3) assess the association among SME market orientation, attitude towards innovation, and firm innovativeness, and (4) determine the influence of agri-food SME entrepreneurial orientation on learning, cost focus and innovation. The study collected cross-sectional primary data from a sample of 521 agri-food SMEs selected from the districts of Kampala, Mukono, Wakiso and Jinja. These districts collectively have the highest concentration of agri-food SMEs. Collected primary data was analyzed in SPSS using descriptive statistics, exploratory factor analysis, hierarchical regression analysis and the multivariate structural equation modelling using AMOS v. 23. Results for the first objective showed that the levels of SME innovations were generally high, at about 80%. Customer focused innovation would be increased by presence of policies that support innovation and reward of creative employees. On the other hand, system focused innovation would be increased by having policies and principles that support innovation and undertaking of internal product and process improvement research. However, systems focused innovation didn't show increase due to reward to creative employees. Results for the third objective showed that interfunctional coordination influences both firm innovativeness and innovation attitude. On the other hand, competitor orientation does not influence innovation attitude, but negatively influences firm innovativeness, while, customer orientation does not influence firm innovativeness, but positively influences innovation attitude. Results also confirmed the positive influence of innovation attitude on firm innovativeness. Results of the fourth objective suggested the importance of proactiveness in enhancing learning orientation, cost focus and innovation. On the other hand, entrepreneurial proclivity was seen to have significant influence on learning orientation and cost focus but not on innovation. The study findings have three broad practical implications. First, encouraging agri-food SMEs to develop policies that support innovation would improve the overall level of innovation, while, building the capacity of agri-food SMEs to conduct product and process improvement research would increase the level of systems focused innovation. Secondly, focusing on improving internal coordination among departments enhances both attitude and firm's ability to undertake innovation. Lastly, helping SMEs to become proactive or have high levels of proclivity would also increase their cost focus and learning orientation which are all important to the sustainability of agri-food SMEs. Theoretically, this study extends the literature on innovation to agri-food SMEs, a sector that is increasing becoming important for growth and development of most African countries, including Uganda. Studies on agri-food SME innovation have been generally lacking. By assessing the drivers of SMEs innovation in agri-food sector of a developing country, this study becomes theoretically relevant

CHAPTER ONE: INTRODUCTION

1.0 Introduction

Chapter one presents general introduction to this study. It starts by presenting background to the study, followed by the problem statement which elaborates the gap in literature and knowledge intended to be addressed in the study. The study objectives and hypotheses are then presented. Finally, the chapter concludes by looking at the theoretical foundations and conceptual framework related to the study.

1.1 Background

Innovation which is the execution of novel or improved products, processes or business models aimed at improving customer satisfaction or operational efficiency (Rothaermel, 2017; OECD, 2005), is now recognised as a key requirement for business growth and sustainability. For innovation to take place, on the minimum, there must be significant improvement to or new introduction of product, service, process or organization method. Innovation therefore consists of many different elements and activities whose success depends on available and accessible firm resources, competencies, and external environmental factors (Xuhua *et al*., 2016). In the last few decades, the world has witnessed a remarkable technological development which stimulated innovation across all sectors.

Several scholars have widely discussed the contributions of innovation to development of many nations (Aksoy, 2017; Chege & Wang, 2020; Devaux *et al*., 2018). These contributions can be economic, technological or both. Consequently, innovation is increasingly becoming important for sustaining economic development

through increased productivity of businesses throughout an economy. For instance, increase in small and medium enterpries (SMEs) productivity has of recent been associated with greater ability and capacity to innovate and adopt modern technologies and processes to their locale (Wolff & Pett, 2006; Devaux *et al*., 2018). The Organisation for Economic Co-operation and Development (OECD)'s Oslo manual of innovation conceptualized and presented four main typologies of innovation (OECD, 2005). These are: product innovation which involves changes to the product, process innovation which involves changes to the operational procedures, marketing innovation which involves changes to the way the products are marketed, and organizational innovation which involves changes to the organizational structure. Innovative and competitive SMEs are a vital constituent in the socio-economic growth of developing countries and world over (Büschgens et al., 2013; Caiazza et al., 2014; Zahoor et al., 2021). Consequently, without meaningful and significant innovation, SMEs contribution to their nations economic development are negligible.

In almost all developing countries, SMEs have a critical part to play in their economies by acting as a source of the much-needed employment. They therefore contribute significantly to Gross Domestic Product (GDP) and tax base in these countries. According to (Muriithi, 2017), SME contribution to GDP in Africa varies from about 8% (Zambia) to 70% (Ghana) and contribution to employment ranging from 15% (Zimbabwe) to 90% (Ethiopia). In Uganda, SMEs are spread across almost all sectors of the economy, constituting 90% of the private sector (Uganda Investment Authority (UIA), 2016). A report by the International Finance Cooperation (IFC) reveals that there are over 1.1 million micro, small and medium enterprises in Uganda (IFC, 2021). They contribute 18% of the GDP and 90% of all the formal employment (Muriithi,

2017). The total tax contribution from SMEs in Uganda was Uganda Shillings 3.54 trillion in the 2018/19 financial year (Business Focus, 2019).

Although SMEs are found in almost all sectors, agri-based SMEs tend to be more important in the predominantly agrarian economies. In sub-Saharan Africa (SSA), agriculture directly employs over 65% of the population and contributes about a quarter of the total GDP in these countries (World Bank, 2021). In Uganda, over three quarter of the employment are directly in agriculture, with the sector contributing more than 20% of the GDP (World Bank, 2021). Most of the farms are however micro and managed by smallholder farmers involved in primary agricultural production with limited value addition.

Recently, there has been an increase in agri-based SMEs involved in value addition of primary agricultural produce, usually procured from smallholder farmers (Chege & Wang, 2020; Odongo, *et al*., 2017). Agri-based SMEs support smallholder farmers by providing them with market for their produce, and in some cases providing agricultural extension services and input support (Akumu, *et al*., 2020). SME growth is therefore important in sustaining most economies in developing countries. Such growth and expansion of SME leads to increased level of employment, increased market for the smallholder farmers, increased GDP and consequently the government tax base (Chege & Wang, 2020). In the face of increasing competition among the many SMEs, innovation becomes very important in sustaining SME growth (Devaux *et al*., 2018).

Whereas SME innovation in Africa is on the rise (Woldemichael *et al*., 2017; Kormawa *et al*., 2011), there are great disparities across countries, with some

countries lagging behind. Uganda is among the sub-Saharan African (SSA) countries where agri-food industrialization is still low (Economic Policy Research Centre (EPRC), 2018). Hence, most of the country's exports are inform of primary raw agricultural produce, with very limited value added agricultural exports (UBoS, 2019). This dominant export of raw agricultural produce is associated with low levels of innovations in the countries agri-food sector. Thus the SMEs contribution to GDP of Ugandas is low, at just 18% of the the GDP, and yet SMEs employ over 90% of the population (Muriithi, 2017). In countries such as Ghana, Nigeria and Kenya where the level of innovation in the agri-food sector in relatively high, SMEs employ a relatively smaller proportion of the population while contributing relatively a higher share of the GDP. In Ghana for instance, SMEs contributes over 70% of the GDP, while employing about half of the population (Muriithi, 2017).

It is therefore likely that SMEs that fail to compete through innovative approaches usually lose their market base and end up closing businesses. In the case of Uganda, fostering sustainable growth will require significant innovation among the SMEs (EPRC, 2018). Fostering this innovation requires understanding the dynamics of agri-food SMEs innovation in the local context.

1.1.1 SME Innovation Landscape in Uganda

Although recent evidence has shown that SME innovation is on the rise worldwide (Woldemichael *et al*., 2017; Kormawa *et al*., 2011), developing countries have lagged behind (Ndicu, Ngui, & Barasa, 2024; Allard & Williams, 2020). The Global Innovation Index 2023, ranks several low-income countries, including Uganda among the least innovative countries (World Intellectual Property Organization, 2023).

Uganda specifically, with an index of 16 percent was ranked number 121 out of 132 countries for which data on innovation are available.

Despite the low level of innovation in Uganda, there are a number of policy frameworks that aims to foster innovation. For instance, the country's vision 2024, which aims for a transformed Ugandan society from a peasant to a modern and prosperous country by 2040, requires a matching level of innovation across all sectors for it to be achieved (National Planning Authority, 2014). With innovation embedded in the Science, Technology and Innovaiton (STI) policy, both private and public actors play critical roles in fostering innovation in the country (United Nations Conference on Trade and Development, 2020). The role of government is largely regulatory and provision of the an enabling environment. In effect, there are a number of policy framework documents that guide innovation in Uganda. For instance, the Uganda National STI policy of 2009 led to the establishment of the Uganda National Council for Science and Technology (UNCST) (MFPED, 2009). UNCST is mandated to regulate science research and innovation in the country. Additionally, Uganda also had a fully fledged Ministry of Science, Technonogy and Innovation, with the mandate of supporting innovation within the country. The Ministry developed the National Research and Innovation Programme (NRIP) Framework to guide in the support to innovation in Ugandan Economy. In addition to the STI policy and NRIP, the government also came with legal and regulatory frameworks to protect the products of innovation. This includes the Intellectual Property Acts and Regulations that is under the jurisdiction of Uganda Registration Services Bureau (URSB).

Even with the right policy framework, the benefits of the innovation can only be realized if actors are effectively involved in creation and commercialization of

innovations. Thus, with the government prioritizing Science, Technology and Innovation as a pillar for socio-economic transformation (Jjagwe, Kirabira, & Mukasa, Contribution of R&D grants and investment to the commercialization of innovations in Uganda: Lessons from UNCST a science granting council, 2024a), commercialization of innovation becomes the bedrock of SME competitiveness. According to Dobrzański, Bobowski, Chrysostome, Velinov, & Strouhal (2021), innovation-driven competitiveness is key to stimulating economic growth in developing countries. This is especially relevent for agri-food value chains, given that agriculture contributes over 20% of Uganda's GDP (World Bank, 2021).

1.2 Statement of the Problem

Despite consensus on the significance of innovation to SME growth and economic sustainability (Dobrzański *et al*., 2021), there is still a general lack of understanding of what drives agri-food SME innovation that is on the rise in most developing countries (Gaillard & Mouton, 2022). This is amidst low levels of innovation for most African countries (World Intellectual Property Organization, 2023). Most studies on factors that drive SME innovation are either focused to a developed country context, or in a non-agricultural based context (e.g., Sawy *et al*., 2001; Pick *et al*., 2015; An *et al*., 2018; Senyard, *et al*., 2014; and Yu *et al*., 2020). Since much of the available information on innovation focuses on large firms in developed economies, (Prajogo & McDermott, 2014; de Klerk, 2015), the relevance of innovation for relatively small firms in developing economies has been given less attention. The few existing studies have focused on usually one component of the agri-food SME. For instance, Iza & Dentoni (2020) studied innovation in coffee multi-stakeholder platforms in Uganda, while, (Kamuri, 2021) studied innovation in Kenya's leather industry. These two

studies focused on specific elements of the agri-food sector. However, with the sector increasingly becoming integrated towards value chain approach (Devaux *et al*., 2018), it is important that such studies adopt a value chain approach towards understanding innovation in the agribusiness and food business sectors. This is because, innovation in agribusiness and food business usually occurs along the food value chain. This narrow focus and lack of empirical information was the main motivation of this study. Consequently, the study sought to provide additional insight to determinants of innovation and innovativeness in agri-food SME firms.

1.3 Objectives of the study

1.3.1 General Objectives

This study investigated the drivers of Small and Medium Enterprise innovation in Uganda's agri-food value chain.

1.3.2 Specific Objectives

Specifically, the objectives were to:

1. Assess the level of Agri-food SME innovation in central and eastern Uganda
2. Analyze factors that influence the level of agri-food SME innovation in central and eastern Uganda
3. Assess the association among SME market orientation, attitude towards innovation and firm innovativeness
4. Determine the relationship among agri-food SME entrepreneurial orientation, learning orientation, cost focus and innovation

1.4 Research Hypotheses

The hypotheses tested in the study follows the objectives. In assessing the drivers of agri-food SMEs innovation in Uganda, the researcher understands that firm level innovation requires a supporting policy framework and the right procedure for it to be undertaken. While SMEs owners and managers recorgnized the need to innovate, those that take an extra step to create a conducive environment for innovation are expected to have higher levels of innovations (Oke *et al*., 2013; Morero, 2017). Whereas previous studies show a positive effect of presences of policies on innovations, they do not separate these effects by the type of innovation. In this study, presence of internal policies are expected to have the same effect on both customer focused and system focused innovations. This study thus hypothesizes that:

H1-1: Presence of policies and principles that support innovations leads to higher levels of innovation

In the process of undertaking innovation, firms may acquire intellectual property (IP) associated with some technologies or processes. Thus, by acquiring such intellectual properties, such firms would be considered more innovative. According to Kalanje (2006), intellectual property rights are effective in facilitation of innovation. Despites this important role, Sukarmijan and Sapong (2014) argue that IPs can become challenges to SME innovation. Consequently, acquiring IP is expected to have varied influence on the different forms of SMEs innovation (Spithoven *et al*., 2013). Therefore, this study hypothesizes that:

H1-2: Acquisitions of intellectual property rights are associated with higher levels of innovation

In addition to having the right policies in place, agri-food firms also need to undertake firm level research aimed at product and process improvments. According to Alarcon and Polonio, (2014), internal research and development is an important ingredient of agrifood innovation. In fact such research and development are a necesity for innovation given that firms are usually faced with resource scarcity (Halme & Korpela, 2014). However, research has shown that firm research and innovation has differential effects on the different forms of innovation. In this, we test whether firm level research and development has the same effect on both systems focused and customer focused innovation. Thus we hypothesis that:

H1-3: Involvement in product or process improvement research improves

Whereas firm level research and development plays an important role for innovation, not all SMEs can afford to undertake such innovations. Such firms may rely on accessing innovations from other institutions. Thus, SMEs that have access to research output are usually more innovative than those that do not (Meuleman & De Maeseneire, 2012; Czarnitzki & Delanote, 2015). Such effects are however expected to vary across the different types of SME innovation. This study therefore hypothesis that:

H1-4: SMEs that received research output from external organizations are more innovative

In fostering firm level innovations staff involvement becomes very vital (Rasheed *et al*., 2017; Demirkan *et al*., 2022). Consequently, SMEs intending to increase their innovation may provide rewards for staff who are creative. However, such rewards

may favour other forms of innovations at the expense of others. In this study therefore, the following hypothese was tested:

H1-5: Provision of rewards to creative employees improves the level of innovation

Secondly, in assessing the relationship among SME market orientation (MO), attitude towards innovation, and firm innovativeness, the study adopted the Narver and Slater (1990) concept during hypothesis development. Their concept positions five constructs that make up the MO concept. These are: interfunctional coordination, competitor orientation, customer orientation, long term focus and profitability focus. This study focused on the first three which are common in SMEs. Studies of similar firms have also previously focused on the first three (Micheels & Gow, 2008; Micheels & Gow, 2015; Ho *et al*., 2018) Each of these constructs is expected to influence innovation attitude and firm's innovativeness differently. First, interfunctional coordination which refers how the different units of the firm coordinate (Grinstein, 2008) has been shown to have varying influence on a firm's innovation. In agri-food MSMEs, this interfunctional coordination depicts how the different employees interact to enable the firm achieve its goals and objectives. The level of interfunctional coordination is thus expected to influence firm's outcomes including innovation (Grinstein, 2008; Ho *et al*., 2018), innovation attitude (Ho *et al*., 2018; Micheels and Gow, 2015) and performance (Ho *et al*., 2018). This study therefore hypothesizes that:

H2-1: Interfunctional coordination has a positive effect on innovation attitude

H2-1b: Interfunctional coordination has a positive effect on firm's innovativeness

The second construct that is expected to influence a firm's innovation attitude and innovativeness is competitor orientation. Competitor orientation which focuses on how the firms view its competitors (Grinstein, 2008) is expected to influence a firm's innovation attitude and innovativesness depending on the firm and the sector. A study by Newman *et al.* (2016), showed that competitor orientation had a positive influence on innovation. Contrarily, Ho *et al*. (2018) showed that competitor orientation did not influence both financial performance and innovation levels of beef cattle producers in Vietnam. This study therefore hypothesizes that:

H2-2a: Competitor orientation positively influences innovation attitude

H2-2b: Competitor Orientation has a positive effect on SMEs innovativeness

The MO concept also includes customer orientation as another construct. Customer satisfaction is very important in the growth of SMEs. This is especially true in the agri-food sector where repeat customers form the bulk of customers. There is also another set of customer base realized through referrals from satisfied customers. For instance, Ho et al. (2018) observed that customer orientation was an important factor for the innovation of primary agricultural producers in central Vietnam. Generally, customer orientation is expected to influence different aspects of the firm including innovation (Grinstein, 2008; Fort-Rioche & Ackermann, 2013; Grunert *et al.*, 2005). This study therefore hypothesizes that:

H2-3a: Customer Orientation positively influences SMEs innovation attitude

H2-3b: Customer Orientation has a positive effect on SMEs innovativeness

In modern agribusinesses, attitude also play a critical role in the firm's innovativeness. According to Montalvo (2006), innovation in firms is triggered by several factors including the manager's attitude towards various internal and external aspects including economic risk perceptions. The impact of attitude on innovation is expected to vary across sectors and firm sizes (McGuirk *et al*., 2015; Filippetti, 2011). In relation to this study, it is expected that a positive attitude towards innovation would significantly influence the decision to undertake innovation, and thus the level of innovation. This study therefore hypothesized that:

H2-4: Innovation attitude has a positive effect on firm's innovativeness

Lastly, in assessing the relationship among agri-food SME entrepreneurial, and learning orientation, cost focus and innovation, this study hypothesized that:

H3-1: Enterpreneurial Orientaion positively influences agri-food SME learning orientation

H3-2: Enterpreneurial orientaion positively influences agri-food SME cost focus

H3-3: Enterpreneurial orientaion positively influences agri-food SME innovation

H3-4: Agri-food SME learning orientation positively influences agri-food SME Innovation

H3-5: Agri-food SME cost focus positively influences agri-food SME Innovation

1.5 Significance of the study

SMEs in developing countries play a critical part in driving the expansion of GDP and increasing available employment opportunities for the mostly young population in these countries. This has led to the emergence of several SMEs that are competing for the same market. In the agriculture sectors, SMEs play an important role in driving agri-industrialization by adding value to mostly smallholder produced primary agricultural produce. With increasing competition, innovation becomes critical to the growth and sustainability of a given SME. This study is looking at the factors that drives SMEs into undertaking innovative activities. Consequently, this study findings will be useful to governments, development practitioners and SME owners and managers to design policies and approaches to ensuring sustained SME growth and development. This will in the long run ensure that such economies have jobs created by SMEs, and that consumers are supplied with various innovative products and services.

1.6 Theoretical Background and Conceptual Framework

1.6.1 Theoretical perspectives

1.6.1.1 Resource Based Theory

In studying the determinants and drivers of innovation, the study applied the resource-based view which is usually applied to the firm. Innovation have majorly been studied through the theoretical paradigm of resource-based view (RBV) of the firm. This RBV theory has been used in trying to understand how business firms expand, grow and diversify (Armstrong & Shimizu, 2007). The theory is part of the strategic

management literature and is considered as an approach to achieving competitive advantage by harnessing its resources to its advantage (Fahy, 2000). Proponents of RBV argue that firms can only utilize the resources in order to grow and out compete other competitors (Lockett, et al., 2009).

The RBV postulates that a firm must rely on internal resources which may be tangible or intangible to achieve growth. These resources are either heterogeneous or immobile and have attributes of being valuable, rare, costly and can be organized to capture the inherent value of the firm (Barney, 1991; Fahy, 2000). Bromiley and Rau (2016) observed that firm heterogeneity is a central issue on why firms vary in performances. They argued that implementation of the same practice by everyone would benefit all firms. This eliminates its ability to explain performance variability. So in essence agri-food SMEs that consistently have higher performance "must have rare, valuable, hard to imitate or duplicate, and hard to substitute resources". In other words, skills, capabilities and other resources differ across firms. Immobility on the other hand, assumes that resources are not mobile and cannot be moved across firms at least in the short run. Consequently, it is assumed that firms cannot duplicate or replicate resources of their rivals and have the same strategies.

This theory is important in understanding what drives firm performance and growth (Szymaniec-Mlicka, 2014). Innovative firms for instance are driven by some drive to expand and outcompete their rivals and capture market value (Lockett *et al*., 2009). Consequently, this study adopted the RBV so as to provide an understanding of factors within and internal to the SMEs that drive them to innovate and consequently expand. RBV has been used to study firm's entrepreneurial orientation (EO) and market

orientation (MO) with aim of understanding how they influence a firm's business performance which is usually attributed to several factors.

1.6.1.2 Dynamic Capability Theory

In todays ever changing business environment, firms need to adopt strategies that would allow for their survival. This requires businesses and individuals to have the capability of making sense of the dynamism surrounding the business environs so that they are able to adapt by gaining, organising and reorganising resources and capabilities to enable them survive. Acccording to Teece (2014) adapting the changes in business environs requires businesses and individuals to have dynamic capabilities (DC). Naldi et al. (2014) defines dynamic capability as the capacity to amalgamate, assemble and adapt firm competencies to overcome the demerits associated with a rapidly changing circumstance. Usually the focus is on both internal and extenal competencies that have a bearing on the firms existence and survival. Firms that can sense opportunities and seize them early enough are on the right truck of developing DC. This sensing and seizing of opportunities improves the firms innovative performance.

However, for firms to achieve a positive outcome, their inherent capabilities must surpass the threshold level of the industry standards. Recently, there has been increased attention towards the dynamic capability theory among business management researchers, resulting into recorgnition of its importance and the link between the strategic choices of the firm and its environs (Naldi *et al*., 2014; Teece *et al*., 2014). The DC approach is thus an extension of the resource-based view of the firm. The extension play a critical role in filling the gap in the RBV poor argument on

firm performance (Teece, 2018). RBV critics consider it's argument on firm performance as being static and not flexible enough to describe the process through which firms including agri-food SMEs can achieve competitive advantage in a non-static business environment. The concept was introduced by Teece and Pinao (2014) in 2014. However, it is the 2018 work (Teece, 2018) that made the concept to have a break through among scholars.

1.6.1.3 Open Technological Innovation

Innovation can be implemented at different levels. At firm level, innovation is usually an outcome of activities associated with research and development. It can also be as a result of interactions with forces outside the business such as a supplier or customer. In the event that the firm is adopting innovation from other collaborating firms, such innovation may be acquired through licensing or patents (Tidd & Bessant, 2009). Whether through research and development or through licencing and patents, the goal of innovation is usually similar and aims at moving the firm forward to achieve its vision and goals.

Whereas research and development is a closed innovation model that helps to sustain firm competitiveness, interaction with outside stakeholders usually helps in gaining new insights and facilitating the process of reseacrh and development. This is refered to as open innovation. In otherwords, it is innovations that takes into consideration the views of all relevant partners. The term 'open innovation' was initially used by Chesbrough (2003) to describe the open model of innovation. This model of innovation require firms to incorporate both external and internal ideas while trying

to create new processes and approaches. Additionally, it also requires firms to incorporate both internal path and external path to the market while trying to innovate.

1.6.2 Conceptual Framework

This study is focusing on understanding the determinants of SME innovation in the agri-food value chain in Uganda. Figure 1 present the conceptual framework adopted for this study. It depicts how the variables arising from the study objectives are related. From the conceptual framework, the dependent variable, the level of innovation for the respective SME was measured based on both customer-focused (product and market) innovation and system-focused (business and organizational processes aimed at improving efficiency) innovation. The framework shows that SME level of innovation as indicated by customer based and system-based innovations can be driven by several internal and external factors, including the level of market orientation (MO) of the SME, the extent of entrepreneurial orientation (EO) of the SME and variables related to access to and utilization of innovation support services such as presence of an innovation/ incubation support facilities like incubation hubs, science and technology parks, product development facilities, innovation funds, research and testing laboratories. Customer focused innovation relates to changes around the products and services in addition to their delivery mechanism to customers, while, systems focused innovations relate to changes around the SME organizations and processes aimed at improving the efficiency. The level of innovation would subsequently translate into better performance and growth of the respective SME. The main focus of the determinants of SME innovation are on the internal factors including SME market orientation, SME entrepreneurial orientation, capacity to innovate and SME characteristics.

The study adopted the MO notion advanced by (Narver & Slater, 1990), which operationalizes MO as how a given firm view its customers (customer orientation), competitors (competitor orientation), its relationship with other chain actors (inter-functional coordination), its goals and visions (long term focus) and the need to make profits (profitability focus). While the operationalization of entrepreneurial orientation (EO) adopted a study by Iza & Dentoni, 2020; Nuseir, *et al.*, 2020 who studied EO by considering several interrelated constructs, these constructs include the SMEs level of innovation (innovativeness), their attitude towards under taking entrepreneurial activities, response to opportunities (proactiveness), proclivity towards entrepreneurial activities, risk taking, ability to learn from experience, intentions and autonomy.

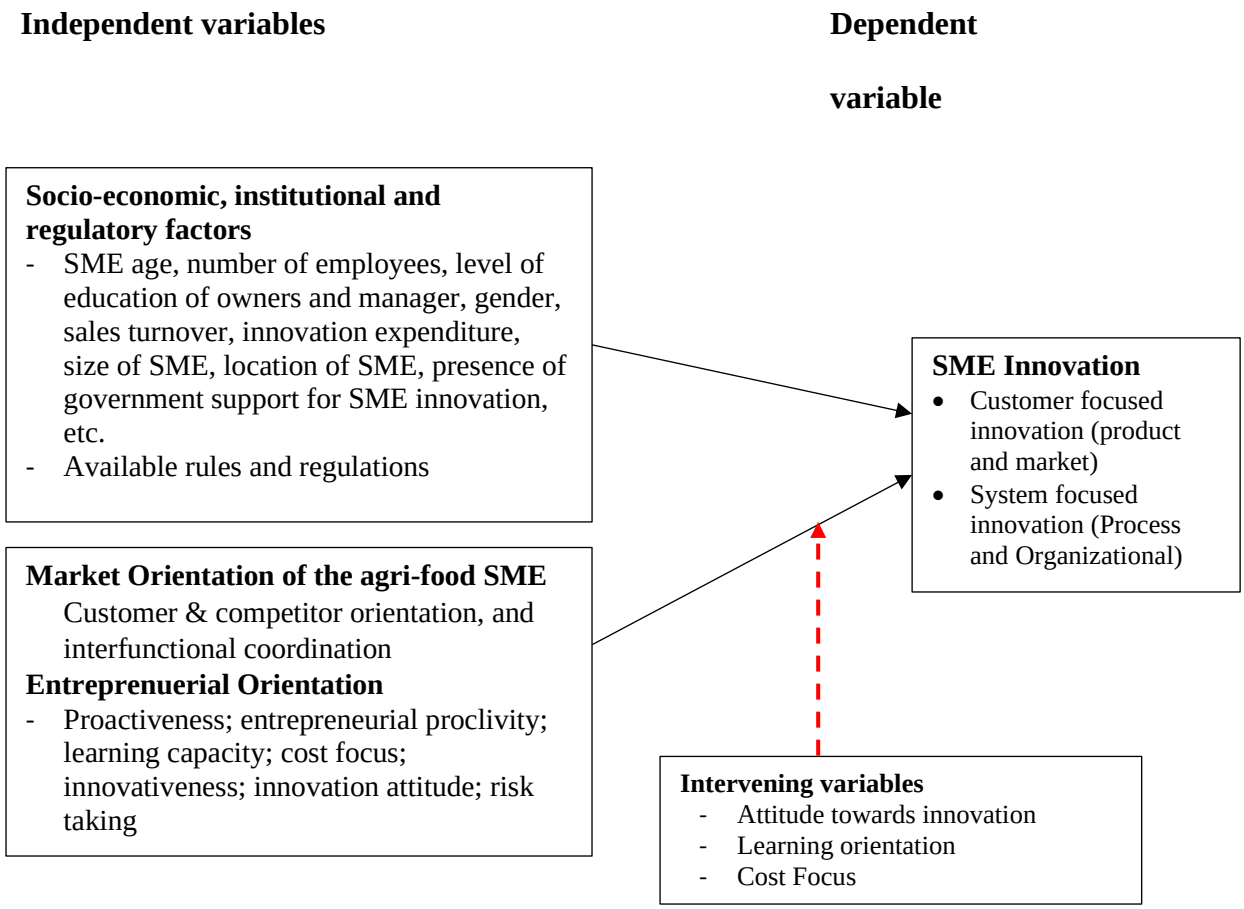

Figure 1: Study Conceptual framework,

Own conceptualization, Adapted and modified from Iza (2019)

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter presents a summary of the relevant literature reviewed with respect to the concepts being proposed in this study. The section has three sub-sections. Sub-section 2.1 presents the definition of the key concepts, indicating how they will be applied and measured in this study. The second sub-section (2.2), looks at the interrelation between the concept's MO and innovation, with respect to previous studies, while, sub- section 2.3 reviews literature on the association between EO and SME innovation. These relationships discussed include how MO and EO are expected to influence the level of innovation of the SME with respect to the agri-food sector. Section 2.2 and 2.3 each concludes by discussing and presenting the gaps in literature with respect to innovation studies in the agri-food SME. Lastly, section 2.4 concludes the literature review section by pointing key research gap identified from the review of literature.

2.1 Definition of Key concepts

From the conceptual framework, it can be noted that this study utilizes several latent variables and their operational definition are presented subsequently.

2.1.1 Market Orientation in the agri-food SME context

Marketing constitutes an important activity of any business. Firms that usually employ the best marketing strategies have an upper hand in achieving their marketing goals. Consequently, the MO of the firm, which looks at how a particular firm views its market (Grunert *et al*., 2005), becomes important in determining success in their

marketing strategies. MO refers to strategies adopted by a specific firm in identifying and prioritizing consumer needs and desires and subsequently responding with products and/or services and approaches that satisfy them (Ho, *et al*., 2018). Thus, MO is expected to have many dimensions that are all equally important. Two main perspectives on the MO dimensions are the MAKTOR (Jaworski & Kohli, 1993) and the MKTOR (Narver & Slater, 1990) views. This study adopts the MKTOR concept advanced by (Narver & Slater, 1990), which is the most commonly adopted dimension in most MO studies.

The MKTOR concept operationalizes MO as how a given firm view of its customers (customer orientation), competitors (competitor orientation), other chain actors (inter-functional coordination), goals and visions (long term focus) and the need to earn profits (profitability focus). In other words, MO refers to strategies that a firm employs to provide the best good and services to its customers, while outcompeting its competitors, and harnessing the benefits that can arise from the value chain. In doing this, firms use strategies that are in line with their goals. In addressing customer needs, an SME requires a clear understanding of who the customers are so as to provide frequent and better value to both current and potential customers. With respect to MO, customer's orientation thus requires an SME to assess and understand customers taste and preferences so as to create value to the customer for purposes of enhancing sustainable relationship between the business and the customer.

Since competition, direct or indirect, is inherent of any business, firms also should fully understand the strength and weaknesses of rival SMEs. The focus on out-shining competitors should be in both short term and long terms strategies, while, taking care of both actual and potential rival agri-food SMEs. Chain coordination is important

especially in the agri-food where unique value tends to be created at each node of the chain. In studying MO, inter-functional coordination involves creating superior value for all stakeholders in the chain. Consequently, everyone working in a given SME must actively undertake activities that help to collect, share and utilize market intelligence. MO also takes consideration of a firm's long term and financial goals, but ensuring a firms marketing and competitive strategies are aligned their long term and profitability goals. Most of the studies on MO usually adopt the use of structural equation modelling for their analysis (for example Ho et al., 2018; Sisay *et al*., 2017; Lee *et al*., 2015; Bamfo & Kraa, 2019).

2.1.2 Entrepreneurial Orientation in the agri-food SME context

There is a thin line between an entrepreneurial business and a small business, since most entrepreneurial ventures usually start small as small business. Most small business requires some level of entrepreneurial activity so as to grow and expand sustainably. Consequently, small businesses that employ entrepreneurial strategies are also entrepreneurial ventures. Entrepreneurial Orientation (EO) which refers to the extent to which a given SMEs undertakes the different entrepreneurial activities, is thus important in ensuring sustained growth and expansion of the particular SME. In the agri-food SME context, EO is a firm level deliberate strategy that focuses on the behavior of the agri-food SMEs in relation to entrepreneurial tendencies (Anderson, *et al*., 2009).

In other words, EO focuses on how SMEs respond to the inherent risk in their sector, how they organize resources, and the involvement of new ideas through creative activities. Since entrepreneurship has several dimensions, EO of SMEs has been

studied by considering several inter-related constructs. The constructs include the SMEs level of innovation (innovativeness), their attitude towards under taking entrepreneurial activities, response to opportunities (proactiveness), proclivity towards entrepreneurial activities, risk taking, ability to learn from experience, intentions and autonomy (Iza & Dentoni, 2020; Nuseir, *et al*., 2020). The level of undertaking of each of the constructs, shows the SMEs overall level of entrepreneurial orientation. In the EO literature, these constructs are measured using psychometry since it is not possible to measure them directly. Consequently, this study assessed the EO by looking at all the above constructs using a modified and adopted psychometric scale. The final constructs included in the study are the ones that best measure EO after assessing their reliability in the agri-food context. Quantitative studies on EO apply structural equation modeling to assess relationship between the constructs (See for e.g., Anderson *et al*., 2009; An *et al*., 2018; Chirico *et al*., 2011; Diabate *et al*., 2019; Gellynck *et al*., 2015).

2.1.3 Innovation in the agri-food SME context

The concept ‘innovation’ has of recent become very common when talking about business. In its ordinary usage, innovation simply refers to changes aimed at improving the existing situation. In the business language, it refers to changes in business routine and activities with the ultimate goal of making things better. It entails implementation of new ideas generated through creative thinking. The creative thinking usually focuses on increasing customer value, improving operational efficiency, learning from past errors and experience, and focusing on cost reduction (Micheels & Gow, 2008). One other way of looking at innovation is to classify it based on two dimensions: the technology it uses and the impact it has on the market

(Zuhroh & Rini, 2024; Qerimi, Demeter, & Losonci, 2024). This categorisation gives rise to; incremental, disruptive, sustaining and radical innovations (Caiazza, Volpe, & Audretsch, 2014). Incremental innovation refers to gradual and continous improvements on existing products and services in the existing market. Here the product or service is just a little better than the previous version. While disruptive innovation is where a product, or a service creates a new value network, either by entering an existing market or by creating a completely new market (Iza & Dentoni, 2020). Sustaining innovation is the opposite of disruptive innovation as it exists in the current market and instead of creating new value networks, it improves and grows the existing ones by satisfying the needs of a customer (Aksoy, 2017). On the other hand, realizaing long term profits require firms to initiate radical innovation, which entails novel and technological breakthroughs that transform industries by doing things differently to create something new, better and often create new markets (Aksoy, 2017; Chesbrough, 2003; Finco *et al*., 2018).

Generally, innovation focuses on improving customer value or improving operational efficiency. Innovation that focuses on improving value to the customer is referred to as customer-focused innovation. It usually entails changes around either the product, services or both and how it is delivered to the customer. Consequently, product and market innovation are customer -focused innovation (Iza & Dentoni, 2020). Innovation focusing on improving operational efficiency is referred to systems-focused innovation and usually involves changes to the business process and organization (Kamuri, 2021). In this study, both customer-focused and system-focused innovation were considered. When these two measures of innovation are aggregated, it shows an overall level of innovation of the respective firm.

In practice, the observed level of innovation in any firm is driven by the firm's innovativeness and attitude towards innovation. Innovativeness is related to the ability and capability of the firm to undertake innovation (Zawawi, *et al*., 2016). According to (Kunz *et al*., 2011), innovation and innovativeness have always been confused and taken to mean the same thing. However, innovation focuses on the outcome, while, innovativeness refers to the potential of a firm to undertake innovative activities (Crawford & Di Benedetto, 2003). Similarly, innovation attitude is also different from innovation and innovativeness. Attitude is what differentiate between those who take action to adopt changes in the firm and those who don't. According to (Coronado *et al*., 2008), innovation attitude is a 'predisposition' or inclination of firms to engage in any prior stages of innovation. Consequently, even with the capability to undertake innovation, a negative attitude towards innovation would discourage the firm from undertaking the required innovation (Chapman & Hewitt-Dundas, 2018).

Studies on innovation have either adopted a regression approach using either multivariate linear regression or multivariate logistic regression (Aksoy, 2017; Caiazza *et al*., 2014)), or structural equation modelling (see for example (Sawy et al., 2001; Ho *et al*., 2018). Usually, it is the way innovation is conceptualized, in this study the factors that influence the level of innovation was assessed using the regression approach, while in determining relationship between MO, EO and innovation the study used structural equation modeling.

2.1.4 Value chain in the context of Agri-food SME

Although the term value chain can be interpreted in many ways, it generally refers to a chain of value adding activities as a product moves from pre-production up to the

final consumption, including waste disposal and management (Dent & Collins, 2021). This entails a full range of activities including procurement or inputs, physical transformation, undertaking critical services as well as, response to consumer demand (Kaplinsky & Morris, 2000). In essence, agri-food value chains entail a series of value adding activities undertaken for a given agricultural product. Thus, the number of value-adding activities, the length of the value as well as its complexity varies across the difference agricultural commodities and intended final use of the product (Webber & Labaste, 2009).

In the agri-food value chain, each actor plays a critical role in creating value for the next actor who then creates value for the next actor in the chain, until the product reaches the final consumer (Dent & Collins, 2021; Trienekens, 2011). Thus, there are several actors involved in the agri-food value chain (Cucagna & Goldsmith, 2018). In the Ugandan context, these actors vary in size, with smallholder farmers dominating the bottom of the chain, while, medium to large actors dominate the upper chain (Reardon, Liverpool-Tasie, & Minten, 2021).

Since, actors can take on several value creation activities, agri-food value chains can undergo transformation (Hidayati, Garnevska, & Childerhouse, 2023). This transformation may involve taking up additional existing value adding activities, or innovating new practices and activities so as to remain competitive (Dobrzański, Bobowski, Chrysostome, Velinov, & Strouhal, 2021). According to the Food and Agricultural Organization, value driven transformation is required for the sustainability of the agri-food value chains in developing countries (FAO, 2022; FAO, 2024). Thus, the study of agri-food SME innovations can best be positioned in the context of agri-food value chain. Consequently, this study, included all actors in the

agri-food value chain. In essence, these actors are expected to be involved in several stages of the value chain.

2.2 Market Orientation and Innovation in the agri-food SME

MO concept has been applied in several studies to assess firm innovation. To date, the several MO-innovation studies agree that effects of MO on innovation varies across sectors and in scale (Ho *et al*., 2018; Sisay *et al.*, 2017; Grunert *et al*., 2005). Although the MO concept following the MKTOR approach (Narver & Slater, 1990) has five dimensions, each of the different dimensions has a different relationship on innovation and subsequently business performance. Each of the constructs are also moderated by different factors. For instance, Sisay, *et al.* (2017) in a study of MO of members of an agricultural cooperative in Ethiopia reported that only how a firm views the customer and how it relates with other chain actors were critical for cooperative members in Ethiopia. In another study in Vietnam, Ho *et al*., (2018) observed no direct relationship between a beef firms focused on the customer and how they relate with other chain actors. In their study, the influence of these two factors (customer orientation and inter-functional coordination were only indirect through innovation. In their study, competitor orientation, long term focus and profitability focus were all not significant to both innovation and financial performance. It therefore appears as if innovation plays a critical role in linking MO to performance. In a study by Bamfo & Kraa, (2019), the effect of customer orientation, a construct of MO, on performance was only partially indirect. However, Inter-functional coordination showed an indirect influence on performance of the firms studied, moderated by the level of innovation undertaken. These studies show that, whereas, MO is crucial for a performance, its

role in influencing the level of performance largely depends on the level of innovation being undertaken by the respective SME.

In most studies on MO, innovation and business performance, long term and profitability dimensions usually drop out of the analysis since they fail to meet the minimum reliability for them to be included. This is attributed to the lack of long-term goals of many SMEs and the sensitivity of the aspects of profits. Many firms either do not have long term goals, for which they can develop strategies to achieve, or they are uncomfortable sharing such information with researchers. Similarly, most business firms are not comfortable sharing the strategies on profits with researchers. In most studies on MO, only a handful of studies have reported significant relationship of a firm's competitor orientation on the level of innovation and subsequent performance. This observation can be attributed to of the poor focus on developing strategies against competitors. The implication is that, in the wake of increasing competition faced by agri-food SMEs, current evidence on how MO influences firm innovation is largely inconclusive. For some sectors, MO has a direct relationship (e.g., franchising industry) with innovation, (Lee, *et al*. 2015). For other sectors, indirect relationships are observed and there is need to explore the roles of other factors in the MO-innovation paradigm (Gellynck, *et al*., 2015). In the agri-based SMEs, the interaction between MO and innovation is poorly understood (Micheels & Gow, 2015; Ho, *et al*., 2018).

Several other studies have shown the significance of MO on innovation. However, they do not disaggregate between the influences of the different dimensions of MO on innovation. For instance, Micheels & Gow, (2015) reported the positive significant role played by MO on firms' innovativeness without disaggregated data for the

different dimensions of MO. Hansen *et al.*, (2006) reported the significance of MO on the strategies employed by a firm. With evidence, already showing that the different MO dimensions have differential influence on a firm's level of innovation and innovation activities, this study sought to examine this relationship in the agri-based SMEs. Understanding this relationship is key in providing additional evidence to foster agri-food SME innovation.

The choice of Agri-based SME was informed by the observation that most studies on the MO-innovation paradigm are either focused on other non-agri-food SMEs (Lee, *et al*., 2015; Perry, 2014; Bamfo & Kraa, 2019; Armario, et al., 2008) or focused on SMEs in primary agricultural production (Micheels & Gow, 2008; Micheels & Gow, 2015; Sisay, *et al*., 2017; Hansen, *et al.*, 2006). Additionally, these studies scantily consider the influence of firm characteristics and external environment in their analysis. The external environment for instance has a strong bearing on SMEs ability, willingness and capacity to innovate. For instance, a firm's perception of looming economic crisis has strong influence on the firms' MO and may subsequently influence its willingness to innovate (Petzold *et al*., 2019). Similarly, Tindiwensi *et al*. (2020) showed the importance of management skills for the farm manager in influencing MO and entrepreneurial bricolage in smallholder farming. In this study, the external environment assessed looked at SME's access to innovation support services including incubation hubs, product development facilities, innovation trainings, innovation funds, research and testing laboratories. It is anticipated that agri-food SMEs that have better access to these services would have higher level of innovation activities, and consequently, high level of innovation.

The influence of MO on innovation and vice versa also tend to be location specific. Consequently a few studies conducted on the MO-innovation paradigm focusing on the agri-food SMEs, have limited applications in developing countries. This is because most of them were conducted in developed countries and can thus only be applied to the context of the developed countries. A study by Grunert, *et al*., (2005) looks at MO in the food industry in a developed country context, yet agri-food industries in developed countries have marked difference with those in a developing country. In a developing country for instance, the agri-food SMEs are supplied mainly by the majority of smallholders (Odongo, *et al*., 2017). The smallholder farmers in developing countries are faced with different challenges that affects how they relate with higher level chain actors.

This is different for most agri-food SMEs in developed countries. These differences have a strong implication for the quality and quantity or raw materials supplied to the agri-food SME and the overall organization of the supply chain. This study was conducted with the aim of addressing this locational gap in the MO-innovation paradigm. This dimension is critical since SME innovation is increasingly becoming important for the sustainability of agri-food SMEs in developing countries (Devaux, *et al.*, 2018). The study assessed the influence of MO on innovation in the agri-food SME by looking at how dimensions of MO influences agri-food SME innovation and performance, while taking into consideration SME specific characteristics and access to innovation support services.

2.3 SMEs innovation and Entrepreneurial Orientation in the agri-food sector

SME willingness to undertake entrepreneurial activities shows its level of Entrepreneurial Orientation (Wiklund & Shepherd, 2005). These entrepreneurial activities include innovation, risk taking and acting proactively, and responsiveness to new and better market opportunities. Consequently, as with MO, entrepreneurial orientation is influenced by a number of factors that are both internal and external to the SME. Previous studies have observed that each of the different EO dimensions have differential influence on performance either directly or indirectly by influencing the level of innovation undertaken by a given firm (Rauch, *et al*., 2009; Li, *et al*., 2009). While controlling firm specific characteristics, a study by Iza & Dentoni, (2020) reported that a firm's innovativeness had a negative influence on the customer-focused innovation aimed at improving its marketing activities. They however reported positive and significant influence of proactiveness on both customer focused innovation aimed at the product and system-focused innovation aimed at the changing the business process. They however reported an insignificant influence of intentions on all aspects of innovation. Li *et al*., (2009) reported that overall EO positively affects firm performance, while, Rezaei & Ortt, (2018) reported that the association between EO and performance and innovation can be intermediated by how EO influences functional performance. The effect of EO on innovation and performance can thus be both direct and indirect (Soares & Perin, 2020; Diabate, *et al*., 2019).

Although there is some evidence that EO has a strong relationship with a firms level of both customer focused and systems focused innovation, and perfomance, some authors have provided counter evidence that it does not infleunce SME innovative and performance (Linton, 2016). For instance, a study by Okangi, (2019), reported a

negative influence of proactiveness on profitability of construction firms in Tanzania. EO may only be relevant to innovation if applied under the right circumstances and context (Chirico, *et al*., 2011; Linton, 2016). For some firms, EO is not relevant, while, for other, EO plays a vital part in enhancing innovation. For instance, in agribusiness, changes to the product must be in line with what the consumers desire and are willing and able to pay for. Where EO leads to negative effect on innovation, the firm will not undertake such entrepreneurial activities. This inconclusive findings on the importance EO on innovation and performance becomes realistic in some sectors of the economy and regions for which entrepreneurial orientation research is critically lacking.

Several studies on EO have either been undertaken in advanced economies (Li, *et al*, 2009; Rezaei & Ortt, 2018; Soares & Perin, 2020; Gupta, *et al*., 2019; Gellynck, *et al*., 2015) or for non-agri-food SMEs (Okangi, 2019). In the agri-food sectors of developing countries, EO perspective is unique and requires its own level of understanding with supporting evidence. This is because developing country agri-food competitive strategies requires an understanding of the developing context of EO-innovation paradigm. Whereas there are few studies that try to address this gap for developing countries, they either focus on primary production (Iza & Dentoni, 2020; Tindiwensi, *et al*., 2020) or on agri-trade (Kamuri, 2021). It is however, important to extend such analysis to agri-food value chain SMEs that are becoming important in sustaining the economy of most developing countries (Devaux, *et al*., 2018).

2.4 Conclusion

This chapter reviewed literature on agri-food SME innovation with reference to Uganda. It demonstrates evidence on the limited understanding of the status of agri-food SME innovation and its drivers. In essence, the poor understanding of agri-food SME innovation presents a challenge to stakeholders who want to put in place strategies to drive agri-food SME innovation for purpose of achieving national development. In Uganda, the countries, vision 2040, places emphasis on agri-industrialization. This agri-industrialization will require a matching level of innovation. However, the lack of the understanding of the drivers and determinants of agri-food SME innovation suggest a limited research focus on agri-food SME innovation in developing countries. Currently, African countries including Uganda, have a low level of innovation index, suggesting, the innovation outputs in such countries are less documented and less commercialized. It is thus evident that the relevance of agri-foo SME innovation in developing economies has been given less attention. The limited attention, as well as, the lack of empirical information on SME innovation in developing countries presents a challenge to practitioners interested in fostering SMEs innovations. For instance, there is no current information of the level of SME innovation in Uganda. Thus, this study was motivated by the need to contribute to this knowledge void. It is expected that this study will provide further insights on the status of SME innovation in Uganda, as well as its determinants. This study is thus expected to provide an understanding of the level and determinants of SME innovation in Uganda.

CHAPTER THREE: METHODOLOGY

3.0 Introduction

Chapter three presents the materials necessary for the study and methods applicable to this study. It also shows how they were applied in the current study. It starts by describing the study area. It then describes the research design before, describing the population of study and sampling design and methodology. The chapter then presents the data collection procedure and requirements for data reliability and validity. Lastly, the method of data analysis is described.

3.1 Study Area

This study was conducted in Uganda. Specifically, the study was conducted in Kampala City, Wakiso and Mukono districts in central Uganda and Jinja district and City in eastern Uganda (Figure 2). Eastern Uganda has over 33% of agri-food SMEs, most of which are located in the greater Jinja area. Similarly, central Uganda has over 30% of the agri-food industries, with Kampala alone having over 12% of the agri-food industries (FSD Africa; FSD Uganda; Nathan Associates; & TNS East Africa, 2015; IFC 2021). Kampala is the Capital City of Uganda, while, Jinja city has traditionally been known as an industrial town. Wakiso and Mukono districts have also of recent seen an increase in the number of agri-based industries due to their proximity to Jinja and Kampala cities. These districts and cities have the largest concentration of agri-based SMEs in Uganda and would be ideal for this study. Most of the agri-based SMEs are involved in agri-food, acquiring raw materials from the multitudes of smallholders spread throughout the country. Being in the capital or close to the capital city of Uganda, these locations are expected to follow the capital city

dynamics (Mayer *et al.*, 2016). It is expected that these districts will have a substantial level of innovation that would warrant the study.

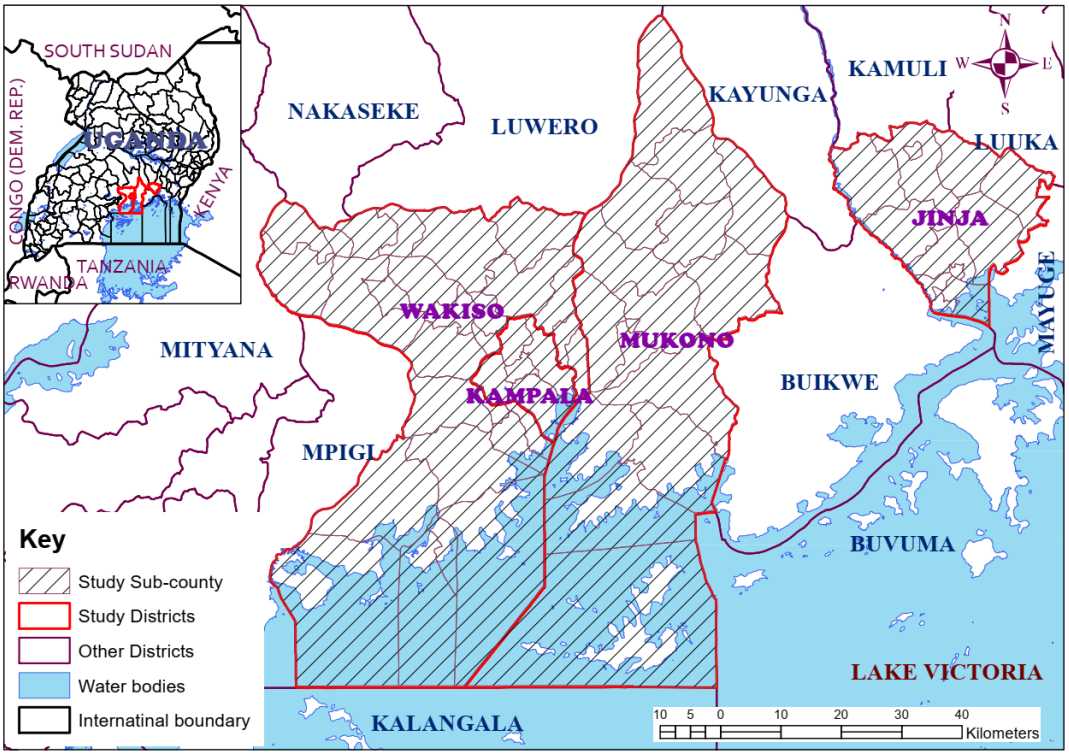

Figure 2: Map of Study Area

3.2 Research Design

The study applied the cross-sectional research design. This implies that this study looked at a cross-section of agri-food SMEs in the proposed study area at one specified time period. The choice of the design was thus informed by the need to understand SME innovation in the context of several agri-based firms, at a given time. In conducting the cross-sectional survey research, the study adopted quantitative techniques for collecting data on the constructs under study.

3.3 Study population

In studying SME innovation, the study focused on the SME owners and managers who formed the target population from the target agri-based SMEs. The unit of analysis was the SME firm. However, on the firm data was collected by interviewing the SMEs owner. In the absence of the owner, the manager was interviewed. The choice of the target population was informed by the need to collect relevant information on innovation from the SMEs. For most SMEs, although all employees may be involved in undertaking innovation activities, it is usually the owner and/or managers who are the initiators of such activities and are thus the right persons to talk about innovation in their respective firms. This study's sample size was determined following the Krejcie and Morgan, (1970) method. According to them, the sample size for survey research where the population is over 100,000 should be 384. There are over 100,000 agri-food SMEs in the proposed study area (UIA, 2016; IFC, 2021).

However, due to the anticipated non-responses that usually occurs in survey research, the sample size was corrected upwards, by 36%. According to Groves & Peytcheva (2008), the average non-response rate for survey research is 36%. This gave a total sample size of 521 SMEs. The distribution of the sample across all the study locations was proportional to the distribution of SMEs across the study locations.

3.4 Sampling Design

In selection of the Agri-food SMEs, this study adopted a multi-stage sampling approach. This was operationalized at two levels. First, the selection of districts was purposive. Specifically, Kampala, Mukono, Wakiso and Jinja cities/districts were selected due to the high concentration of diverse agri-food SMEs. For each of the

city/district, a list of registered SMEs was obtained from Uganda Investments Authority. This list formed the sampling frame. Basing on the need to have realistic representation for each category of SMEs by role in the value chain (retailer, wholesaler, processor, transporter, and exporter), the sampling frame was disaggregated by the SMEs role in the agri-food value chain. From the disaggregated sampling frame, a representative sample was then selected using simple random sampling. Given that the number of SMEs in each of the districts were not equal (UIA, 2016), the sample obtained from each city/district, was proportional to the population of SMEs in the respective city/district. In essence, Kampala city had the highest number of SMEs while, Mukono district had the least number of SMEs included in the study.

3.5 Data types and sources, data collection methods, and instruments

This study utilized primary data. This data was collected from a sample of agri-based SMEs in the study area. Data was collected on the constructs under study and on SME specific variables using semi-structured interview schedule that was administered to SME owners/managers. The interview schedules were developed to contain questions on the constructs under study and on several other SME specific variables. Specifically, the interview schedule was structured with sections corresponding to the different data requirements of the specific objectives. Section one of the questionnaire had questions on the socio-economic characters of the SME manager and owner, institutional factors and regulatory factors and moderating factors. Section two of the questionnaire had questions related to market orientation of the SME. Section three of the questionnaire had questions on SME entrepreneurial orientation. Lastly section

four of the questionnaire had questions on SME level of innovation specifically focusing on customer focused innovations and system focused innovations.

The study adopted the use of psychometry in measuring the constructs under study, while, the SME specific variables were measured as they are. For instance, age of the SME was measured by asking for how long the SME has been in operation, while, the size of the SME was measured directly by asking for the annual sales volume in Uganda shillings and the total number of full and part-time employees in a given SME.

Measuring the constructs under study involved modifying the psychometric scales used by previous studies to carefully fit in this study (See Table 1 for how innovation was measured). Selected study participants were required to respond to a set of questions related to the constructs. The responses to the constructs were presented as a Likert scale. Since the study is focusing on SME managers and/or owners, a six-point Likert scale is proposed. The six-point Likert scale is favorable in situations where the researcher is not interested in the midpoint of the responses.

Since most of the constructs proposed in this study were those that had been used in earlier studies, care was taken to rephrase and reword them making them relevant and useful to the context of this work. Data was collected by a team of competent and trained Research Assistants/ enumerators, who all had background of agribusiness and experience in digital data collection. Before data collection, the enumerators were trained by the researcher. The enumerators then collected data under close supervision of the researcher. Data was collected digitally using the mobile application, Kobo collect.

During data collection, there were challenges of some MSME owners not being available or being too busy. This was addressed by being flexible during data collection and interviewing such owners/manager at an appropriate time. Where they could not get time, a replacement of another firm was made.

3.6 Data Reliability and Validity

The study assessed reliability and validity of the data collection tools and the collected data for purposes of ensuring quality and relevance of the findings.

3.6.1 Validity Test

To establish validity for the questionnaire and interview guide, the instruments were given to peers for review alongside the university supervisors, to ascertain relevance and consistence with the title and objectives of the study. The questionnaire was also developed following previous research.

3.6.2 Reliability Test

The study used exploratory factor analysis (EFA) to assess for reliability of the cross-sectional primary data. This was achieved using Cronbach's Alpha criterion. Similarly, during data analysis, the research ensured that the data was collected by a team of competent and experienced persons, and that all entries where check for completeness on the same day of data collection. Only complete entries were passed. Prior to data collection, the research also conducted a pre-test. The results from the pretest were used to improve the instrument by modifying the items that did not appear to give reliable responses.

3.6.3 Addressing common method bias

This study used semi-structured questionnaires, designed for the study. In preparing the questionnaire, the researcher was aware of the problem of common method bias, and thus prepared the questionnaires such that it did not suffer from the same. Common method bias usually stems from use of the the same/similar scale to measure both the dependent and independent variables (Podsakoff & Organ, 1986). Consequently, common method bias is not a challenge where different variables are measured using different approaches (Podsakoff *et al*., 2003). In this study however, both dependent and independent variables were measured using different scales and thus, the bias did not arise. In this study, the dependent variables was measured using Likert scale constructs while the independent variables which are the firm and demographic characteristics and dummy variables for support services were measured directly. The Likert scale specification were altered to avoid it being common across constructs. The study also included firm characteristics as independent variables whose measurement have been shown not to lead to common method bias (Podsakoff & Organ, 1986). This is because such variables can usually be independently verified from other sources. Thus, the challenge of common methods bias did not arise in the study.

3.7 Data Analysis

3.7.1 Investigating factors influencing the level of agri-food SME innovation

In studying SME innovation in the agri-food, first the study assessed the level of innovation among the agri-food SMEs and then investigated its drivers. The focus in assessing innovation was on customer focused and systems focused innovation. The

study adopted and modified scales used for measuring innovation in earlier studies (Roach, et al., 2016; Ar & Baki, 2011; Aksoy, 2017; Caiazza, *et al*., 2014; Karakara & Osabuohien, 2020). Customer focused and system focused innovation was measured using a set of constructs that were answered on a Likert scale, showing SMEs owner/manager's agreement with the respective statements. This study adopted a six-point Likert scale ranging from "unlikely" (1) to "most likely" (6). The choice of a six-point Likert scale was informed by the need to omit the neutral choice. A six-point Likert scale was previously used by (Micheels & Gow, 2008; Micheels & Gow, 2011; Micheels & Gow, 2015). Previous studies have shown that a six-point Likert scale was similar to a five-point Likert scale (Preston & Colman, 2000) and having better indices in some cases (Chomeya, 2010).

Table 1 presents the statements adapted from earlier studies (Roach, et al., 2016; Ar, 2011; Aksoy, 2017) and modified for purposes of study. After collecting data on the constructs in Table 1, the Likert scale items were aggregated to give a single index for the level of customer focused and level of systems focused innovation for the respective SME. The aggregation followed exploratory factor analysis that was used to assess for reliability of the items. After collection, the data was exported to SPSS spreadsheet for analysis.

Data analysis involved descriptive, factor analysis and hierarchical regression analysis. Given the nature of the scale used to measure innovation, exploratory factor analysis (EFA) was necessary for data extraction to reduce the dimensions of the constructs and create composite variables. This allowed for assessing which items would best measure systems focused and customer focused innovations. In this study,

EFA was also used to evaluate reliability and validity of the measurement scale. The variables in this study were summarized using frequencies, percentages and means.

Table 1: Constructs adopted for measuring customer focused and systems focused innovation

S/N	**Customer focused innovation (product and market)**
1	We develop new ideas of improving our products/services
2	We implement new techniques in production and processing of our products/services
3	In our firm, we aim to create value for the consumer
4	We usually change our products/services with respect to changing conditions
5	In my farm, we have adopted ongoing collaborations with other farmers as a way of improving my product competitiveness
6	We continually provide different products to the market
7	Our internal pricing strategies are innovative in that it makes our products the most competitive in the market
8	In marketing our products/services we create awareness of the availability of our products using innovative promotion approaches
9	Our products/services are usually sold at market place that is most competitive
	System focused innovation (Process and organizational)
1	We adopt new techniques for attracting new customers in our operations
2	We create new customer centred processes in our operations in order to improve efficiency
3	We acquire new equipment for use in our firm
4	Our processes are changed according to changing conditions
5	In our firm, there is a clear innovative power structure between everyone involved that allows for proper function of all farm activities
6	The management structure in our firm is the most innovative of all firms I know
7	We have standard procedure when it comes sourcing for raw materials for our firm
8	There is a standard procedure when it comes to identifying customers of our firm

In order to assess the influence of institutional support services on innovations, a hierarchical linear regression model was estimated, with the composite indices of innovation as dependent variables. Hierachical regression allows for the controlling of the effects of one or several factors so as to observe the effects of one or several other variables on the dependent variable (Raudenbush & Bryk, 2002). In this study,

two composite measures of innovation were related to customer focused innovation and system focused innovation. For each composite measure of innovation, a three step hierchical regression model was estimated. Step I of the hierachical model which controlled for the effect of demographics characteristics on innovations is presented in equation (1).

$$Y_i = \beta_0 + X_i'\beta_i + \varepsilon \quad (1)$$

Where: Y_i is the level of innovation of the i^{th} firm. This can be either systems focused innovation or cusomer focused innovation. $X_i'$is a vector of independent variables that can explain variations in innovation. These variables were related to the demographics characteristics of the agri-food SME and included: age in years, gender dummy (male), education level of the owner and district dummies. β_0 is is the regression constant. β_i is a vector of parameters associated with demographic characteristics. ε is the random error term.

The second level regression controlled for the effect of SME characteristics on the innovation conditioned on the demographic factors. This was estimated following equation (2).

$$Y_i = \beta_0 + X_i'\beta_i + W_j'\beta_j + \varepsilon \quad (2)$$

Where: W_j' is a vector of SME characteristics that can influence their level of innovation. These include: SME age in years, number of fulltime workers, approximate annual expenditure in innovative activities, and indicators for SME size (micro, small and medium). β_j is a vector of parameters associated with the SMEs characteristics. Y_i , β_0, X_i', β_i, and ε are as described in equation (1).

The third and lasts step of the hierchachical regression model introduced indicator variables for instititional support for innovation to assess their moderation effects on all other predictors of both systems focused and customer focused innovation. This step was estimated following equation (3).

$$Y_i = \beta_0 + X_i'\beta_i + W_j'\beta_j + Z_k'\beta_k + \varepsilon \quad (3)$$

Where: Z_k' is a vector of indicator variables representing institutional support for innovation. These are: presence of guiding principles/policies that support innovations, acquiring of intellectual properties rights, involvement in research to improve on products or process, access to research output from government or research institute and provision of reward for employees who come up with creative/innovative ideas. β_k is a vector of parameters associated with each of indicator variables. The other parameters in the equation (3) are as described in equation (2). During the analysis, the variables age of SME owner, SME age, number of full-time employees and annual expenditure on innovative activities were transformed to natural logarithms in order to improve model fit. Since there were two composite variables relating to innovation, a separate hierarchical regression model was estimated for each of these measures.

3.7.1.1 Exploratory factor analysis for innovation

Exploratory factor analysis was performed on the scale items of innovation in order to test for reliability and validity of the measure. EFA was appropriate since, in this study there were 521 participants implying that there were at least 10 time more participants for each scale item (Janssens *et al*., 2008). The study performed EFA to determine the best factor solution. Speicifically, principal component analysis (PCA)

of EFA was used. The PCA followed the varimax rotation. In order to improve fit, EFA items with factor loading less than 0.5 were dropped (Field, 2009; Janssens et al., 2008). Similarly, factors with strong cross-loadings were also dropped. Consequently, the innovation scale which had 17 items was reduced to eight items, with a two factor-solution. The Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of Sphericity confirmed the adequacy of the sample for factor analysis (Table 2).

Table 2: Factor Analysis for innovation

Scale Items	**F1**	**F2**
We implement new techniques in production and processing of our products/services	0.798	
We develop new ideas of improving our products/services	0.742	
We adopt new techniques for attracting new customers in our operations	0.741	
We usually change our products/services with respect to changing conditions	0.689	
We create new customer centerered processes in our operations in order to improve efficiency	0.682	
Our internal pricing strategies are innovative in that it makes our products the most competitive in the market		0.790
In my firm, we have adopted ongoing collaborations with other firms as a way of improving my product competitiveness		0.765
In our firm, there is a clear innovative power structure between everyone involved that allows for proper function of all firm activities		0.754
Eigenvalue	3.367	1.411
Percentage of Variance	42.084	17.642
Cumulative Percentage of variance	42.084	59.726
Cronbach's Alpha	0.801	0.700
Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO = 0.812)		
Bartlett's Test of Sphericity (Chi-square = 1229.683, p-value=0.000)		

The final EFA solution, explained 60% of the total variation of the innovation measures. The scale items of innovation were reduced to a two-factor solution. Internal consistency of each of EFA factor solutions was assessed using Cronbach's Alpha. The first EFA derived factor, had five items and was related to customer

focused innovation and explained 42% of the variance with a Cronbach Alpha of 0.801. The second EFA derived factor, had three items and was related to systems focused innovation, explaining 18% of the variance and having a Cronbach's Alpha of 0.700. The Cronbach's Alpha reported in this study was above 0.7, confirming internal reliability (Nunnally, 1994). All the factors loadings of scale items in the final solutions were all above 0.5 (Table 2).

3.7.2 The relationship among marketing orientation, innovation attitude and firm innovativeness

In order to determine the relationship between SME MO, innovation attitude and firm's innovativeness, this study used multivariate analysis using structural equation modelling. The study adopted the covariance based econometric model using structural equation modeling (CB-SEM). CB-SEM is useful in situations where a given variable in measured indirectly through several other variables, since it can handle multi-variable situations with multi-relationships, and, where the study is anchored on an already existing theory. Figure 3 shows the relationship between variables for objective two. All these relationships were assessed using the multivariate structural equation model. The validity of all the models were assessed by utilizing the Root Mean Square Error of Approximation (RMSEA) that should be at most 0.08, the Comparative Fit Index (CFI) that should be at least 0.9, the Tucker–Lewis index (TLI) that should be at least 0.9 (Xia & Yang, 2019). Additionally, the models were assessed for composite reliability (CR) that should be at least 0.7 points and the average variance extracted (AVE) that should be at least 0.5 (Ab Hamid et al., 2017). All these thresholds were met in the final model (Table 8 & 10; Appendix 2).

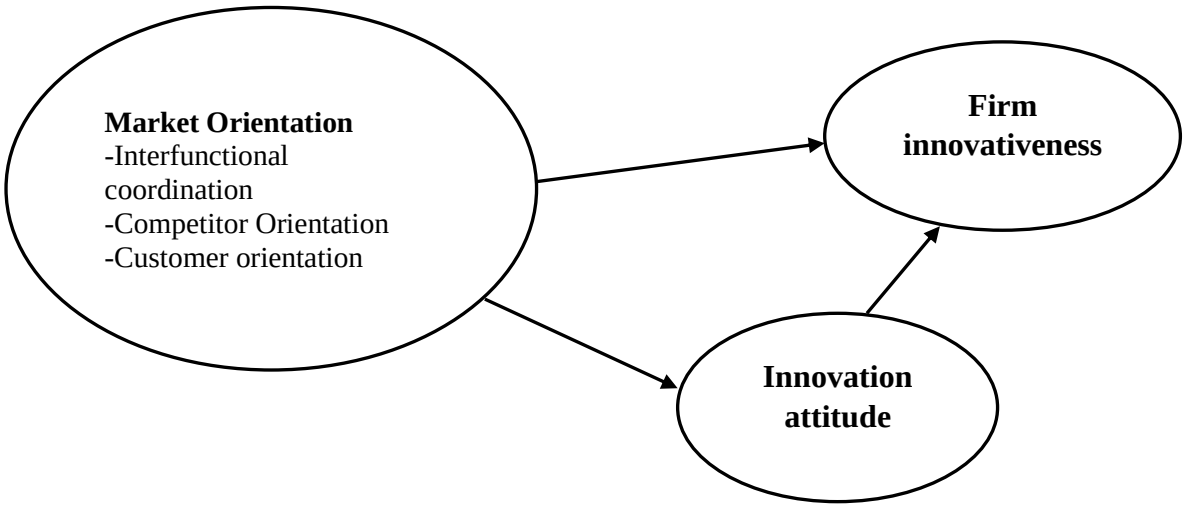

Figure 3: Structural model for assessing the relationship among MO, innovation attitude and firm innovativeness

Adopted with modification from Ho et al., (2018)

3.7.3 The relationship among enterpreneurial orientation, learning orientation, cost focus and level of innovation

In order to determine the influence of SME EO on learning orientation, cost focus and level of innovation, this study used CB-SEM for data analysis. CB-SEM is useful in situations where a given variable in measured indirectly through several other variables, since it can handle multi-variable situations with multi-relationships, and, where the study is anchored on an already existing theory. Figures 4 presents the structural relationship that was assessed using the multivariate structural equation model. All these relationships were assessed using the multivariate structural equation model. The validity of the models was assessed using: RMSEA that should be at most 0.08, CFI that should be at least 0.9, TLI that should be at least 0.9 (Xia & Yang, 2019). Additionally, the CR that should be at least 0.7 and AVE that should be at least

0.5 were also to validate the model (Ab Hamid et al. 2017). All these parameters were met (Tables 14 & 16; Appendix 3).

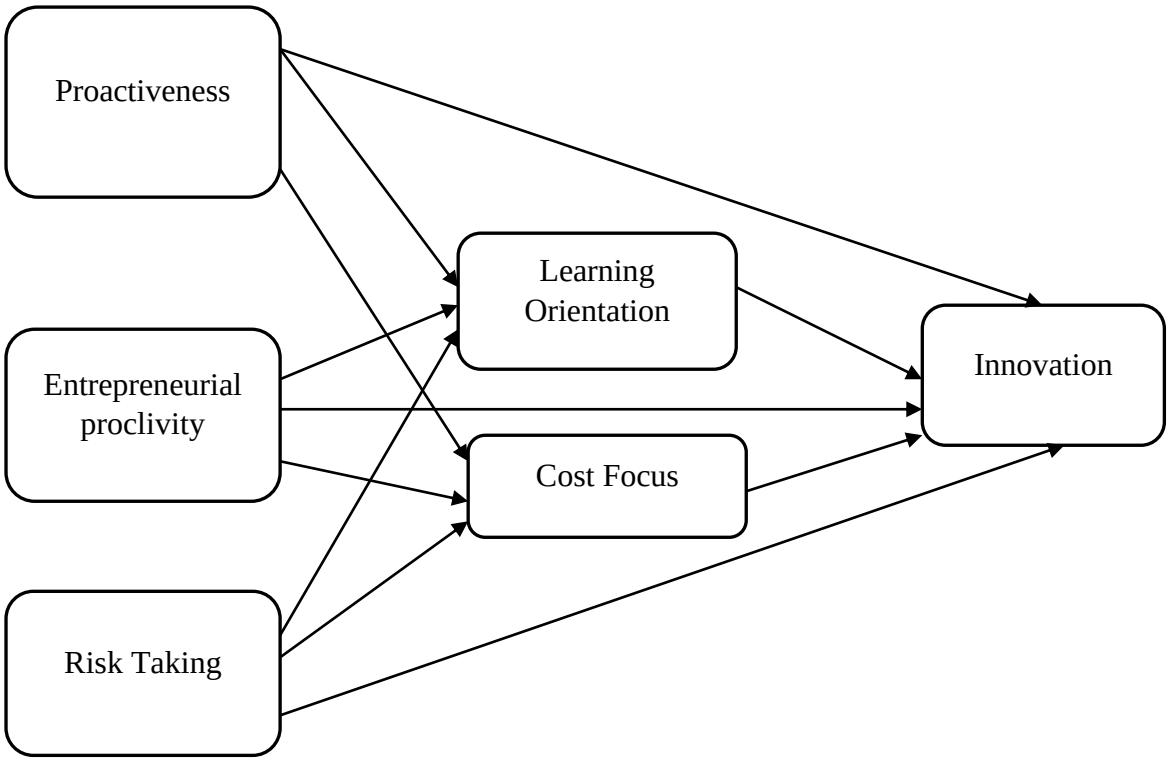

Figure 4: Structural model for assessing the relationship among EO, learning orientation, cost focus and overall innovation

Modified from Iza & Dentoni (2020)

3.7.4 Model Specification for the CB-SEM

This study used the CB-SEM for the second (section 3.6.2) and third (section 3.6.3) objectives. CB-SEM is useful in situations where a given variable in measured indirectly through several other variables, since it can handle multi-variable situations with multi-relationships, and, where the study is anchored on an already existing theory. The structural depiction of the dependent and independent variables follows Figures 3 and 4. The model specification for the CB-SEM is presented in equations (4) – (6). Following Sarstedt et al. (2016) and Rigdon *et al*. 2017. The relationship

between the observed and the unobserved latent variables was modeled as in equation (4)

$$x = lY + e \quad (4)$$

Where; x is the observed indicator variable, in this case the questionnaire items for measuring each latent construct, Y is the latent variable (the constructs of innovation, MO and EO), l is the factor loading which represented the regression coefficient. It represents the quantitative strength of the relationship between observed indicator, x and the latent variable, Y. e is the random error of measurement.

In the CB-SEM, the model specification is presented has a function of the random variance. If Y is the composite of variables x_i $(i = 1, \ldots . . k)$ with the weight k, then the model will be specified as in equation (5).

$$C = \sum_{i=l}^{k} X_i W_i, \quad (5)$$

Where; W_i represents a vector of multiplier weights associated with each corresponding variable prior to being included to the composite, C is the variance of the composite, which is represented by equation (6)

$$\sigma_C^2 = \sum_{i=1}^{k} w_i \sigma_i^2 + 2 \sum_{i=1}^{k} \sum_{j=1}^{i-1} w_i w_j \sigma_{ij} \quad (6)$$

Where; σ_i^2 is the variance of x_i and σ_{ij} $(i = 1, \ldots . k, j = 1, \ldots \ldots i,\ i \neq j)$ is the pairwise covariance between the different indicators x_i & x_j. In other words, the variance of the summation is equal to the weighted sum of variance of the respective components added to the double of the weighted sum of covariances. The CB-SEM

preceded the EFA. EFA was allowed for checking the reliability of the constructs in relationship to measuring the independent variable.

The first part of the CB-SEM examined how specific questionnaire items relates to the latent factor. The first part showed how the different questionnaire items predict the latent variables that is represented by the different constructs. The second part of the CB-SEM is the path model examining how the latent factors correlate and co-vary with each other. It shows how the latent variables MO and EO represented by their different constructs and the endogenous latent variables (innovation) represented by customer focused and system focused level of innovations are related. In performing the CB-SEM, sub-group analysis for location, SME typology, SME type, gender and education level of the SME owner were modelled as moderating factors that influence the relations between the exogenous and endogenous latent variables. The CB-SEM was fitted using the generalized least squares approach. Separate models were estimated for the relationships in Figure 3 and Figure 4.

3.8 Ethical Considerations

All ethical considerations necessary for a study were followed to the latter. At the University, the study proposal and tools was first approved at the Department of Agricultural Economics, then at the School of of Agriculture and Environmental Sciences and finally by the School of Graduate Studies of Kenyatta University. After the University approval and authorisation, the proposal was submitted to Research Ethics Committee of the Infectious Disease Institute (Institutional Review Board) for validation and approval. This was cleared and then forwarded to Uganda National Council of Science and Technology (UNCST) that finally approved the study and

issued a research permit. A detailed, understandable Respondents Consent Form (see Appendix 4) was developed and tailored to match each category of respondents, depending on the research tool. The consent form was not only for seeking permission from respondents but also provided detail of the purpose and aims of the study. Hence, permission from respondents was sought before interviews are conducted and the purpose and objectives of the study carefully explained to the respondents. Likewise, to ensure confidentiality of the respondents, the researcher designed the tools in such a manner that the respondents remain anonymous. No information on participant identification (name, email, and/or phone contact) was included in the tool.

CHAPTER FOUR: RESULTS

4.0 Introduction

Chapter 4 presents the main findings of this study. It starts by presenting the descriptives statistics of the study sample in section 4.1. The chapter then presents detailed research findings for each of the research objectives in sections 4.2 (objective one), 4.3 (objective two) and 4.4 (objective three).

4.1 Summary Statistics

Table 3 presents summary statistics of variables relating to SMEs in this study. In this study, 59% of those interviewed were males. The average age of the SMEs managers was 36 years. Above 60% of the SME owners had education levels less than a University degree, while, 69% of the managers had education levels less than a University degree. Majority of the agri-food SMEs interviewed were in Kampala (37%) and Wakiso district (36%). Jinja district had 14% while Mukono district had 13% of the agri-food SMEs interviewed in this study. Sixty eight percent of the SMEs interviewed had annual revenue of between Uganda Shillings (UGX) 10 – 100 million and could be classified as small. Only 14% had annual revenue of over UGX 100 million and were classified as medium, while, 18% had annual revenue of less than UGX 10 million and were classified as micro. The average age of the SMEs was seven years, similarly, the avegarge number of full-time workers was also seven, with the SMEs employing various numbers of part-time workers throughout the year. About 36% of the SMEs owners/managers indicated that their businesses had guiding principles or policies that support innovations in their business. Only about one out of five SMEs had ever acquired various intellectual properties rights in their business.

Involvement in product or process improvement research was generally low, with only 15% of SMEs admitting to undertaking such research. Only less than three percent also reported to ever receiving research outputs from external sources including government or research institutes. In 48% of the SMEs, employees who come up with creative ideas were rewarded, with various forms of rewards. On average, each SME spent about UGX 1,340,000 (about USD 383) annually on innovation related activities.

Table 3: Summary Statistics

Frequencies and percentages of categorical variables			
Variable	**Category**	**Freq.**	**Percent**
Sex	Female	216	41.5
	Male	305	58.5
Education level of SME Owner	Less than University Degree	312	59.9
	University Degree or above	209	40.1
Education level of SME Manager	Less than University degree	358	68.7
	University degree or above	163	31.3
Location of SME	Jinja	71	13.6
	Kampala	195	37.4
	Mukono	69	13.2
	Wakiso	186	35.7
Size of SME	Micro	94	18.0
	Small	354	68.0
	Medium	73	14.0
There are guiding principles/policies that support innovations	No	333	63.9
	Yes	188	36.1
Has ever acquired intellectual properties rights	No	404	77.5
	Yes	117	22.5
Business is involved research to improve on products or process	No	442	84.8
	Yes	79	15.2
Received research output from government or research institute	No	506	97.1
	Yes	15	2.9
Provide reward for employees who come up with creative/innovative ideas	No	273	52.4
	Yes	248	47.6
Means and Standard deviations of quantitative variable			
		Mean	**SD**
Age of manager (years)		36	8.3
SME Age (years)		7	5.0
Number of full-time workers		7	16.7
Approximate annual expenditure on innovation related activities		1,340.883	6129093.5

4.2 Level of SME Innovation

The mean score for customer focused innovation was 5.26, while, the mean score of system focused innovation was 4.79 (Table 4). Given that the maximum score of both customer focused and systems focused innovation was six (six-point Likert scale), the mean scores reported in this study translates to 87.7% level of customer focused innovation and 79.8% level of systems focused innovation. In this study the level of customer focused innovation was significantly higher than the level of system focused innovation.

Table 4: Level of innovation of agri-food SME

Parameter	Customer focused innovation	System focused innovation
Mean	5.26	4.79
Median	5.20	5.00
Std. Deviation	0.56	0.82
Range	5.00	3.67
Minimum	1.00	2.33
Maximum	6.00	6.00
t-statistic = 10.804; $p < 0.001$		

A comparison of the mean innovation score across SME size (turnover) shows that the level of customer focused innovation did not vary significantly by SME size (Table 5).

Table 5: Comparing level of innovation by SME turnover

SME Tier	Annual turnover	Customer Focused Innovation		System Focused Innovation	
		Mean	SD	Mean	SD
Micro	Less than UGX 10 million	5.35 [a]	0.41	4.78 [a]	0.81
Small	UGX 10 million – 100 million	5.24 [a]	0.58	4.84 [a]	0.80
Medium	Over UGX 100 million	5.22 [a]	0.61	4.53 [b]	0.91
	F-value	1.644		4.185	
	P-value	0.194		0.016	

Note: SD=Standard deviation; Means in the same column with different superscript are significantly different at $p < 0.05$.

However, the level of systems focused innovation varied significantly by SME turnover. Specifically, SMEs with annual turner of UGX 100 million and above were significantly less innovative in terms of systems focus, than SMEs with less than UGX 100 million (Table 5).

4.3 Hierarchical regression results for factors influencing innovation

Table 6 presents the hierarchical regression with the dependent variable customer focused innovation, while, Table 7 presents the hierarchical regression with the dependent variable systems focused innovation. In both models, the Durbin-Watson test values were between 1.5 and 2.5, signifying that the models were free from potential serial correlation. Similarly, the maximum variance inflationary factor value was less than 2, far below the threshold of 10 to suspect multi-collinearity. All the F-statistics were significant implying model fit. The F-change statistics were also significant implying addition of explanatory variables to the second and third levels of the hierarchical regression was relevant.

Results show that SMEs whose owners had university degree or higher level of education had higher levels of customer focused innovation (β: 0.097, $p < 0.05$), but lower levels of systems focused innovation. SME age negatively and significantly influence the observed level of customer focused innovation (β: -0.106, $p < 0.05$), but, was not a significant factor for systems focused innovation. This implies that younger SMEs were more innovative in terms of customers focused innovation than older SMEs. Similarly, the number of fulltime employees employed by the SMEs also had a negative significant influence on customer focused innovation (β: -0.089, $p < 0.1$), but was not significant for systems focused innovation. Annual expenditure on

innovation had positive significant influence on both customer focused (β: 0.231, $p < 0.05$) and systems focused innovation (β: 0.451, $p < 0.05$). SMEs who had guiding principles and policies innovation also had significantly higher levels of both customer focused (β: 0.217, $p < 0.01$) and system focused innovations (β: 0.071, $p < 0.1$). These findings support hypothesis *H1-1*.

Table 6: Hierarchical regression results for factors influencing customer focused innovation

Variable	Beta (t-statistics)		
	Model 1	**Model 2**	**Model 3**
Intercept	5.889 (14.650) ***	5.443 (13.241) ***	4.663 (12.630) ***
Demographics			
Log_age	-0.084 (-1.897) *	-0.031 (-0.665)	0.032 (0.782)
Male	-0.094 (-2.188) **	-0.063 (-1.477)	-0.063 (1.687) *
Educ_owner	0.227 (5.196) ***	0.218 (4.968) ***	0.097 (2.407) **
Jinja	0.034 (0.721)	0.045 (0.925)	0.010 (0.206)
Mukono	0.124 (2.692) ***	0.128 (2.804) ***	0.092 (2.226) **
Wakiso	0.104 (2.189) **	0.024 (0.499)	0.063 (1.418)
SME Characteristics			
Log_SMEage		-0.075 (-1.549)	-0.106 (2.445) **
Log_fulltime		-0.088 (-1.649)	-0.089 (-1.846) *
Log_inno_exp		0.235 (5.340) ***	0.231 (5.682) ***
Micro		0.007 (0.160)	0.076 (1.826) *
Medium		0.047 (0.962)	-0.007 (-0.160)
Innovation support			
Innov_policy			0.217 (5.003) ***
Acquire_IP			0.115 (2.615) ***
Innov_research			0.030 (0.636)
Research_output			-0.037 (-0.962)
Reward_creative			0.336 (8.343) ***
Model parameters			
R^2	0.093	0.155	0.352
Adjusted R^2	0.083	0.137	0.331
F-value (sig)	8.802 (0.000)	8.508 (0.000)	17.090 (0.000)
R^2 Change	-	0.062	0.196
F-change (sig)	-	7.489 (0.000)	30.540 (0.000)
Max VIF	1.283	1.712	1.809
Tolerance	0.779 – 0.961	0.584 – 0.922	0.553 – 0.909

Note: Durbin-Watson = 2.109; Innov_policy=dummy (1: has guiding principles or policies supporting innovation, 0: none); Acquire_IP=dummy (1: has ever acquired intellectual properties rights, 0:has never); Innov_research=dummy (1:Involvement in product or process improvement research, 0: no involvement), Research_output=dummy (1: received research output, 0: did not receive); Reward_creative=dummy (1:Reward creative employees, 0:no reward); *, ** & *** implies significance at $p < 0.1$, $p < 0.05$ and $p < 0.01$, respectively

Acquisition of intellectual property rights was significantly associated with higher levels of both customer focused (β: 0.115, $p < 0.01$) and system focused (β: 0.159, p

< 0.01) innovations. These finding support hypothesis *H1-2*. Involvement in product or process improvement research had a significant positive influence on system focused innovation (β: 0.116, $p < 0.05$) but not on customer focused innovation. These finding partially support hypothesis *H1-3*. Access to research output by the SME did not have any significant influence on innovation, implying that hypothesis *H1-4* is not supported. Finally, reward of creative employees was associated with significantly higher levels of customer focused innovation (β: 0.336, $p < 0.01$), but, significantly lower levels of systems focused innovation (β: 0.111, $p < 0.05$). These finding partially support hypothesis *H1-5*.

Table 7: Hierarchical regression results for factors influencing Systems focused innovation

Variable	Beta (t-statistics)		
	Model 1	**Model 2**	**Model 3**
Intercept	6.422 (11.174) ***	5.380 (10.041) ***	5.022 (9.486) ***
Demographics			
Log_age	-0.131 (-3.037) ***	-0.084 (-2.049) **	-0.050 (-1.226)
Male	-0.080 (-1.917) *	-0.031 (-0.813)	-0.038 (-1.027)
Educ_owner	-0.046 (-1.085)	-0.083 (-2.133) **	-0.073 (-1.846) *
Jinja	0.268 (5.825) ***	0.322 (7.510) ***	0.296 (6.457) ***
Mukono	-0.073 (-1.620)	-0.038 (-0.942)	-0.071 (-1.744) *
Wakiso	0.222 (4.765) ***	0.110 (2.522) **	0.130 (3.013) ***
SME Characteristics			
Log_SMEage		-0.033 (-0.753)	-0.043 (-1.001)
Log_fulltime		0.011 (0.223)	-0.040 (-0.852)
Log_inno_exp		0.473 (12.086) ***	0.451 (11.315) **
Micro		-0.025 (-0.608)	-0.035 (-0.873)
Medium		-0.035 (-0.820)	-0.094 (-2.175)
Innovation support			
Innov_policy			0.072 (1.707) *
Acquire_IP			0.159 (3.695) ***
Innov_research			0.116 (2.471) **
Research_output			-0.053 (-1.404)
Reward_creative			-0.111 (-2.819) ***
Model parameters			
R^2	0.134	0.329	0.377
Adjusted R^2	0.124	0.315	0.357
F-value (sig)	13.218 (0.000)	22.720 (0.000)	19.053 (0.000)
R2 Change	-	0.196	0.048
F-change (sig)		29.695 (0.000)	7.697 (0.000)
Max VIF	1.283	1.712	1.809
Tolerance	0.779 – 0.961	0.584 – 0.922	0.553 – 0.909

Note: Durbin-Watson = 1.876; Innov_policy=dummy (1: has guiding principles or policies supporting innovation, 0: none); Acquire_IP=dummy (1: has ever acquired intellectual properties rights, 0:has never); Innov_research=dummy (1:Involvement in product or process improvement research, 0: no involvement), Research_output=dummy (1: received research output, 0: did not receive); Reward_creative=dummy (1:Reward creative employees, 0:no reward); *, ** & *** implies significance at $p < 0.1$, $p < 0.05$ and $p < 0.01$, respectively.

4.4 Market orientation and firm innovativeness

4.4.1 Reliability and Validity of MO, innovation attitude and firm innovativeness constructs

In order to assess the influence of MO on innovativeness and innovation attitude, the reliability and validity of the constructs, data analysis was performed using SPSS v. 25 and AMOS v. 23. For all the scale items, all the confirmatory factor loadings were above 0.5 (Table 8) and significant at $p<0.001$. Hair *et al*. (2010) suggest that high

factor loadings are preferred as they indicate better internal consistency of scale items in addition to providing evidences of convergent validity. For all the constructs of the final analysis, the Cronbach's alpha was above 0.7. This implies internal consistency of the items (Nunnally, 1994).

During the analysis, items with low Cronbach's alpha and/or low factor loadings were dropped. All items for inter functional coordination, competitor orientation, attitude towards innovation and innovativeness met this threshold. Only one item of customer orientation did not meet the thresholds and was subsequently dropped from the analysis (Table 8). The study also assessed composite validity of the constructs using composite reliability and average variance extracted. Results showed that the composite reliability were all above 0.73 (Table 9). Similarly, the average variance extracted (AVE) were all above 0.5. According to Hair et al. (2010) and Fornell and Larcker (1981), AVE values above 0.5 shows convergent validity. Results also show that for most of the constructs the square root of the AVE values was above the pairwise correlations indicating that the constructs were less related. Once the constructs passed the reliability and validity assessment, the subsequent analysis involved estimating the measurement and structural models using structural equation model, following the hypothesized relationships. In essence, the study applied the multivariate technique of SEM to establish the influence of agri-food SME's MO on innovation attitude and firm innovativeness.

Table 8: Means, standard deviations and internal consistency of scale items

Construct/Scale Item	Mean	SD	CFA factor loadings
Inter functional coordination (α=0.894)			
All our products and services that we deal in must be profitable	4.92	0.84	0.704
I, as the owner/manager of this firm always emphasize market performance	4.99	0.90	0.851
In our firm, we consider profit performance measured by market indicators	4.91	0.83	0.673
We focus on attaining a positive margin in the long term for our firm	4.84	0.98	0.815
In our firm, we usually focus on obtaining rapid payback from our activities	4.89	0.86	0.593
In our firm, regular profits are the primary objective of the business	5.05	0.97	0.806
Competitor orientation (α=0.796)			
We diagnose the goals of other firms	3.89	0.83	0.577
In our firm, we recognize success areas of our key competitors	4.27	0.76	0.706
We spot the failures of our key competitors	4.08	0.77	0.813
We assess the strengths and weaknesses of key businesses that compete with our business	4.30	0.77	0.734
Customer orientation (α_1=0.609, α_2=0.714)			
We think about the benefits that our customers will receive by consuming our products/services	4.91	0.95	0.881
We anticipate customers needs and suggest new ways of addressing it	4.86	0.84	0.634
We are in close contact with lead customers in order to address their specific needs†	5.04	0.95	0.354
Attitude towards innovation (α=0.930)			
Adopting innovations is a useful decision	4.81	1.09	0.875
In this firm, we value employees that innovate	4.84	1.07	0.854
Those who are important to me, think we should innovate in this firm	4.41	1.29	0.748
Those who are important to our firm think we should innovate	4.56	1.20	0.679
We are motivated to innovate	4.85	1.11	0.739
Innovations improve the results of our firm	4.60	1.25	0.878
Innovation is worth the effort	4.86	1.04	0.795
Innovativeness (α = 0.863)			
Innovation based in research targeting the technical components of our operations are readily accepted on our firm	4.66	1.23	0.812
In our firm, innovation is voluntarily welcomed in our business operations	4.71	1.16	0.817
In our firm, we make deliberate efforts to improve our products and services	4.72	1.15	0.842

n=521; Items were measured on a 6-point Likert scale.
Goodness of fit: Chi-square (193) = 563.111, p < 0.001; chi-square/d.f. = 2.918, GFI=0.908, CFI = 0.954, TLI = 0.945, RMSEA = 0.061 (Pclose = 0.001), SRMR = 0.0410.
†Indicates item that was dropped due to low loading value.
All factor loadings were significant at p < 0.01
α = Cronbach's alpha, α1 = before item(s) were dropped & α2 = after item(s) were dropped

In the structural model, the path estimates were generated for the pooled model and for sub group level. The pooled model showed the overall influence of MO on attitude and innovativeness, while, the sub-group analysis allowed for an understanding of

differences in the influence of MO on attitude and innovativeness across the different sub-groups. The grouping variables used were district, size of business, access to innovation related services and type of business. The fit indices indicated good model fit. Specifically, the chi-square at 193 degrees of freedom was 563.111, with, χ^2/df ratio of 2.918 (less than the threshold of three). All the other indices presented in Tables 8 and 10, were all within the recommended thresholds. During the analysis, model fit was improved by co-varying error terms with high observed covariances.

Table 9: Construct Validity for the MO-Innovativeness model

Construct	1	2	3	4	5	CR	AVE
Interfunctional coordination (1)	**0.746**					0.881	0.557
Competitor orientation (2)	0.199	**0.713**				0.803	0.508
Customer orientation (3)	0.644	0.222	**0.767**			0.736	0.589
Attitude towards innovation (4)	0.725	0.135	0.581	**0.799**		0.924	0.638
Firm innovativeness (5)	0.701	0.108	0.585	0.850	**0.823**	0.740	0.678

Note: Numbers in bold on the main diagonal are square roots of the AVE, others are correlation coefficients

CR is the value of Composite reliability

AVE is the Average Variance Extracted.

4.4.2 The relationship among MO, innovation attitude and agri-food innovativeness

Multivariate analysis results for the whole sample showed that interfunctional coordination had a positive influence on both attitude ($p<0.01$) and firm's innovativeness ($p<0.1$). This finding supports research hypotheses H2-1. Additionally, competitor orientation had a negative influence on firm's innovativeness ($p<0.05$) while, it had no significant influence on attitude. Hypotheses H2-2a and H2-2b are thus not supported. Customer orientation had a positive effect on attitude towards innovation ($p<0.05$) but did not have any significant influence on firm's innovativeness. This implies that hypothesis H2-3a was supported while,

hypothesis H2-3b was not supported. The findings also showed that attitude towards innovation had a positive influence on firm's innovativeness ($p<0.01$), thus supporting hypothesis H2-4 (Table 10).

Table 10: Pooled model results for the effect of MO on innovation attitude and firms innovativeness

Path and perspectives			Std.β	S. E	C.R	P-value	Result
Inter functional coordination	→	Attitude	0.684	0.128	8.586	0.000***	Supported
Competitor orientation	→	Attitude	-0.027	0.068	-0.785	0.432	Not supported
Customer orientation	→	Attitude	0.179	0.087	2.378	0.017 **	Supported
Interfunctional coordination	→	Firm innovativeness	0.124	0.108	1.921	0.055*	Supported
Competitor orientation	→	Firm innovativeness	-0.056	0.053	-2.185	0.029**	Supported
Customer orientation	→	Firm innovativeness	0.030	0.064	0.570	0.569	Not supported
Attitude towards innovation	→	Firm innovativeness	0.864	0.060	14.908	0.000***	Supported

Chi-square = 563.11; df=193; Chi-square/df=2.918; p=0.000; GFI=0.908; CFI=0.954; TLI=0.945; IFI=0.955; RMSEA=0.061 (PCLOSE=0.001); SRMR=0.0410. Std.β = *Standardized estimates; S.E = Standard Error; C.R, = Critical Ration, and p-value = probability value respectively.*
, ** and * indicate significance at p<0.1, p<0.05 and p<0.01, respectively*

Sub-group level analysis by district of location of agri-food SMEs shows differences in the relationship between MO, innovation attitude and firms' innovativeness (Table 11). Interfunctional coordination had a positive and significant effect on innovation attitude across all districts and a positive significant effect on firm innovativeness for Wakiso district only. Similarly, innovation attitude had a positive significant effect in firm's innovativeness in all the districts.

Table 11: Group level analysis for business location and the effect of MO on innovation attitude and firms innovativeness

Path and perspectives			Standardized estimates			
			Kampala	Mukono	Jinja	Wakiso
Inter functional coordination	→	Attitude	0.474**	1.143***	0.688***	0.812***
Competitor orientation	→	Attitude	0.039	-0.015	-0.107	-0.050
Customer orientation	→	Attitude	0.190	-0.173	0.366	0.089
Inter functional coordination	→	Firm innovativeness	0.138	-0.441	0.173	0.205*
Competitor orientation	→	Firm innovativeness	-0.162***	0.004	0.156	0.011
Customer orientation	→	Firm innovativeness	0.021	0.295	-0.103	-0.085
Attitude towards innovation	→	Firm innovativeness	0.873***	1.153***	0.807***	0.868***

Notes: *, ** and *** significant at p< 0.1, p< 0.05 and p<0.01 respectively

Both competitor orientation and customer orientation had no significant effect on innovation attitude in all the districts. On the other hand, competitor orientation had a significant negative effect on firm's innovativeness, while, customer orientation had no significant effect in firm's innovativeness.

Sub-group level analysis by size of business showed that business sizes moderated the relationship among MO, innovation attitude and firm's innovativeness (Table 12). Specifically, the influence of interfunctional coordination on innovation attitude was positive for all agri-food business sizes. Similarly, the influence of innovation attitude was positive in all SME size categories. The influence of customer orientation on attitude was only significant and positive for micro and small enterprises, but, was not significant for medium agri-food enterprises. At sub-group level, competitor orientation did not have any significant influence on both attitude and firm's innovativeness for all the business size sub-groups, while, customer orientation had no significant influence on firm's innovativeness for all business size classifications.

Table 12: Group level analysis for business size typology and the effect of MO on innovation attitude and firms innovativeness

Path and perspectives			Standardized estimates		
			Micro	Small	Medium
Inter functional coordination	→	Attitude	0.568***	0.674***	0.962***
Competitor orientation	→	Attitude	0.037	0.001	0.008
Customer orientation	→	Attitude	0.331**	0.202**	-0.217
Inter functional coordination	→	Firm innovativeness	0.144	0.132	0.130
Competitor orientation	→	Firm innovativeness	0.059	-0.036	-0.077
Customer orientation	→	Firm innovativeness	0.081	0.054	-0.237
Attitude towards innovation	→	Firm innovativeness	0.791***	0.840***	1.033***

Notes: *, ** and *** significant at $p< 0.1$, $p< 0.05$ and $p<0.01$ respectively

Sub-group level analysis for agri-food SMEs by business type showed that SME type moderates the relationship among MO, attitude and firm's innovativeness (Table 13). The influence of interfunctional coordination on attitude was positive for agri-food retailers, wholesalers and processor, but was not significant for agri-food transporter/exporters. The effect of competitor orientation on attitude was positive and significant for agri-food transporters and exporters, but not for retailers, wholesalers and processors. Similarly, the effect of customer orientation on attitude was positive and significant for agri-food processor, but not for agri-food retailer, wholesaler and transporter/exporter. The effect of competitor orientation on firm's innovativeness was negative and significant for agri-food wholesalers, but, had no significant influence for agri-food retailers, processors and transporters/exporters. The effect of innovation attitude on firm's innovativeness was positive and significant for all types of agri-food SMEs, while, there was no significant effect of customer orientation on firm's innovativeness across all agri-food types.

Table 13: Multivariate group level analysis for type of agri-food SME and the effect of MO on innovation attitude and firms innovativeness

Path and perspectives		Standardized estimates			
		Retailer	**Wholesaler**	**Processor**	**Transporter or exporter**
Inter functional coordination	→ Attitude	0.629***	0.815***	0.701***	0.164
Competitor orientation	→ Attitude	-0.061	-0.094	-0.031	0.221**
Customer orientation	→ Attitude	0.154	0.089	0.264*	0.432
Inter functional coordination	→ Firm innovativeness	0.064	0.152	-0.067	0.182
Competitor orientation	→ Firm innovativeness	0.045	-0.105**	0.040	-0.065
Customer orientation	→ Firm innovativeness	0.060	-0.002	-.0140	0.199
Attitude towards innovation	→ Firm innovativeness	0.894***	0.868***	1.140***	0.750***

Notes: *, ** and *** significant at $p< 0.1$, $p< 0.05$ and $p<0.01$ respectively

4.4.3 Mediation Results for effects of Market Orientation on Innovation

Bootstrapping results (Table 14), for mediation effects of attitude on market orientation on innovations was significantly different from zero for customer orientation and inter-functional coordination. In essence, it can be concluded that attitude towards innovations significantly mediates the influences of customer orientation and inter functional coordination on firm innovativeness. Attitude did not mediate the relationship between competitor orientation and firm innovativeness. Consequently, attitude plays an intervening role on the relationship between customer orientation and firm innovativeness, as well as, inter functional coordination and firm innovativeness. The indirect effect of inter-functional coordination on firm's innovativeness was 0.591, while, the direct effect was 0.124. This suggests that, much of the observed effects of inter functional coordination on firm's innovativeness is through its influence on attitude towards innovations. Similarly, the indirect effect of customer orientation on firm's innovativeness was 0.155, while, the direct effect was

0.30, suggesting that, much of the observed effects of customer orientation on firm's innovativeness is through its influence on attitude towards innovations

Table 14: Bootstrapping results for mediations effects of the effects of market orientation on innovation

Path and perspectives			Direct	p-value	Indirect	p-value	Total	p-value
Inter functional coordination	→	Attitude	0.684	0.007	-		0.684	0.007
Competitor orientation	→	Attitude	-0.027	0.648	-		-0.027	0.648
Customer orientation	→	Attitude	0.179	0.019	-		0.179	0.019
Inter functional coordination	→	Firm innovativeness	0.124	0.141	**0.591**	**0.007**	0.715	0.006
Competitor orientation	→	Firm innovativeness	-0.056	0.025	-0.023	0.612	-0.079	0.030
Customer orientation	→	Firm innovativeness	0.030	0.708	**0.155**	**0.018**	0.185	0.021
Attitude	→	Firm innovativeness	0.864	0.014	-		0.864	0.014

4.5 Enterpreneurial orientation and agri-food SME innovation

4.5.1 Reliability and Validity of EO, cost focus, learning orientation and innovation constructs

Prior to assessing the relationship between EO, cost focus, learning orientation and innovation, first was to evaluate the reliability and validity of the constructs. The first focus of the assessing for reliability and validity was to ensure that all the factors loadings were above 0.5 (Hair *et al*. 2010). Items with factors loadings below 0.5, were dropped from the analysis. Thus, for proactiveness, one items was dropped while, for risk taking, two items were dropped. All the items for entrepreneurial proclivity, learning orientation, and innovation met the threshold, and thus non was dropped. Items with non-significant factor loadings were also dropped from the

analysis (Table 15). Thus, in the case of cost focus, one item was dropped. Where an item was dropped, a new Cronbach alpha was computed to assess improvement in internal reliability.

Table 15: Means, standard deviation and internal consistency of scale items

Construct/Scale Item	Mean	SD	CFA factor loading
Proactiveness (α_1 = 0.813, α_2 = 0.846)			
In dealing with other people or firms, we routinely initiate actions first and wait for the other people or firms to respond	3.83	1.15	0.618
In this firm, we have a preference for "stepping-up" to get things going as opposed to sitting and waiting for someone else to do it	4.32	1.41	0.834
In this firm, we have a tendency of planning ahead on projects	4.76	1.10	0.796
In our business operations, we anticipate future challenges, needs and changes	4.60	1.30	0.814
In dealing with other people or firms, we typically respond to actions first initiated by those other people†	3.97	1.06	0.338
Entrepreneurial proclivity (α = 0.942)			
In our firm, we encourage everyone to come up with innovative marketing approaches, knowing well that some will fail	4.62	1.26	0.783
We have a conviction that market change generates a positive opportunity for our business	4.38	1.21	0.673
In our firm, we tend to dialogue more regarding opportunities rather than challenges	4.58	1.14	0.835
In our firm, we prefer to 'play it safe'	5.09	0.88	0.745
In our firm, we prefer implementing our plans only when we are sure they will work	4.74	1.12	0.734
When it comes to solving problems in our business, we have strong preference for new and creative remedies more than the remedies of conventional wisdom	4.60	1.21	0.871
Due to the nature of our business environment, we think it is best to be cautious in exploring our options	4.60	1.13	0.834
In our firm, we have preference for less risky investment projects which have normal and certain rates of return	4.37	1.27	0.677
In our business, we generally avoid conflicts with competitors, preferring a 'live-and-let-live' attitude	4.75	1.27	0.836
In our business, we have strong preference for using tested and tried products or services for our business operations	4.69	1.26	0.884
Risk taking (α_1 = 0.658, α_2 = 0.794)			
In times of uncertainty, we adopt a brave, aggressive stance so as to maximize the chances of exploiting potential opportunities	4.15	1.47	0.518
In this firm, we have a willingness to invest a great deal of time on something that might yield high returns	4.44	1.22	0.895
In our firm, we are willing to invest more money on something that might yield high returns	4.36	1.32	0.910
In general, in our firm, we do not like to take on high-risk projects†	3.95	1.35	0.217
In our firm, we usually take bold actions by trying the unknown†	3.70	1.22	0.130
Learning orientation (α = 0.946)			
Our potential to learn hastily than our competitors are the vital to our competitive advantage	4.58	1.07	0.836
Learning as a key to continuous improvement is one the basic values of our firm	4.78	1.05	0.812

In our firm, we take learning as an investment, not an expense	4.95	0.97	0.742
In our firm, learning is considered as a key ingredient required to guarantee survival in this line of business	4.71	1.19	0.830
Everyone in our firm are all in full agreement with the organizational vision	4.86	1.03	0.834
Everyone working in our firm are committed to the contribute to achieving goals of this firm	4.84	1.09	0.858
Employees of this firm look at themselves as partners in mapping the directions of the firm	4.98	1.03	0.848
All employees in our firm are fully aware that their perception of the marketplace must be examined and adapted continuously	4.63	1.29	0.865
Cost focus ($\alpha_1 = 0.727$, $\alpha_2 = 0.889$)			
In our firm, achieving a high operating efficiency is a top priority	4.91	1.07	0.852
In our firm, we have a supreme responsibility for reducing cost on our firm	4.83	1.09	0.826
In our firm, we take achievement of economies of scale or scope as an important element of our firm's strategy	4.75	1.14	0.835
We closely pay attention to the effectiveness of key processes and business operations	4.99	1.07	0.753
We do not look to improve our firm operations in order to lower our costs	3.98	1.53	0.031^{ns}
Innovation ($\alpha = 0.811$)			
We develop new ideas of improving our products/services	5.24	0.76	0.696
We implement new techniques in production and processing of our products/services	5.23	0.77	0.741
We adopt new techniques in our operations	5.19	0.71	0.768
We create new processes in our operations in order to improve efficiency	5.25	0.71	0.675

n=521
Items were measured on a 6-point Linkert scale.
Goodness of fit: Chi-square (469) = 1372.307, $p < 0.001$; chi-square/d.f. = 2.926, CFI = 0.941, TLI = 0.933, RMSEA = 0.061 (Pclose = 0.000), SRMR = 0.0383
†Indicates item that was dropped due to low loading value.
α = Cronbach's alpha, $\alpha 1$ = before item(s) were dropped & $\alpha 2$ = alpha after item(s) were dropped

The final analysis showed that all the Cronbach's alphas were above 0.75, indicating good internal reliability of the constructs (Nunnally, 1994). Where an item was deleted from analysis, re-analysis showed improvements in the Cronbach's alpha value. After all the items and constructs had met the threshold for factor loadings and Cronbach's alpha, analysis proceeded to assess the composite validity and convergent validity using CR and AVE. Results presented in Table 16, showed that all the constructs had composite reliability values above 0.7, and AVE values above 0.5. A CR value of at least 0.7 confirms composite reliability while, an AVE value of 0.7 confirms convergent validity (Fornell & Larcker, 1981; Hair *et al*., 2010).

After the reliability and validity assessment, the study then estimated the structural model to test for the hypothesized relationships. This was achieved using the multivariate analysis through structural equation modelling (SEM). During the multivariate analysis in SEM, model fit was improved by co-varying errors with high covariances. The final structural model fits indices showed good model fit (Table 15). Specifically, the chi-square to degrees of freedom ratio of 2.926 was less than the cut-off of three. On the other hand, the TLI of was 0.933 while, the CFI was 0.941. Both TLI and CFI all met the acceptable baseline values (spec. $\geq$ 0.90). Similarly, the RMSEA was 0.061. This value was less than the acceptable maximum of 0.08 for good fit. Lastly, the Standardized Root Mean Squared Residual (SRMR) value was 0.0383. This SRMR value was also less than the acceptable maximum of 0.05 (Pavlov *et al*., 2021). During the analysis, path analysis was performed for the pooled sample and for the sub-group sample. The grouping factors were business size, education level of the owner and manager, type of agri-food SME, and gender of the SME owner.

Table 16: Construct Validity of the EO-Innovation model

Construct	1	2	3	4	5	6	CR	AVE
Proactiveness (1)	1.000						0.786	0.594
Entrepreneurial proclivity (2)	0.804	1.000					0.943	0.625
Risk Taking (3)	0.703	0.711	1.000				0.830	0.632
Learning orientation (4)	0.803	0.880	0.720	1.000			0.946	0.687
Cost Focus (5)	0.836	0.876	0.770	0.886	1.000		0.889	0.668
Innovation (6)	0.685	0.634	0.595	0.609	0.607	1.000	0.812	0.520

n=521; CR: Composite reliability, AVE: Average Variance Extracted.

4.5.2 The relationship among enterprenuerial orientaion, cost focus, learning orientation and innovation in Agri-food SME

Table 17 presents results of the multivariate analysis for the relationship between EO, cost focus, learning orientation and innovation. It shows that agri-food SME's proactiveness positively and significant influences learning orientation ($p<0.01$), cost focus ($p<0.01$), and innovation ($p<0.1$), thus, supporting hypothesis H3-1. On the other hand, entrepreneurial proclivity, had a positive and significant effect on agri-food SME's learning orientation ($p < 0.01$), and agri-food SME's cost focus ($p<0.01$), but had no significant effect on agri-food SME innovation, thus partially supporting hypotheses H3-2. Risk taking potential of the Agri-food SME did not have any significant effect on learning orientation, cost focus and innovation, thus hypotheses H3-3 was not supported. Similarly, both agri-food SME learning orientation and cost focus did not, have any significant effect on agri-food SME innovation, thus both H3-4 and H3-5 were not supported in the pooled model.

Table 17: Pooled model results for the effects of EO on learning orientation, cost focus and overall innovation

Path and perspectives			Std.β	S. E	C.R	P-value	Result
Proactiveness	→	Learning orientation	0.475	0.150	3.908	0.000***	H3-1a Supported
Proclivity	→	Learning orientation	0.493	0.083	5.349	0.000***	H3-2a Supported
Risk Taking	→	Learning orientation	0.032	0.065	0.564	0.572	H3-3a Not supported
Risk Taking	→	Cost focus	-0.021	0.071	-0.358	0.720	H3-3b Not supported
Proclivity	→	Cost focus	0.643	0.088	6.710	0.000***	H3-2a Supported
Proactiveness	→	Cost focus	0.377	0.155	3.086	0.002 ***	H3-1a Supported
Learning orientation	→	Innovation	2.591	1.547	0.913	0.361	H3-4 not Supported
Cost focus	→	Innovation	-4.157	2.214	-0.996	0.319	H3-5 Not supported
Proactiveness	→	Innovation	1.454	0.556	1.760	0.078*	H3-1c Supported
Proclivity	→	Innovation	1.156	0.685	0.823	0.410	H3-2c Not supported
Risk Taking	→	Innovation	-0.214	0.202	-0.673	0.501	H3-3c Not supported

Chi-square = 563.11; df=469; Chi-square/df=2.926; p=0.000; CFI=0.941; TLI=0.933; IFI=0.941; RMSEA=0.061 (PCLOSE=0.000); SRMR=0.0383. Std.β *= Standardized estimates; S.E = Standard Error; C.R, = Critical Ration, and p-value = probability value respectively.*

, ** and * indicate significance at p<0.1, p<0.05 and p<0.01, respectively*

Sub-group level analysis by size of agri-food SMEs shows differences in the relationship between EO, learning orientation, cost focus and innovation (Table 18). Specifically, the influence of agri-food SMEs proactiveness on learning orientation was only significant and positive for agri-food SMEs classified as small, but not for micro and medium agri-food firms. Similarly, the influence of agri-food SMEs proactiveness on cost focus was only significant and positive for agri-food SMEs classified as small, but not for micro and medium agri-food firms. On the other hand, the influence of agri-food SMEs proactiveness on innovation was only significant and positive for agri-food SMEs classified as medium, but not for micro and small agri-food firms. The influence of entrepreneurial proclivity in learning orientation was

positive and significant for both small and medium agri-food firms, but not for micro agri-food firms.

Table 18: Group level analysis for business size typology and the effects of EO on learning orientation, cost focus and overall innovation

Path and perspectives			Standardized estimates		
			Micro	Small	Medium
Proactiveness	→	Learning orientation	-0.077	0.499***	0.079
Proclivity	→	Learning orientation	0.869	0.512***	0.501***
Risk Taking	→	Learning orientation	0.248	-0.007	0.383
Risk Taking	→	Cost focus	-0.131	-0.065	0.063
Proclivity	→	Cost focus	0.151	0.659***	0.968***
Proactiveness	→	Cost focus	0.943	0.406***	-0.047
Learning orientation	→	Innovation	1.453	2.465	0.807
Cost focus	→	Innovation	-4.564	-3.234	-1.028
Proactiveness	→	Innovation	3.447	0.606	1.458**
Proclivity	→	Innovation	0.886	1.054	0.026
Risk Taking	→	Innovation	-0.830	-0.021	-0.424

Notes: *, ** and *** significant at $p< 0.1$, $p< 0.05$ and $p<0.01$ respectively

Table 18 presents results of sub-group analysis by level of education of SME owner and manager. It shows that the influence of agri-food SME proactiveness on learning orientation was positive and significant only for SME managers and owners with diploma or lower level of education. On the other hand, the influence of agri-food SME proactiveness on agri-food SME cost focus was positive and significant only for SMEs whose owners have at least an undergraduate degree, and for SMEs, whose owners had at most a diploma. The influence of agri-food SME entrepreneurial proclivity on learning orientation was significant for all levels of education of both owner and manager, while, the influence of agri-food SME entrepreneurial proclivity on cost focus was significant for all levels of education of SMEs owners, but, only significant for SME' whose managers have at most a diploma (Table 19).

Table 19: Group level analysis education level of owner and manager and the effects of EO in learning orientation, cost focus and overall innovation

Path and perspectives			Standardized estimates			
			Education Owner		Education manager	
			Degree or more	Diploma or less	Degree or more	Diploma or less
Proactiveness	→	Learning orientation	0.228	0.602***	0.314	0.522***
Proclivity	→	Learning orientation	0.709***	0.336**	0.732**	0.418***
Risk Taking	→	Learning orientation	0.040	0.075	-0.087	0.070
Risk Taking	→	Cost focus	-0.190	0.019	-0.343	0.020
Proclivity	→	Cost focus	0.695***	0.747***	0.406	0.655***
Proactiveness	→	Cost focus	0.478*	0.237	0.894	0.329***
Learning orientation	→	Innovation	-0.396	-1.272	-0.781	1.411
Cost focus	→	Innovation	0.816	-3.612	0.763	-2.587
Proactiveness	→	Innovation	0.356	3.073	1.531	1.100
Proclivity	→	Innovation	-0.181	2.532	-0.520	0.953
Risk Taking	→	Innovation	0.304	0.109	-0.171	-0.053

Notes: *, ** and *** significant at $p< 0.1$, $p< 0.05$ and $p<0.01$ respectively

Sub-group level analysis by type of agri-food SMEs indicates that agri-food SME type moderates the relationship between EO, learning orientation, cost focus and innovation. Results in Table 20 shows that agri-food SMEs proactiveness had significant positive effects on learning orientation and cost focus only for agri-food transporters or exporters. There was no significant effect of proactiveness on learning orientation and cost focus for agri-food retailers, wholesalers and processors. Agri-food SME proactiveness was significant and positive for agri-food processors, but not for agri-food retailers, wholesalers and transporters or exporters. On the other hand, entrepreneurial proclivity had a significant positive effect on learning orientation for agri-food retailers, wholesalers and processors. It also had a positive and significant effect on cost focus for agri-food retailers, and processors only. Similarly, the influence of risk taking on learning orientation of agri-food processor was positive and significant. Agri-food SME learning orientation also had a significant effect on innovation of agri-food transporters or exporters (Table 20).

Table 20: Group level analysis for type of agri-food SME and the effects of EO on learning orientation, cost focus and overall innovation

Path and perspectives			Standardized estimates			
			Retailer	Wholesaler	Processor	Transporter or exporter
Proactiveness	→	Learning orientation	0.101	0.494	0.076	1.535***
Proclivity	→	Learning orientation	0.800***	0.481*	0.616***	-0.262
Risk Taking	→	Learning orientation	0.112	0.019	0.304*	-0.259
Risk Taking	→	Cost focus	0.104	-0.046	0.142	-0.216
Proclivity	→	Cost focus	1.094***	0.305	0.723***	0.263
Proactiveness	→	Cost focus	-.210	0.755*	0.122	0.929***
Learning orientation	→	Innovation	1.107	-0.535	0.885	2.107*
Cost focus		Innovation	0.039	0.523	-0.996	-2.993
Proactiveness	⇒	Innovation	0.812	0.607	0.521*	0.812
Proclivity	→	Innovation	-.736	0.080	0.563	0.402
Risk Taking	→	Innovation	-0.531	0.196	0.047	0.127

Notes: *, ** and *** significant at $p< 0.1$, $p< 0.05$ and $p<0.01$ respectively

Table 21 presents results of sub-group analysis by level of education of SME owner and manager. It shows that gender of the SME owner moderates the relationship between EO, learning orientation, cost focus and innovation. Whereas the influence of agri-food SME proactiveness was significant for both male and female owned agri-food SMEs, the influence of proactiveness on agri-food firm cost focus and SME innovation were only significant for male owned firms, but not for female owned firms.

Table 21: Group level analysis for gender of agri-food SME owner and the effects of EO on learning orientation, cost focus and overall innovation

Path and perspectives			Standardized estimates	
			Male	Female
Proactiveness	→	Learning orientation	0.340***	0.908*
Proclivity	→	Learning orientation	0.620***	0.087
Risk Taking	→	Learning orientation	0.030	0.011
Risk Taking	→	Cost focus	-0.074	0.048
Proclivity	→	Cost focus	0.702***	0.520**
Proactiveness	→	Cost focus	0.364***	0.437
Learning orientation	→	Innovation	2.082	1.144
Cost focus	→	Innovation	-3.723	-1.511
Proactiveness	→	Innovation	1.750*	0.675
Proclivity	→	Innovation	0.997	0.701
Risk Taking	→	Innovation	-0.306	-0.147

Notes: *, ** and *** significant at $p< 0.1$, $p< 0.05$ and $p<0.01$ respectively

Similarly, the effect of proactiveness on SME innovation was only significant for agri-food firms owned by men, but not for women owned firms. The effect of entrepreneurial proclivity on learning orientation was also significant only for male owned firms but not for female owned firms. However, the effect of entrepreneurial proclivity on cost focus was significant for both male and female owned firms (Table 21).

4.5.3 Mediation Results for effects of Enterprenuerial Orientation on Innovation

Bootstrapping results (Table 22), for mediation effects of learning orientation and cost focus on entrepreneurial orientation and innovations was significantly different from zero for proactiveness, proclivity and risk taking. In essence, it can be concluded that cost focus and learning orientation significantly mediates the influence of proactiveness, proclivity and risk-taking on entrepreneurial orientation and firm innovativeness. Consequently, both learning orientation and cost focus plays intervening roles on the relationship between entrepreneurial orientation and

innovations. The indirect effect of entrepreneurial orientation on innovation were -6.595, -4.552 and 1.122, for proactiveness, proclivity and risk taking, respectively.

Table 22: Bootstrapping results for mediations effects of the effects of market orientation on innovation

Path and perspectives			Direct effect	p-value	Indirect effect	p-value	Total Effect	p-value
Proactiveness	→	Learning orientation	0.730	0.002			0.730	0.002
Proclivity	→	Learning orien tation	0.326	0.121			0.326	0.121
Risk Taking	→	Learning orientation	-0.062	0.256			-0.062	0.256
Risk Taking	→	Cost focus	-0.117	0.042			-0.117	0.042
Proclivity	→	Cost focus	0.467	0.120			0.467	0.120
Proactiveness	→	Cost focus	0.645	0.001			0.645	0.001
Learning orientation	→	Innovation	-1.083	0.385			-1.083	0.385
Cost focus	→	Innovation	-8.992	0.000			-8.992	0.000
Proactiveness	→	Innovation	8.029	0.000	-6.595	0.002	1.433	0.002
Proclivity	→	Innovation	4.095	0.000	-4.552	0.000	-0.457	0.112
Risk Taking	→	Innovation	-1.281	0.010	1.122	0.010	-0.159	0.289

CHAPTER FIVE: DISCUSSIONS

5.0 Introduction

Chapter 5 discusses the findings presented in the previous chapter. First, section 5.1 discusses results for the study findings on first research objective, which investigated the level of agri-food SME innovation. This is followed by section 5.2 which discusses results for the study findings on the second research objective, which investigated the determinants of agri-food SME innovation. Section 5.3 then discusses results for the study findings on the third research objective which assessed the relationship among MO, innovation attitude and firm's innovativeness. Section 5.4 discusses results for the study on the four objective which assess the relationship among enterpreneurial orientation, learning orientation, cost focus and overall innovation. Lastly, section 5.5 discusses the role of intervening variables in influencing the relationship among MO, EO and Innovation.

5.1 Agri-food SME innovation

Agrifood SME plays a critical role to economic growth of economies worldwide (Dobrzański, Bobowski, Chrysostome, Velinov, & Strouhal, 2021; Brar, Farley, Hawkins, & Wagner, 2010). This study assessed agri-food SME innovation in Uganda. The results of thus study showed that the level of Agri-food SME was at about 80%. Although the level of innoivation reported in this study is higher than the national average, it is typical of agri-food sector (Egbetokun, Adeniyi, Siyanbola, & Olamade, 2012; Abubakar, Hand, Smallbone, & Saridakis, 2019). According to Kahn (2022), the level of innovation varies significantly across sectors.

Despite the high level of innovation reported in this study, it appears that the innovation outputs from these SMEs are not available in the market. This is because, the World Intellctual Property Organizations which ranks countries by level of innovation output, ranks Uganda at number 121, with an innovation index of about 10% (World Intellectual Property Organization, 2023). Consequently, it can be argued that, Ugandan SMEs innovate to improve their competiveness, without focus on commercializing and/or patenting the outcomes of their innovations (Jjagwe, Kirabira, Mukasa, & Okure, 2024b).

SMEs usually innovate in order to remain competitive (Dobrzański, Bobowski, Chrysostome, Velinov, & Strouhal, 2021; Okumu & Buyinza, 2020). Their innovations are rarely commercialized (Jjagwe, Kirabira, & Mukasa, 2024a; Jjagwe, Kirabira, Mukasa, & Amanya, 2024c). In essence, such innovations tend to focus on the customer needs. This explains why, in this study, the level of customer focused innovation was higher than the level of systems focused innovation. Customer focused innovation which entails incremental changes to the product and market processes, has been shown to improve market performance of SME firms (Zuhroh & Rini, 2024). In practice, customer focused as well as systems innovations are dynamic and may not be easy to commercialize. This is as opposed to pure product innovattions that can be commercialized and pattented (Jjagwe, Kirabira, & Mukasa, 2024a; Buwule & Mutula, 2017). This is opposed to innovations in developed countries where almost every new idea is patented and commercialized (Régnier, Frey, Pierre, Varghese, & Wild, 2022; Allard & Williams, 2020). Consuequently, it is imperative that SMEs are supported in commercializing their innovations. This would go along way in improving the innovation index of country.

5.2 Determinants of Agri-food SME innovation

Innovation in SMEs and specifically agri-food SMEs is becoming an important ingredient of the SME growth and sustainability (Devaux et al., 2018; Ndiaye et al., 2018; Ilie *et al*., 2022). Agri-food SME growth is critical to sustaining the agricultural value chains (Dagbelou *et al*., 2021; Ilie *et al*., 2022) that supports millions of smallholder farmers (World Bank, 2021). This study assessed the drivers of innovation of agri-food SMEs in Uganda. Findings shows much of agri-food SMEs innovations focuses on the customers, and did not vary by SMEs turnover level. Such findings point to the efforts that agri-food SMEs put in order to provide products that are required by consumers whose needs and demands are not static. A study by Kamarulzaman et al. (2021) presented high levels of correlation between SME's customer orientation and product-market innovation. These findings suggest that agri-food SMEs innovation seems to be linked to market forces that are highly dynamic (Park *et al*., 2019; Zahoor *et al*., 2021). Consequently, SMEs prioritized customer focused innovations in order to increase their competitiveness in a rapidly changing market environment. System focused innovation on the other hand involves changes around the organizations and processes.

This study also identified factors that drive this much-needed agri-food SME innovation. Whereas a study by Ali *et al*. (2021) reported that SME age did not influence the level of SME innovation for selected agri-food firms in India, in this study, SME age was a significant determinant of customer focused innovation. Specifically, newly created agri-food SMEs were found to be more innovative creating value for customers. Similar findings were reported by Prajogo & McDermott (2014) in a study on Australian service firms. In a bid to capture the market and be

competitive, and capture some market share, newly created SMEs, have come up with better ways of attracting customers from other already existing agri-food SMEs. This is so given that most agri-food products complement each other. It is thus possible that new SMEs dealing in similar products like for their competitors have to please "unsatisfied" consumers from the competitors in order to gain market entry (Zuhroh & Rini, 2024). As the SMEs become established with a known customer base, customer focused innovation reduces.

Findings from the current study also show the relationship between number of employee and innovation. It shows that there is a negative relationship between number of full-time employees and customer focused innovations but no significant relationship with systems focused innovation. In essence, agri-food SMEs that employ fewer staff have higher levels of customer focused innovation. A study by Ali *et al*. (2021) reported no significant influence of number of employee on innovation, while, a study by Finco *et al*. (2018) reported a positive influence of number of employees on innovation. Similarly, Prajogo & McDermott (2014) observed the influence of employee number in moderating factors influencing innovation. These findings suggests differences in employee productivity between firms with many employees and those with fewer employees. Employee productivity has been shown to have a positive effect on innovation (Preenen *et al*., 2017). These employee productivity is driven by employee motivation and reward (Gupta, 2020; Lasisi *et al*., 2020). Such rewards may be inform of incentives associated with meeting some sales target. Employee motivation and reward has been shown to enhance the level of creativity (Khan & Mohiya, 2020). In this study, SMEs that provided reward to employees for being creative had higher levels of customer focused innovation but lower levels of

systems focused innovation. This findings suggests that such rewards focuses in employee interactions with the clients. As such, these employees would come up with the best ways of handling the many clients.

In order to enhance SME innovation, business owners may undertake deliberate efforts to enhance the level of innovation in the business (Okumu & Buyinza, 2020). In this study, agri-food SMEs that had policies and principles to support innovation in place, were more innovative, than those who did not. These findings are not surprising given that the purpose of such policies it to foster innovation. According to Moravcíková *et al*. (2021), presence of existing internal regulations ranks highly in enhancing SME innovation. Similarly, SMEs owners who understand the value of innovation would take deliberate efforts and acquire intellectual property rights to help them improve business performance. Such intellectual property rights usually leads to better performance by improving efficiency and making such firms competitive (Davcik *et al*., 2021).

Internal research and development activities are an important pathway to innovation. Although, not all SMEs are involved in some product or process improvement research, findings from this study shows that those involved had higher levels of systems focused innovation. A similar finding was reported by Ali *et al*. (2021). There was however no significant influence of internal research on customer focused innovation. This finding suggests that, internal research, conducted by agri-food SMEs in Uganda usually targets improving operational efficiency or cost reduction, as opposed to improving customer experiences. Consequently, agri-food SMEs involved in internal research would also have higher levels of systems focused innovation. This study also finds no evidence of the influence of receiving external

research products on innovation. In essence, only less than 3% of the SMEs receive such external research output form government. Whereas government support is expected to positively influence SMEs performance (Alkahtani *et al*., 2020).

5.3 The relationship among Market orientation, innovation attitude and innovation

This study investigated the relationship among MO on innovation attitude and agri-food small and medium enterprises innovativeness in the Ugandan context. Results shows that innovation attitude drives firms' innovativeness. This was expected given that a positive attitude is a prerequisite for several firm undertakings including innovation and firm's innovativeness. Attitude plays a great role in influencing innovation (Trabucchi *et al*., 2020; Fort-Rioche & Ackermann, 2013). According to Dibrell *et al*. (2011), a positive attitude is required of agri-food owners and managers, if they are to undertake or accept innovation. Thus, inculcating a positive attitude of innovation for agri-food actors would also increase their innovativeness. This positive attitude would also require a good level of internal coordination. According to findings of this study, inter functional coordination which depicts coordination among the different departments of the firm was seen to positively influenced both attitude towards innovation and firm innovativeness. A study by Ho *et al*. (2018) reported similar findings. Their study findings presented a positive influence of interfunctional coordination of innovation in Vietnam's beef value chain. Interfunctional coordination depicts a firm's management capability. According to Tindiwensi et al. (2020) farm management has a positive relationship with MO.

Whereas inter functional coordination was important for both attitude and firm innovativeness, at sub-group level however, the influence of interfunctional coordination on firm innovativeness was only observed for Wakiso district, but not for the other districts, SMEs sizes and SMEs types. On the other hand, the influence of interfunctional coordination on innovation attitude was significant across all sub-groups except for transporters or exporters. This implies that the influence of interfunctional coordination may not be critical for certain categories of agri-food SMEs. The influence of interfunctional coordination on firm innovativeness can thus be said to be localized to certain conditions including the product (Lukas & Ferrell, 2000).

Results also show that in the pooled model, competitor orientation did not influence attitude but negatively influenced firm innovativeness. Ho *et al*. (2018) observed that although competitor orientation had a negative coefficient, it did not have a significant effect in firm innovativeness. Consequently, the influence of competitor orientation observed in this study could be attributed to homogeneity of agricultural products which makes it relatively hard to create a unique identity of the product without driving cost high. Consequently, agri-food SME owners who are sensitive to their competitors would be more comfortable dealing in low cost undifferentiated product, making them have low levels of innovativeness. In other words, they find it relatively easier to compete with non-innovative undifferentiated products.

At sub-group level however, competitor orientation positively influenced attitude. This is also related to why, at sub-group level, the influence of competitor orientation on innovativeness was only significant for wholesalers and for SMEs in Kampala only. Such findings imply variations in competitive pressures across different context

and locations, and thus differences in reactions of SME actors. For instance, agri-food wholesalers tend to have limited room for innovation since they do not face the final consumers directly so as to know what innovations to undertake.

This study also finds that customer orientation did not influence firm innovativeness. Instead, it positively influenced attitude towards innovation. Even at sub-group level, the influence of customer orientation on innovation was not observed. However, the influence of customer orientation on attitude varied in the sub-group analysis. The influence of customer orientation on attitude was significant for processors, micro and small agri-food businesses. This finding implies that customer orientation influence attitude positively but only for some categories of agri-food firms. Bamfo & Kraa (2019), observed an indirect influence of customers orientation and innovation, while Newman *et al.* (2016) and Ho *et al*. (2018) independently reported positive effects of customer orientation on firm innovativeness. The implication of this finding is that encouraging SMEs to have a better customer orientation would positively improve their attitude towards innovation. This positive attitude on innovation would later improve firm innovativeness. A firm's customer orientation depicts their level of trust with the respective upper chain actor. This trust, which has been shown to influence MSME performance (Odongo *et al*., 2016; Odongo *et al*., 2017; Owot *et al*., 2022; Owot *et al*., 2023), could have played a salient role in the relationship between customer orientation and innovation. Consequently, firms that have a positive customer orientation are more likely to trust the relationship and its ability to payback their investments in innovation activities.

5.4 The relatinship among entreprenual orientation on learning orienation, cost focus and innovation

This study assessed the relationship among EO, learning orientation, cost focus and innovation for a cross-section of agri-food small and medium enterprises in Uganda. Whereas EO has many dimensions, this study focused on proactiveness, entrepreneurial proclivity and risk taking which all play a vital role in fostering innovation among SMEs. Results showed the entrepreneurial proactiveness is important for improving learning orientation of agri-food firms. Proactiveness presupposes that entrepreneurs take charge of all aspects of the business and avoid being taken by surprise on key aspects of the business. Given the uncertainty involved in business, learning becomes important for entrepreneurs who are proactive . Continuous learning has been observed to be a pre-requisite for SME business performance (Wahyuni & Sara, 2020). This explains why, proactiveness positively influenced learning orientation. This finding implies that proactiveness is one of the dimensions of EO that is responsible for the observed influence of EO on learning orientation (Shaher & Ali, 2020; Huang & Wang, 2011).

Similarly, entrepreneurial firms that are usually proactive would also be cautious of their cost. This is because blindly being in charge trying to achieve business goals may instead push certain cost higher, making such firms uncompetitive. According to Forés (2019), proactiveness usually becomes costly to firms. In this study, results showed that proactiveness positively influenced cost focus. This implies that, in addition to the willingness to take up new opportunities as soon as they appear, agri-food firms also pay attention to the cost implications of such opportunities. Agri-food

firms also need to understand the timeliness of their proactiveness so at to fully benefit from it (Srinivasan *et al.,* 2005; Poll *et al*., 2018).

Results also suggest that firms that are proactive are also most likely innovative. Only firms willing to take up new opportunities would also be willing to make changes to several aspects of their operations including both product and market innovations. Generally, entrepreneurial orientation is expected to influence firm innovation and innovative performance (Pérez-Luño *et al*., 2011; Huang & Wang, 2011; Song *et al*., 2019; Jalilvand *et al*., 2019). However, the specific influences of each of the dimensions of EO may vary by sector and firm. For instance, a study by Khalili & Fazel (2013), observed that proactiveness did not have significant influnece for petrochemical firms in Iran. However, (Al Mamun & Fazal, 2018) reported that proactiveness significantly influence performance and innovation of micro enterprises in Malaysia. Proactiveness seems to be more visible to relatively small firms such as those in this study. This is because proactiveness is highly linked to personal initiatives (Hahn *et al*., 2012).

Entrepreneurial proclivity which is a firm's willingness to undertake entrepreneurial activities and processes (Zhou, 2007), influences a firm's ability and capacity to learn new strategies and approaches to doing business. Consequently, in this study, results suggest that entrepreneurial proclivity is important for agri-food firm's learning orientation. Previous studies also observed similar results (Huang & Wang, 2011; Soares & Perin, 2020). Additionally, entrepreneurial proclivity may involve regular investments into processes that improve the performance of firm. Such investments have cost implications. It is thus imperative that agri-food firms that practice entrepreneurial proclivity also focus on cost. Failure to do so may make the

entrepreneurial efforts counterproductive. This finding suggests even when firms are adopting entrepreneurial strategies, they need to be careful that their approaches do not make them counterproductive by increasing their cost and thus reducing their profitability.

Whereas risk taking is crucial to agribusiness, this study finds no significant influence of risk taking on learning orientation, cost focus, and innovation. Similar results were reported by (Akbar *et al*., 2020). This is attributed to the fact that firms included in this study were dealing in agri-value chain activities beyond primary production. In the agribusiness, risk is usually more pronounced in primary production, but less encountered at levels above primary production. According to (Imbiri *et al*., 2021), risk in agricultural supply chain are varied with each having a different impact and requiring a different approach to its management.

Results also show that, the observed relationship among EO, learning orientation, cost focus and innovation depends on the size of SME, education level of the owner and manager, type of SME and gender of the SME owner. These findings corroborate those of earlier studies. For instance, Etriya, Scholten, Wubben, Kemp, & Omta, (2018), reported that firm age and firm size moderated the relationship between EO and innovation. Similarly, Arzubiaga *et al*. (2018) reported that gender diversity and family involvement among board members moderated the relationship between enterpreneurial and firm performance. These findings suggest that, whereas the relationship among entreprenuerial orientation, learning orientaion, cost focus and innovation exist, it is usually context specific. This context, has to be taken into consideration while formulating policies aimed at improving agri-food SME innovation.

5.5 Intervening roles of atttitude towards innovation, learnig orientation and cost focus

Mediation results showed that the observed indirect effect of inter functional coordination and customer focus on firm's innovativeness was 83% and 84%, of the observed total effects, respectively. These findings suggest that, attitude towards innovation plays a critical role in the relationship between the two constructs of market orientation and firm's innovativeness. In essence, attitude towards innovations influences the both customer orientation and inter functional coordination, thereby creating an overall positive effect in firm's innovativeness. These findings are in line with previous studies (Tortosa Edo, Llorens-Monzonís, Moliner-Tena, & Sánchez-García, 2015; Aldas-Manzano, Küster, & Vila, 2005; Yaqub, Yaqub, Alsabban, Baig, & Bajaba, 2024; Jiménez-Jimenez, Sanz Valle, & Hernandez-Espallardo, 2008).

In the case of entrepreneurial orientation, the mediator variables had a significant counter effect to the influence of entrepreneurial orientation on innovation. In essence, the positive direct effect of proactiveness and proclivity on innovation were countered by the negative indirect effects, as a result of the mediating role of cost focus and learning orientation. Similarly, the negative direct effect of risk taking on innovation were countered by the positive indirect effects, attributed to the mediating roles of cost focus and learning orientation. These findings suggest that, both cost focus and learning orientation, are critical in the influencing the relationship between entrepreneurial orientation and innovation. In essence, SMEs with higher cost focus or learning orientation would have a reduced total effect. This suggest why the total effects for proclivity and risk taking were not significant, even though, the direct and indirect effects were all significant.

The mediation results suggest that the role of mediators needs to be considered while understanding the relationship between MO, EO and innovation. In practice, SMEs that develop a positive attitude towards innovation are likely to have a greater effect of inter functional coordination and customer orientation on firms' innovativeness. These mediators are seen as missing link in the relationships. For instance, Nasution, Mavondo, Matanda, & Ndubisi, (2011) reported that learning orientation was an antecedent for the enterprenuerial-innovation relationship. Similarly, Putra, Wahyuni, Yasa, & Giantari, (2020) reported a positive indirect role of learning orientation on influence of market orientation on innovation performance.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

This is the last chapter of this work and presents conclusions and recommendations arising from the study. The recommendations are separated into general recommendations and recommendations for further studies.

6.1 Conclusions

This study had four objectives, viz: (1) assess the level of Agri-food SME innovation in central and eastern Uganda, (2) analyze the factors that influence the level of agri-food SME innovation in central and eastern Uganda**,** (3) assess the association among SME market orientation, attitude towards innovation, and firm innovativeness, and (4) determine the influence of agri-food SME entrepreneurial orientation on learning orientation, cost focus and innovation.

Study results demostrates that customer focused innovation is higher compared to system focused innovation, SMEs prioritized customer focused innovations in order to increase their competitiveness in a rapidly changing market environment.

Results also show that, the presence of internal policies and principles supporting innovation, increased annual expenditure towards innovation activities and reward of creative employees in a given SME firm can signifianty increase on the level of SME innovation.

It is further concluded that, while interfunctional coordination, innovation attitude and market orientation have positive effects on firm innovativeness, their influence are

localised. For instance, whereas the influence of interfunctional coordination on both attitude and firm innovativeness was observed in the pooled model, it was not observed for certain groups in the sub-group analysis disaggregated by business location, business size and type of SME firm. These lack of observation at sub-group level analyses are worth noting since it helps to avoid a one-size-fits all approach. Consequently, it is important that efforts to foster firm level innovation among agri-food SMEs takes into consideration the wide diversity of agri-food businesses.

Lastly, from the fourth objective, findings conclude that all dimensions of entrepreneurial orientation are important for learning orientation, cost and overall agri-food SME innovation. Particularily, entrepreneural proactivenes plays a positive and significant effect on learning orientation, cost focus and innovation. These relationships however, is moderated by a number of factors including SME size, gender, education level of owner and manager and the type of agri-food SME.

This study therefore provides valuable insights into the factors that can be harnessed to increase level of innovation of agri-food SMEs in Uganda.

6.2 Recommendations

6.2.1 Recommendations for Policy and Practice

Basing on the results and conclusions, the study suggests ways of improving overall agri-food SME innovation and performance.

Agri-food SMEs should be encouraged to embrace innovation by deliberately developing customised policies and guidelines that stimulates innovations.

Development practitioners and government have to provide technical support to the SMEs in the development of these policies.

In order to encourage innovation among staff and employees, agri-food firms need to develop an internal system that reward innovative and creative workers. This would encourage self drive for innovation within the firm.

Results have shown that internal coordination among departments increases the firms innovativeness. It is therefore important that SMEs should encourage meaningful interactions within and among the firms departments. This would in turn foster innovation which will ultimately lead to growth of the SMEs.

These findings indicate that, the relationship among entrepreneurial orientation, learning orientation, cost focus and innovation is usually context specific. This context, has to be taken into consideration while formulating policies aimed at improving agri-food SME innovation.

In the face of changing markets and competitions, agri-food SMEs also need to be proactive in their operations. This proactiveness would in turn harness organizational learning and foster overall innovation in the firm.

6.2.2 Recommendation to the practitioners

i) The research institutions, Universities and all players involved in knowledge generation should conduct practical research programmes, anchored on local needs of the industry and agrifood SME businesses across the whole value chain. This would create a conducive knowledge hub that stimulates innovation performance.

ii) Based on the findings of this study, it is recommended that Government of Uganda should consolidate the scattered existing legal frameworks (National Science and Innovation Policy, the National SME Policy, National Intellectual Property Policy and the Copy Right Law) into a national blue print that drives innovation in the country.

iii) Additionally, there is need for the relevant Ministries, Department and Agencies (MDAs) and all partners to roll out customised training templates for SMEs, to develop internal innovation policies and reward systems that can reinforce creativity of employees.

iv) Governments needs to strengthen the innovation regulatory activities, including intellectual property rights protection and innovation support services like research grants.

6.2.3 Recommendations for further studies

This study assessed innovation and its determinants in the agri-food SMEs of Uganda. The study focused on the agricultural value chain and has provided insightful findings in the context of Uganda agri-food SMEs. The study however did not focus on specific commodity chain in the agricultural sector. Whereas this was the design of the study, findings showed that there were variations in the relationship between innovation and its drivers. Consequently, with the numerous agricultural commodities available in the country, it is anticipated that there may also be commodity specific drivers of innovation in the agri-food value chain. It is therefore imperative that this study be replicated with commodity specific approah, with the view of comparing innovation across the different commodity chains. This would provide further insights into whether, the drivers of agri-food sector innovations are also commodity specific.

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APPENDICES

Appendix 1: Research Questionnaire

KENYATTA UNIVERSITY

SCHOOL OF AGRICULTURE AND ENTERPRISE DEVELOPMENT

DEPARTMENT OF AGRICULTURAL ECONOMICS

Small and Medium Enterprise Innovations: Precursors in the Agri-Food Value Chain in Central and Eastern Uganda

Introduction

I am……. We are conducting a study titled "**Small and Medium Enterprise Innovations: Precursors in the Agri-Food Value Chain in Central and Eastern Uganda.** As an SME manager/owner, you have been selected to participate in this study. We kindly request you to show due diligence in responding to the questions in this questionnaire. We promise that the information you will provide will be treated with utmost confidentiality and that the information given will only be used for purposes of this study. In case you need further clarification or more information pertaining to the study, please kindly contact the lead researcher Mr. **Ajer Basil** on Tel No. **+256 772 687774** or on email: ajerbasil@gmail.com. Participating in this study will take about 20 – 30 minutes to complete.

Thank you for your time:

SME Identification

Questionnaire ID: …… Name of Respondent ……..……

Village:……. Parish: ……..

Sub County/division:……District/City: ……..

Section A: Backrground Information

Qn.	Question	Options	Response
1	Sexof the respondent	1 = Male 2 = Female	
2	Position of Respondent in Business	1=Owner 2=Manager 3=Others (specify)	
3	Age of respondent (years)		
4	Level of education of SME owner	1=None 2=Primary 3=O - level 4=A - level 5=Certicate 6=Diploma 7= Undergraduate Degree 8=Post-graduate Diploma 9=Masters 10=PhD 11=Others (specify)	
5	Level of education of SME manager (if different from manager)	1=None 2=Primary 3=O - level 4=A - level 5=Certicate 6=Diploma 7= Undergraduate Degree 8=Post-graduate Diploma 9=Masters 10=PhD 11=Others (specify)	
6	How long has the SME been in operation (years)		
7	Number of full time employees (persons)	_____males _____female	
8	Average number of part-time employees (persons)	_____males _____female	
9	Annual sales average turn over (Ushs)	1 Below 10 million 2 10 - 100 million 3 101 - 360 million 4 Above 360 million	
10	About how much of the company revenue do you spend on innovation? (Ushs)		
11	Type of SME	1=Agri-food retail 2=Agri-food Wholesale 3=Agri-food processor 4=Agri-food transporter 5=Agri-food exporter 6=Agri-food primary producer 7=Others (specify)	
12	Have you ever received any government support for innovation	1=Yes 2=No	

<table>
<tr><th>Qn.</th><th>Question</th><th>Options</th><th>Response</th></tr>
<tr><td>13</td><td>If yes, please indicate the type of support you received? (list them)</td><td></td><td></td></tr>
<tr><td>14</td><td>If no, why didn’t you received any support</td><td>1=Not aware
2=Not interested
3=Others (specify)</td><td></td></tr>
<tr><td>15</td><td>Are there rules and regulations that govern innovation in your business</td><td>1=Yes
2=No</td><td></td></tr>
<tr><td>16</td><td>If yes, which rules and regulations? (list them)</td><td></td><td></td></tr>
<tr><td>17</td><td>Do you have access to any other form of business support from Government or any institution?</td><td>1=Yes
2=No</td><td></td></tr>
<tr><td>18</td><td>If yes, which support? (list them)</td><td></td><td></td></tr>
<tr><td>19</td><td>In your view, what type of support do SMEs need to stimulate innovations?</td><td></td><td></td></tr>
<tr><td>20</td><td>Have you acquired any intellectual properties rights for your business? If yes which ones</td><td>1=Yes
2=No
<table><tr><th>IP</th><th>Tick</th></tr><tr><td>Copyright</td><td></td></tr><tr><td>Trademarks</td><td></td></tr><tr><td>Patents</td><td></td></tr><tr><td>Utility models</td><td></td></tr><tr><td>Industrial designs</td><td></td></tr><tr><td>Others Specify</td><td></td></tr></table></td><td></td></tr>
<tr><td>21</td><td>List the key challenges constraining innovations in your business</td><td></td><td></td></tr>
<tr><td>22</td><td>Are you attached or ever received support from an incubation facility?

If yes, what support</td><td>1=Yes
2=No</td><td></td></tr>
<tr><td>23</td><td>Have you ever benefited from an innovation fund?

If yes how much and from who</td><td>1=Yes
2=No</td><td></td></tr>
<tr><td>24</td><td>Did you ever receive any skills trainings in regard to improving your products, service or business processes</td><td>1=Yes
2=No</td><td></td></tr>
</table>

Qn.	Question	Options	Response
25	Is your business involved in any research to improve on products / processes?	1=Yes 2=No	
26	Have you benefited from any research output from government/ a university or any research institute?	1=Yes 2=No	

Section B: SME Market Orientation

Carefully read and understand the following statement. You are required to indicate your extent of agreement with the statements on a scale of 1 – 6, where 1== unlikely; and & 6=most likely

S/N	Statement (Do not skip any statement)	1	2	3	4	5	6
Customer Orientation							
1	In our business, we explore additional customer needs even when they are not aware of them						
2	We anticipate customers needs and suggest new ways of addressing it						
3	In our business, we attempt to change the ways we conduct our current business operations to meet customer needs even if we recognize a possibility of risk						
4	We think about the benefits that our customers will receive by consuming our products/services						
5	We try to recognize the needs of our customers early enough before the majority of market may notice them						
6	We are in close contact with lead customers in order to address their specific needs						
Competitor orientation							
1	In our firm, we share information concerning activities of other firms' that we compete with						
2	In our firm, we are slow to respond to the actions of our competitors that threaten our business survival*						
3	In our firm, we regularly discuss the strength and weakness of other firms' that we compete with						
4	In our firm, we only target customers where we have an upper hand in out competing our business rivals*						
5	Our employees collect information concerning activities of other firms						
6	We diagnose the goals of other firms						
7	In our firm, we rarely keep track of the performance of our key business rivals*						
8	In our firm, we recorgnize success areas of our key competitors						
9	We spot the failures of our key competitors						
10	We assess the strengths and weaknesses of key businesses that compete with our business						
Interfunctional Coordination							
1	We continually visit our current customers.						
2	We frequently follow-up our prospective customers						
3	We voluntarily share our successful and unsuccessful customer experiences with our partners.						

S/N	Statement (Do not skip any statement)	1	2	3	4	5	6
4	All departments in our business are integrated in serving the needs of our target customers						
5	Employee and everyone in our firm understands how all of use can contribute to creating superior customer value.						
6	We seldom share resources with other players in our marketing channel						
Long term focus							
1	In our firm, regular profits are the primary objective of the business						
2	In our firm, we usually focus on obtaining rapid payback from our activities						
3	We focus on attaining a positive margin in the long term for our firm						
Profitability focus							
1	In our firm, we consider profit performance measured by market indicators						
2	I, as the owner and manager of this firm always emphasize market performance						
3	All our products and services that we deal in must be profitable						

Section C: SME Enterprenuerial orientation

*For the following statements, Please use a **rating of 1 to 6 points; where 1 =unlikely and 6 = most likely**; to show how the statements apply to you*

S/N	Statement (Do not skip any statement)	1	2	3	4	5	6
Proactiveness							
1	In our business operations, we anticipate future challenges, needs and changes						
2	In this firm, we have tendency of planning ahead on projects						
3	In this firm, we have a preferrence for "steping-up" to get things going as opposed to sitting and waiting for someone else to do it						
4	In dealing with other people or firms, we typically responds to actions first initiated by those other people						
5	In dealing with other people or firms, we routinely initiate actions first and wait for the other people or fimrs to respond						
6	In this business, we are rarely the first to begin using a new products or services						
Entrepreneurial proclivity							
1	In our business, we have strong preference for using tested and tried products or services for our business operations						
2	In our firm, improvements in product or service lines have usually been minor						
3	We typically responds to actions which competitors initiate						
4	In our business, we generally avoid conflicts with competitors, preferring a 'live-and-let-live' attitude						

S/N	Statement (Do not skip any statement)	1	2	3	4	5	6
5	In our firm, we have preference for low-risk investment projects which have normal and certain rates of return						
6	Owing to the nature of our business environment, we think it is best to explore our options cautiously						
7	We typically adopt a careful wait and see attitude in order to reduce the chances of making costly decision						
8	When it comes to solving problems in our business, we have strong preference for new and creative remedies more than the remedies of conventional wisdom.						
9	In our firm, we prefer implementing our plans only when we are sure they will work						
10	We appreciate risk-reducing procedures and operations much more highly than innovative profit-seeking precedures and operations.						
11	In our firm, we prefer to "play it safe"						
12	In our firm, we tend to dialogue more regarding opportunities rather than challenges						
13	We have a conviction that market change generates a positive opportunity for our business.						
14	In our firm, we encourage everyone to come up with innovative marketing approaches, knowing well that some will fail.						
Learning capacity							
1	Our potential to learn hastily than our competitors is thevital to our competitive advantage						
2	Learning as a key to continous improvement is one the basic values of our firm						
3	In our firm, we take learning as an investment, not an expense						
4	In our firm, learning is considered as a key ingredient required to guarantee survival in this line of business						
5	We are not frightened about challenging our assumptions on our customers						
6	Everyone in our firm are all in full agreement with the organizational vision						
7	Everyone working in our firm are committed to the contribute to achieving goals of this firm						
8	Employees of this firm look at themselves as partners in mapping the directions of the firm						
9	We sheldom examine our own biases of our interpretation of customer information*						
10	All employees in our firm are fully aware that their perception of the marketplace must be examined and adapted constinously.						
11	We do not share the same goals with other firms in our marketing channel.						
Cost focus							
1	In our firm, achieving a high operating efficiency is a top priority						
2	In our firm, we have a supreme responsibility for reducing cost on our firm.						

S/N	Statement (Do not skip any statement)	1	2	3	4	5	6
3	We do not look to improve our firm operations in order to lower our costs						
4	In our firm, we take achivement ofeconomies of scale or scope as an important element of our firm's strategy						
5	We closely pay attention to the effectiveness of key processes and business operations						
Innovativeness							
1	Innovation based in research targeting the technical components of our operations is readily accepted on our firm						
2	We rarely seek innovative ideas to be incorporated in our business operations						
3	In our firm, innovation is voluntarity welcomed in our business operations						
4	Employees in our firm are punished for bringing new ideas that fail to work						
5	In our firm, our perception of innovation is that its is too risky and is resisted						
6	In our firm, we make deliberate efforts to improve our products and services						
Innovation attitude							
1	Adopting innovations is a useful decisions						
2	In this firm, we value employees that innovate						
3	Those who are important to me, think we should innovate in this firm						
4	Those who are important to our firm think we should innovate						
4	We aremotivated to innovate						
5	Innovations improve the results of our firm						
6	Innovation is worth the effort						
Risk Taking							
1	In our firm, we usually take bold actions by trying the unknown						
2	In general, in our firm, we do not like to take on high-risk projects						
3	In our firm, we are willing to invest more money on something that might yield high returns						
4	In this firm, we have a willingness to invest a great deal of time on something that might yield high returns						
5	We are not frightened by situations where risk is involved						
6	In times of uncertainty, we adopt a brave, aggressive stance so as to maximize the chances of exploiting potential opportunities						
7	In times of uncertainty, we adopt a cautious, "wait-and-see" stance in order to minimize the chances of making wrong decisions						

Section D: SME Innovation

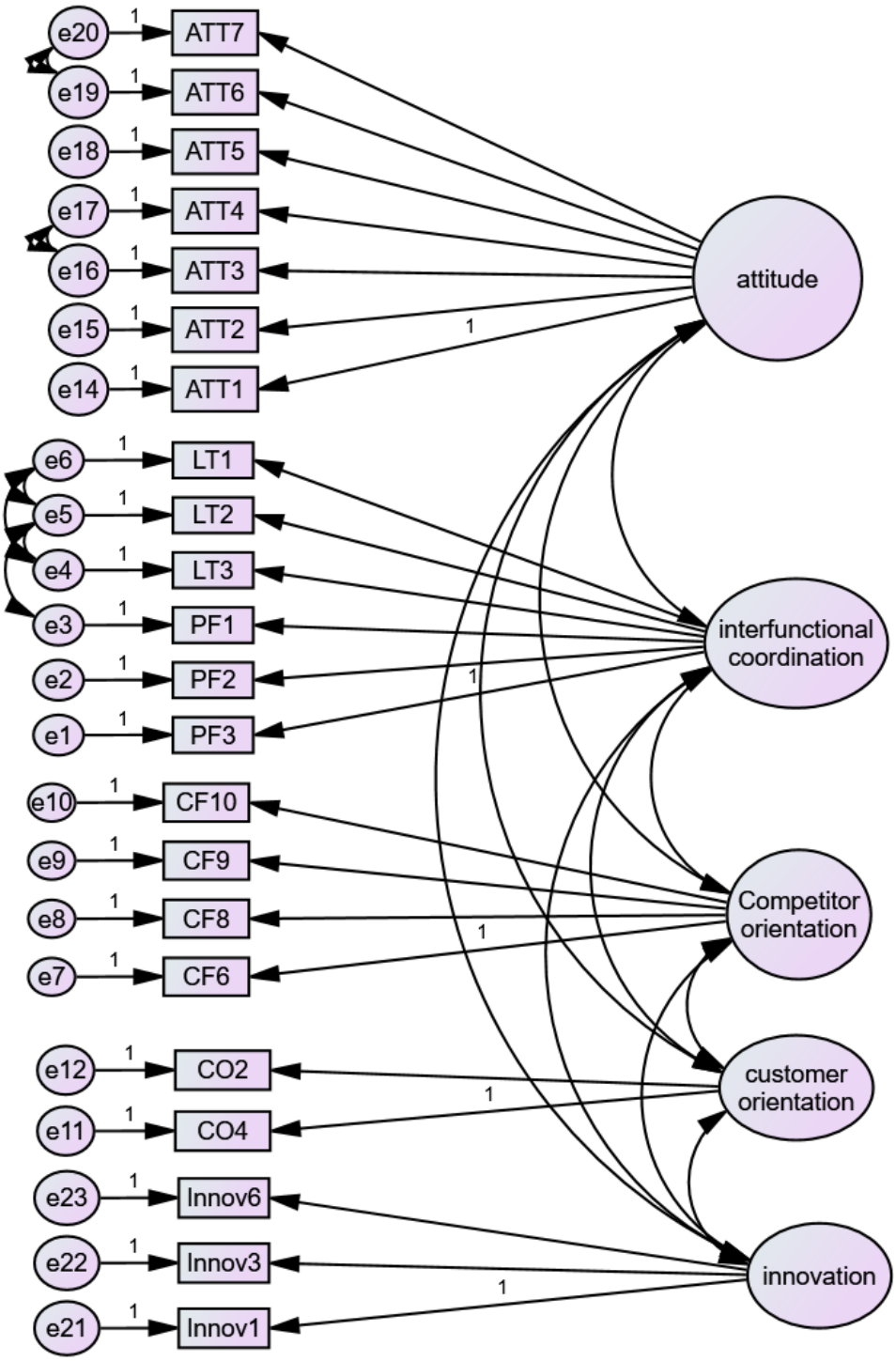
*For the following statements, Please use a **rating of 1 to 6 points; where 1 = Unlikely and 6 = Most likely**; to show how likely the statements apply to you*

S/N	Statement (Do not skip any statement)	1	2	3	4	5	6
Customer focused innovation (product and market)							
1	We develop new ideas of improving our products/services						
2	We implement new techniques in production and processing of our products/services						
3	In our firm, we aim to create value for the consumer						
4	We usually change our products/services with respect to changing conditions						
5	In my farm, we have adopted ongoing collaborations with other farmers as a way of improving my product competitiveness						
6	We continually provide different products to the market as						
7	Our pricing strategies are innovative in that it makes us the most competitive in the market						
8	In marketing our products/services we create awareness of the availability of our products using innovative promotion approaches						
9	Our products/services are usually sold at market place that is most competitive						
System focused innovation (Process and organizational)							
1	We adopt new techniques in our operations						
2	We create new processes in our operations in order to improve efficiency						
3	We acquire new equipment for use in our firm						
4	Our processes are changed according to changing conditions						
5	In our firm, there is a clear innovative power structure between everyone involved that allows for proper function of all farm activities						
6	The management structure in our firm is the most innovative of all firms I know						
7	We have standard procedure when it comes sourcing for raw materials for our firm						
8	There is a standard procedure when it comes to identifying customers of our firm						

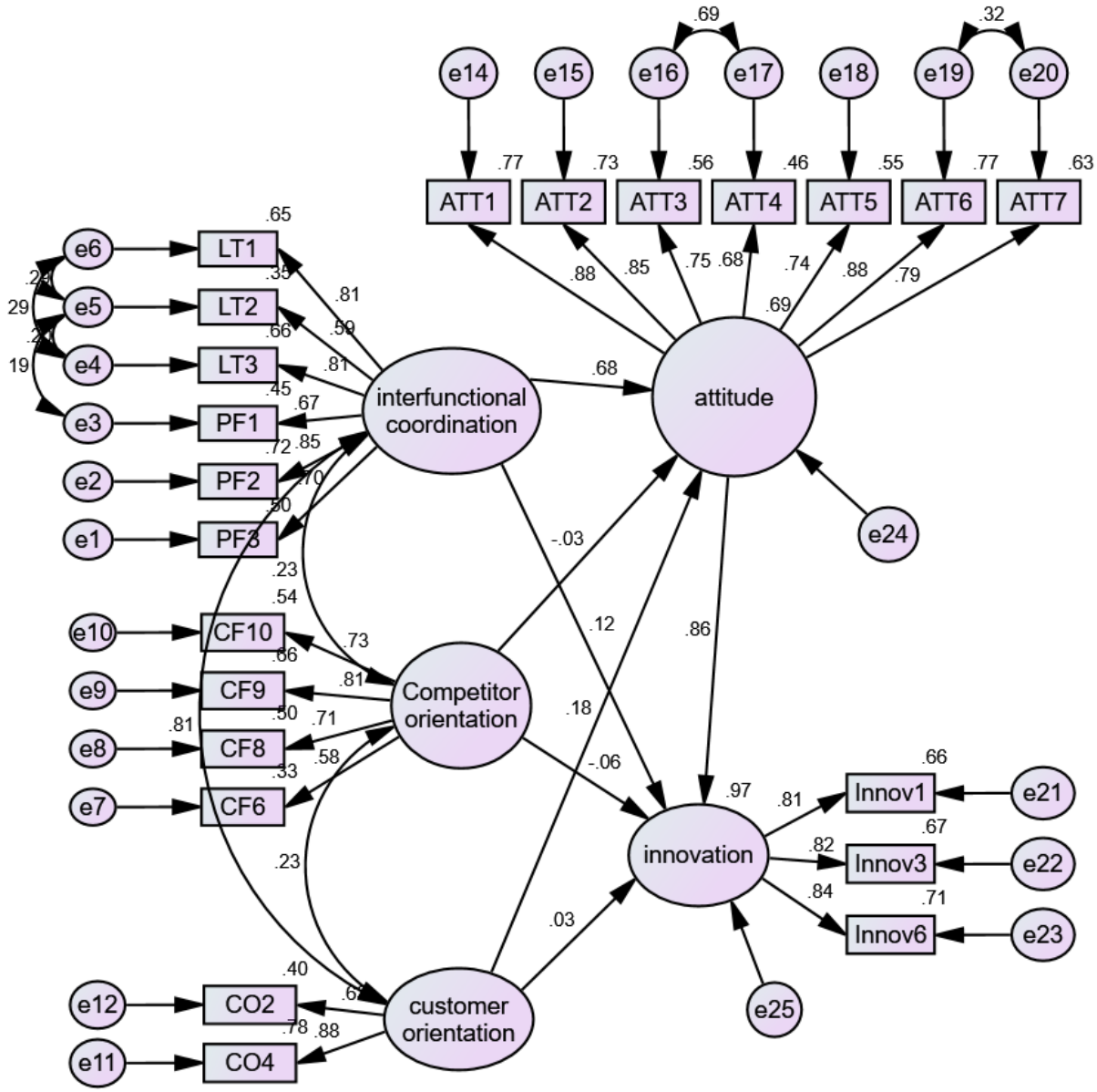
Thank you for your response

Appendix 2: Measurement Model and Structure model for assessing the relationship among MO, innovation attitude and firm's innovativeness

Appendix 2.1: Measurement Model for assessing the relationship among MO, innovation attitude and firm's innovativeness

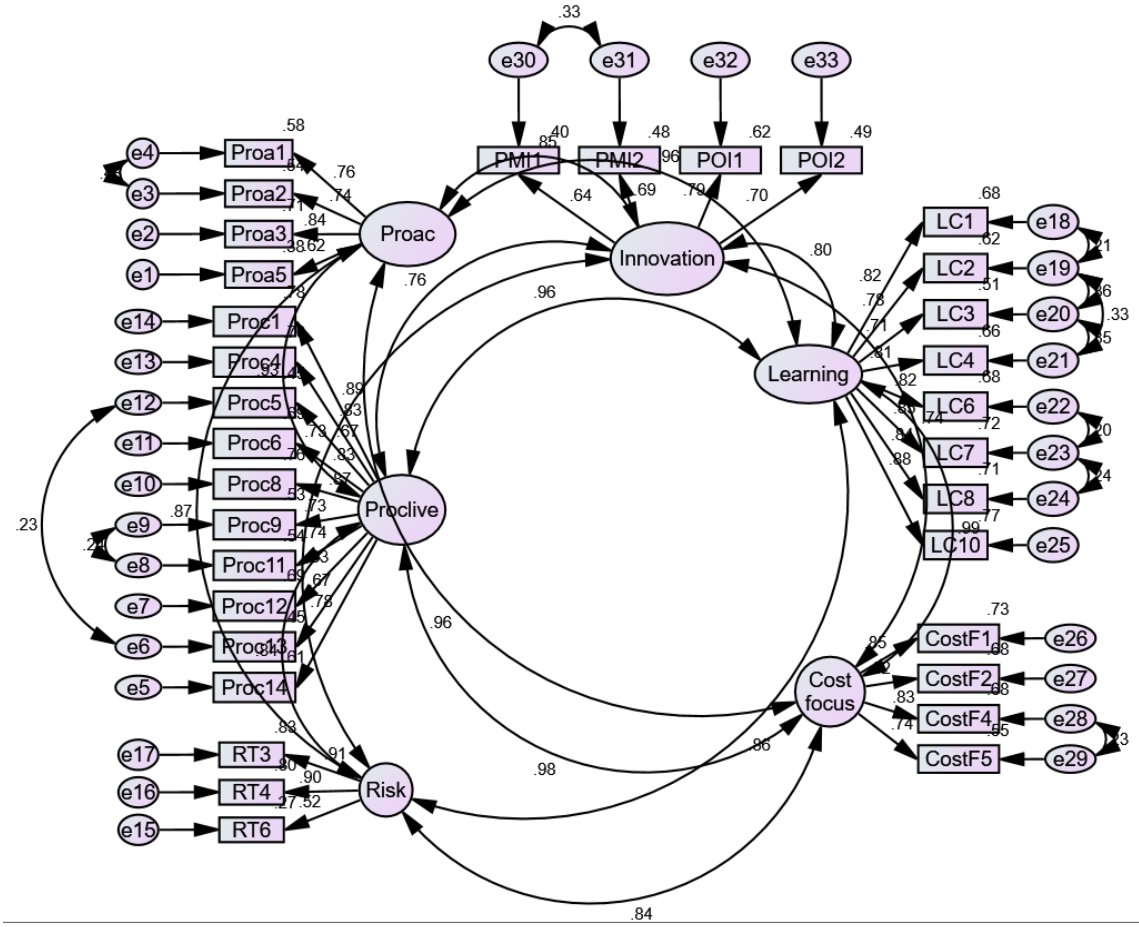


Appendix 2.2: Structural model for assessing the relationship among MO, innovation attitude and firm's innovativeness

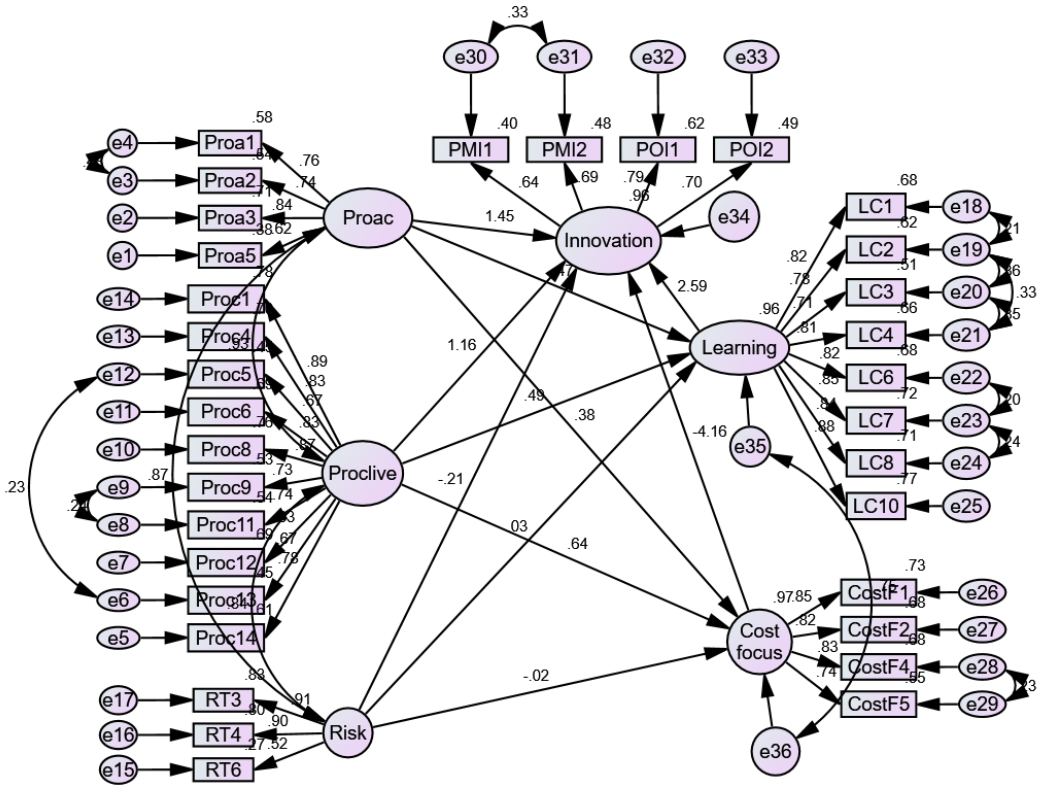


Appendix 3: Measurement and Structural Model for assessing the relationship among EO, learning orientation, cost focus and overall innovation

Appendix 3.1: Measurement Model for assessing the relationship among EO, learning orientation, cost focus and overall innovation



Appendix 3.2: Structural Model for assessing the relationship among EO, learning orientation, cost focus and overall innovation



Appendix 4: Respondents Consent Form

Study Title: Small and Medium Enterprise Innovations: Precursors in the Agri-Food Value Chain in Central and Eastern Uganda

List of Investigators

Name	Institution	Role	Contact
Ajer Basil	Kenyatta University	Principal Investigator	0772687774 0702687774

Description of the Study: This study will investigate the precursors to innovation of agri-food SME in Uganda. The study seeks to characterize agri-food value chain SMEs by their level of innovation and determine the factors that influence the level of innovation among SMEs in the agri-food value chain. A cross-sectional research survey design shall be adopted, the study is expected to provide evidence for design and development of strategies that maybe utilized to enhance agri-food value chain SME performance in any developing country.

Purpose of the Study: The study will investigate the drivers to innovation among the Small and Medium Enterprises in Uganda's agri-food value chain.

Confidentiality; Data collected will be treated with utmost confidentiality and the information given will only be used for purposes of this study. Information will be stored on a hard/google drive which are secure and only the researcher has access. Hard copies will be kept in a safe until after graduation and then destroyed. Participants do not need to write their names on the questionnaires. I am committed to carrying out the research according to Kenyatta University Code of Research Conduct and Research Ethics and the ethical guidelines provided by the National Council of Science and Technology (UNCST) in Uganda.

Risks and Benefits:

a) **Risks:** The study is of minimal risk.
b) **Benefits:** There is no direct tangible benefits at the moment but the views, opinions and information you provide shall be very important. Research findings shall also be shared you if interested.

Duration of Interview: The interview shall last one-hour maximum
Reimbursement: You will not be compensated for your time.
Voluntary Participation; Your participation is entirely voluntary. I will not ask any question without your formal consent. If you decide to take part, then you will be given this information sheet to keep and asked to sign a form giving your permission to take part.

Voluntary withdrawal; You are at liberty not to respond to some questions or withdraw completely at any point of the interview when uncomfortable.

Dissemination of findings; The results of study will be used to write my final research paper to complete my PhD studies. The findings may also be published in the journals and conference proceedings.

Ethical Approval

The study has sought ethical approval from the Infectious Diseases Institute Research Ethical Committee.

Questions

If you ever have any questions about this study, you should contact; Basil Ajer, on email ajerbasil@gmail.com; Tel +256772687774. If you have questions about your rights as a research participant, you should contact the Chairperson, IDI-REC, Dr. David Patrick Kateete: emailrec@idi.co.ug, telephone-0393193144.

Statement of Consent and Signature

..... has described to me what is going to be done, the risks, the benefits involved and my rights regarding this study. I understand that my decision to participate in this study will not alter my position at my organization. In the use of this information, my identity will be concealed. I am aware that I may withdraw at any time. I understand that by signing this form, I do not waive any of my legal rights but merely indicate that I have been informed about the research study in which I am voluntarily agreeing to participate. A copy of this form will be provided to me.

Participant's Name
Participants' signature/thumbprint: _____
Date: (DD/MM/YY):

Name of witness
Witness's signature/thumbprint: _____
Date: (DD/MM/YY):

Person obtaining consent
Name:
Signature: _____
Date: (DD/MM/YY):

Appendix 5: List of Publications emanating from the thesis

I. Ajer, B., Ngare, L. and Macharia, I. (2023), "Drivers of innovation in the agro-food micro, small and medium enterprises of Uganda", *Journal of Agribusiness in Developing and Emerging Economies*, Vol. 14 No. 5, pp. 979-996. https://doi.org/10.1108/JADEE-09-2022-0206

II. Ajer, B., Ngare, L. and Macharia, I. (2023), "The influence of market orientation on innovation attitude and firm innovativeness: a case of agri-food MSMEs in Uganda", *Journal of Agribusiness in Developing and Emerging Economies*, Vol. 14 No. 5, pp. 1218-1232. https://doi.org/10.1108/JADEE-11-2022-0250

III. Ajer, B., Ngare, L. and Macharia, I. 2022. Entrepreneurial orientation, learning orientation, cost focus and innovation in agri-food SME of Uganda. *African Journal of Rural Development* 7 (1): 68-88. https://afjrdev.org/index.php/jos/article/view/366

Appendix 6: Full Estimation Results for the Hierarchical Regression model

Customer focused innovation

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	5.569	.447		12.450	.000		
	Log_age	-.109	.128	-.043	-.853	.394	.682	1.466
	Male	-.112	.049	-.098	-2.293	**.022**	.956	1.046
	Owner	-.089	.055	-.079	-1.618	.106	.733	1.364
	Educ_owner2	.250	.050	.218	4.951	**.000**	.905	1.105
	Mukono	.214	.077	.129	2.797	**.005**	.822	1.217
	Wakiso	.134	.056	.114	2.383	**.018**	.766	1.305
	Jinja	.046	.077	.028	.594	.553	.792	1.262
2	(Constant)	5.060	.477		10.619	.000		
	Log_age	.083	.138	.033	.602	.547	.549	1.821
	Male	-.074	.048	-.065	-1.540	.124	.921	1.085
	Owner	-.124	.057	-.110	-2.155	**.032**	.635	1.575
	Educ_owner2	.243	.050	.212	4.852	**.000**	.860	1.163
	Mukono	.212	.076	.128	2.809	**.005**	.790	1.265
	Wakiso	.036	.057	.031	.632	.527	.694	1.441
	Jinja	.044	.080	.027	.556	.579	.696	1.437
	Log_SMEage	-.067	.040	-.081	-1.672	.095	.704	1.420
	Log_fulltime	-.084	.038	-.121	-2.188	.029	.539	1.854
	Log_inno_exp	.020	.004	.224	5.091	.000	.849	1.178
	Micro	-.059	.102	-.041	-.583	.560	.338	2.960
	Small	-.073	.078	-.061	-.931	.352	.390	2.567
3	(Constant)	4.467	.429		10.421	.000		
	Log_age	.147	.124	.058	1.188	.235	.539	1.855
	Male	-.074	.043	-.065	-1.721	.086	.908	1.101
	Owner	-.051	.052	-.046	-.988	.324	.602	1.661
	Educ_owner2	.110	.046	.096	2.379	.018	.792	1.263
	Mukono	.151	.068	.091	2.213	.027	.754	1.326
	Wakiso	.078	.052	.067	1.496	.135	.645	1.550
	Jinja	.005	.078	.003	.064	.949	.574	1.742
	Log_SMEage	-.089	.036	-.108	-2.481	.013	.683	1.464
	Log_fulltime	-.070	.035	-.101	-2.025	.043	.514	1.946
	Log_inno_exp	.020	.004	.230	5.508	.000	.741	1.349
	Micro	.121	.094	.083	1.287	.199	.313	3.193
	Small	.010	.071	.009	.147	.883	.366	2.731
	Innov_policy2	.259	.052	.221	5.017	.000	.662	1.512
	Acquire_IP2	.147	.060	.110	2.439	.015	.639	1.566
	Skill_train	-.009	.073	-.005	-.126	.900	.704	1.421
	Innov_research2	.045	.077	.029	.591	.555	.536	1.866
	Research_output	-.112	.131	-.033	-.850	.396	.841	1.189
	Reward_creative2	.372	.046	.331	8.166	.000	.783	1.277
a. Dependent Variable: Innovmean1								

Systems focused innovation

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	5.665	.637		8.897	.000		
	Log_age	-.242	.183	-.066	-1.328	.185	.682	1.466
	Male	-.146	.070	-.088	-2.101	.036	.956	1.046
	Owner	-.211	.078	-.128	-2.692	.007	.733	1.364
	Educ_owner2	-.103	.072	-.061	-1.431	.153	.905	1.105
	Mukono	-.158	.109	-.065	-1.449	.148	.822	1.217
	Wakiso	.407	.080	.238	5.100	.000	.766	1.305
	Jinja	.618	.110	.258	5.634	.000	.792	1.262
2	(Constant)	4.672	.621		7.525	.000		
	Log_age	-.093	.180	-.025	-.517	.606	.549	1.821
	Male	-.055	.063	-.033	-.877	.381	.921	1.085
	Owner	-.168	.075	-.102	-2.251	.025	.635	1.575
	Educ_owner2	-.148	.065	-.088	-2.269	.024	.860	1.163
	Mukono	-.094	.099	-.039	-.951	.342	.790	1.265
	Wakiso	.198	.074	.116	2.665	.008	.694	1.441
	Jinja	.732	.104	.306	7.058	.000	.696	1.437
	Log_SMEage	-.046	.052	-.038	-.880	.379	.704	1.420
	Log_fulltime	-.020	.050	-.020	-.409	.683	.539	1.854
	Log_inno_exp	.060	.005	.464	11.816	.000	.849	1.178
	Micro	.039	.133	.018	.292	.771	.338	2.960
	Small	.087	.102	.050	.858	.391	.390	2.567
3	(Constant)	4.315	.613		7.038	.000		
	Log_age	-.009	.177	-.002	-.051	.960	.539	1.855
	Male	-.067	.061	-.040	-1.095	.274	.908	1.101
	Owner	-.139	.074	-.085	-1.872	.062	.602	1.661
	Educ_owner2	-.123	.066	-.074	-1.864	.063	.792	1.263
	Mukono	-.172	.098	-.071	-1.753	.080	.754	1.326
	Wakiso	.231	.075	.135	3.085	.002	.645	1.550
	Jinja	.673	.111	.281	6.069	.000	.574	1.742
	Log_SMEage	-.055	.051	-.046	-1.081	.280	.683	1.464
	Log_fulltime	-.066	.050	-.065	-1.338	.182	.514	1.946
	Log_inno_exp	.057	.005	.443	10.862	.000	.741	1.349
	Micro	.141	.134	.066	1.049	.295	.313	3.193
	Small	.223	.102	.126	2.181	.030	.366	2.731
	Innov_policy2	.131	.074	.077	1.777	.076	.662	1.512
	Acquire_IP2	.285	.086	.145	3.295	.001	.639	1.566
	Skill_train	.045	.105	.018	.425	.671	.704	1.421
	Innov_research2	.243	.110	.106	2.210	.028	.536	1.866
	Research_output	-.240	.188	-.049	-1.275	.203	.841	1.189
	Reward_creative2	-.196	.065	-.119	-3.002	.003	.783	1.277
a. Dependent Variable: Innovmean2								