STIMULATING INDUSTRIAL DEVELOPMENT IN UGANDA THROUGH OPEN INNOVATION BUSINESS INCUBATORS

Joshua Mutambi

Blekinge Institute of Technology Licentiate Dissertation Series

No.

STIMULATING INDUSTRIAL DEVELOPMENT IN UGANDA THROUGH OPEN INNOVATION BUSINESS INCUBATORS

Joshua Mutambi

Division of Technoscience Studies

Department of Technology and Aesthetics

School of Planning and Media Design

Blekinge Institute of Technology

SWEDEN

This work is dedicated to the memory of my late father Rev. Canon Boaz Muntu who passed away immediately after submission of the concept proposal for this research to University

Abstract

Uganda is an agro-based land locked country with a population of about 30 million people. It is well endowed with natural resources and salubrious climate. Her industrial profile is still dominated by agro-industry and not innovation led, predominantly micro, small and medium scale enterprises (MSMEs). Facing the challenges of poverty alleviation, a high population growth rate (3.5% p.a), climatic change and environmental impacts among others, Uganda identified exploitation of natural resources, value addition as well as industrialization to transform the country and reduce poverty in her National Development Plan 2010/11-2014/15 (NDP).

In this respect, there are many existing programs and initiatives in the country supporting small businesses, but tend to suffer from a number of weaknesses. In particular typically small businesses find it difficult to do research and development; commercialize their results in markets (innovation) as fast as they should. For micro, small & medium enterprises to be dully competitive in a competitive economic environment requires that they develop internal capabilities to effectively assimilate, use and adapt product and process technologies for their businesses to survive on an ongoing basis.

To overcome this drawback, the concept of Business Incubation has been proposed. This concept has gained large interest in the research community. The key idea is to create and nurture new businesses for growth by providing services and infrastructure required by utilizing the external knowledge sources (open innovation) and triple-helix model which assist formation of business and industrial clusters. A business incubator is an organization that supports the creation and growth of new businesses by providing services and infrastructure that is required by the targeted clients.

Given that most firms in developing countries start too small to compete especially in international markets, a pre-requisite to industrial development, governments and policy makers should give particular attention to the constraints and needs of MSMEs. This can be done by adopting a mix of policies and framework conditions to reduce on the obstacles that hamper technological innovation, collaboration and business growth. In particular is access to finance and enhancing technology and business capacity development through training, linkages and networks.

This Licentiate thesis discusses and reviews the initiatives and programs aimed at supporting the development of MSMEs with a view to stimulate industrial development in Uganda. The main aim of this research is to examine the process of business incubation and explain the contribution of open innovation business incubators to entrepreneurs/ start-up firms within the broader context of developing entrepreneurship, promoting science, technology and innovation and creating employment.

This research focuses on the roles and relationships of government, university and research institutions and the private sector as sources of knowledge for technological innovations. Literature review, theory understanding, and participatory methods including group discussions with questionnaires, meetings and interviews, were used to achieve the objectives.

From the findings, it was revealed among MSMEs that due to their sizes, limited managerial and technological skills, and inadequate functional business support services have had adverse effects on their upgrading and growth. There was little linkage and follow up between industry and other public research sectors i.e. government agencies and higher institutions although there are quite a number of support institutions with poor coordination. The research analyzed a wide range of issues that are related to the desired structural transformation of the Ugandan economy towards industrialization process. Finally it will propose strategies for the most appropriate model for Uganda.

Keywords: Business Incubation, Industrialization, Open-Innovation, Triple-Helix, Uganda

Acknowledgements

First of all, I would like to thank the Almighty God for enabling me throughout this licentiate degree period since I started. A special acknowledgement goes to my late father, Rev. Canon Boaz Muntu who encouraged me to start this PhD program even when there was no sponsor yet. I further give my appreciation to Prof. Barnabas Nawangwe and Prof. Lena Trojer for their support during the Innovation Systems and Clusters Program activities and towards securing this sponsorship of which I have been able to carry on with my research.

I would like to express my gratitude to my two main supervisors Prof. Lena Trojer, Assoc. Prof. Joseph K. Byaruhanga and my other co-supervisor Dr. B. Kariko Buhwezi for their professional guidance and support through this process. Special thanks go to the Ministry of Tourism, Trade and Industry for their support and allowing me time off office schedule to attend to my research work.

I am thankful to Dr. Mackay Okure, Dr. Yasin Naku Ziraba, Dr. Peter Okidi-Lating, Dr. J. B. Kirabira, Dr. Samuel B. Kucel and my other colleagues and friends at Makerere University and BTH Mr. Julius Ecuru, Ms. Fatuma Simba, Ms. Lydia Mazzi Kayondo Ndandiko, Gideon Mbiydzenyuy and Mr. George Kisakye to mention a few for many helpful ideas and discussions. I want also in particular to thank Ms. Imelda Atai Musana of Uganda Bureau of Statistics and Mr. Richard Lutalo of National Council for Science and Technology who assisted me in conducting the STII surveys.

I want also to thank my family, my mother, sisters, brother, in-laws, relatives, friends for their support and most especially my wife Barbra Babweteera Mutambi and our lovely two children Samuel and Esther for their love, patience and understanding during the period of this work and while am away from home.

Lastly but not least, am very grateful to the support from Sida, Makerere University, the College of Engineering, Design, Art and Technology, Blekinge Institute of Technology Karlshamn and all staff inside and outside of these institutions for their contributions. I thank you.

Table of Contents

Abstract iv

Acknowledgements vi

Table of Contents vii

List of Figures ix

List of Tables ix

List of Abbreviations and Acronyms x

PART I 1

CHAPTER ONE: INTRODUCTION 1

1.1 Background 1

1.2 Research problem 5

1.3 Objectives 5

1.4 Significance 6

1.6 Research Questions 6

1.7 Expected Outputs 7

1.8 Research Scope 7

CHAPTER TWO: CONCEPT DISCUSSIONS AND THEORETICAL FRAMEWORK 8

2.1 Conceptual Framework 8

2.2 Various Concepts Discussions 9

2.2.1 Industrialization 9

2.2.2 Entrepreneurship 10

2.2.3 Entrepreneurship and Industrialization 11

2.2.4 Science, Technology and Innovation 12

2.2.5 Open Innovation 14

2.2.6 Triple Helix and Clusters 15

2.2.7 Business Incubation 16

2.3 Industrialization in Uganda 17

2.3.1 An Overview of Micro, Small and Medium Enterprises in Uganda 21
2.3.2 Building Entrepreneurial Communities in Uganda 23
CHAPTER THREE: METHODOLOGICAL CONSIDERATIONS 25
3.1 Introduction 25
3.2 Participatory Action Research 25
3.3 Data Sources 26
3.3.1 Secondary Data Review 26
3.3.2 Primary Data Collection 27
3.3.3 Analysis 27
PART II 28
CHAPTER FOUR: INTRODUCTION TO THE PAPERS 28
4.1 Paper 1 31
4.2 Paper II 44
4.3 Paper III 51
4.4 Paper IV 59
PART III 80
CHAPTER FIVE: DISCUSSION AND CONCLUSIONS 80
5.1 Brief Summary of the Papers 80
5.2 Concluding Discussions 81
5.3 Scientific Contributions and Originality 85
5.4 Way Forward 85
References 87

List of Figures

Figure 1-1: A Conceptual Framework for the Study on the Role of Open Innovation Business Incubators 8

Figure 2-2: Pillars of Growth 12

Figure 3-2: Sectoral Contribution to GDP 18

Figure 4: The Evolution of Business Incubator Model 64

Figure 5: Business Incubator Model 67

Figure 6: Growth of Business Incubators in Brazil 70

Figure 7: Growth of Incubators in China 72

List of Tables

Table 2- 1: Primary and Secondary Enrollment 19

Table 2-2: Higher Institutions Enrollment 2006-2007 20

Table 2-3: Definition and Classification of MSMEs 21

Table 3.4: Number of Innovative firms by employee size 54

Table 3. 5: Percentage share of firms that introduced innovations and performed R&D among innovators 54

Table 3. 6: Percentage share of firms that introduced totally new to the Ugandan market and their turnover by year 54

Table 3.7: Gross Domestic Expenditure on R&D (GERD) as an Indicator of R&D Activities-in Uganda (2007) 55

Table 8: Growth of incubators in China 72

List of Abbreviations and Acronyms

AGOA	African Growth and Opportunity Act
BDS	Business Development Services
BTTB	Background to the budget
BTVET	Business, Technical and Vocational Education Training
CICS	The Competitiveness and Investment Climate Strategy
COMESA	Common Market for Eastern and Southern Africa
EAC	East African Community
EU	European Union
EUG	Enterprise Uganda
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GoU	Government of Uganda
ICT	Information, Communication Technology
ISCP	Innovation Systems and Clusters Program
LDCs	Least Developed Countries
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MDG	Millennium Development Goals
MES	Ministry of Education and Sports
MFI	Micro Finance Institutions
MFPED	Ministry of Finance, Planning & Economic Development
MGLSD	Ministry of Gender, Labour and Social Development
MSMEs	Micro, Small & Medium Enterprises
MTAC	Management Training and Advisory Centre
MTCS	Medium Term Competitiveness Strategy
MTTI	Ministry of Tourism, Trade & Industry
MUBS	Makerere University Business School
NAADS	National Agricultural Advisory Services
NCHE	National Council for Higher Education
NDP	National Development Plan
NGOs	Non-governmental Organizations
NPA	National Planning Authority
OECD	Organization for Economic Co-operation and Development
PAR	Participatory Action Research
PEAP	Poverty Eradication Action Plan
PFA	Prosperity for All
PPP	Public Private Partnership
PSFU	Private Sector Foundation of Uganda
R & D	Research and Development
SBIR	Small Business Innovation Research
S&T	Science and Technology
SME	Small & Medium Enterprise
STI	Science, Technology and Innovation
UBOS	Uganda Bureau of Statistics
UEPB	Uganda Export Promotion Board
UGT	Uganda Gatsby Trust

UIA	Uganda Investment Authority
UIRI	Uganda Industrial Research Institute
UMA	Uganda Manufacturers Association
UN	United Nations
UNBS	Uganda National Bureau of Standards
UNCCI	Uganda National Chamber of Commerce and Industry
UNCST	Uganda National Council for Science & Technology
UNECA	United Nations Economic Commission for Africa
UNIDO	United Nations Industrial Development Organization
UPE	Universal Primary Education
UPPET	Universal Post Primary Education Training
URT	United Republic of Tanzania
USA	United States of America
USE	Universal Secondary Education
USSIA	Uganda Small Scale Industries Association
WTO	World Trade Organization

PART I

CHAPTER ONE: INTRODUCTION

1.1 Background

Uganda is an agro-based land locked country with a population of about 30 million people. It is well endowed with natural resources and salubrious climate, but the industrial profile is still dominated by agro-industry and not innovation led. Facing the challenges of poverty alleviation, a high population growth rate, climatic change and environmental impacts among others, Uganda identified exploitation of natural resources and value addition as one of its main strategies to transform the country and reduce poverty (MTTI, 2008).

With her vision of transforming the society from a peasant to a modern and prosperous country within 30 years, (GoU- NDP, 2010), the main focus is private sector driven economy. The government of Uganda also signed up to the Millennium Development Goals (MDGs) under the UN Millennium Declaration15. The MDGs include: 1) eradication of poverty; 2) achieving universal primary education; 3) promoting gender equality and empowering women; 4) reducing child mortality; 5) improving maternal health; 6) combating malaria, HIV/AIDS and other diseases; 7) ensuring environmental sustainability; and 8)developing a global partnership for development (MFPED, 2004). The government is therefore aggressively promoting private sector development, value addition, employment creation, country's competitiveness improvement and industrialization to levels associated with middle income countries.

Uganda is a member of East African Community (EAC) with a market of over 120 million people with access to the sea. Even more attractive is being a member of the Common Market for Eastern and Southern Africa (COMESA) with over 400 million people (Ngwenya et al., 2010). Furthermore, it's well advanced trading partners and international markets that include mainly World Trade Organization (WTO) member states, European Union (EU) countries, Asian countries and USA/AGOA. The country therefore highly desires value added agriculture, value addition industries and investors/entrepreneurs to take advantage of such opportunities.

Industrial development is fundamental for economic growth. Both theoretical and empirical literature shows that a high degree of efficiency in the industrial sector can contribute to increased production, product innovation, high value manufactured exports and high foreign earnings. It is through industrialization and innovation that wealth can be created and higher incomes realized from natural resources and raw materials transformation. Business incubators can promote innovation and accelerate industrialization through encouraging business start-ups, information and technology transfer, commercialization of research results, and implementation of science, technology, innovation and industrial development policies.

Business incubation is referred to as complex services and special environment provided temporarily for start-up enterprises with the aim of improving their chance of survival in the

early phase of the life span and establishing their later intensive growth. There are numerous approaches in the literature and in industrial –economic development practice to define business incubation (Lalkaka, 1997; EC-CSES, 2002; Sun et al., 2007).

Uganda, due to the unstable political situation and economic mismanagement in the 1970s and 1980s, experienced varying growth rates, policies and regulatory instruments. All these resulted into a significant decline in industrial and commercial sectors and negatively impacted on the gains made during the previous years from independence to 1970 (UNIDO, 2007).

During the past two decades Ugandan economy has established a strong record of prudent macro-economic management and continues to undertake private sector oriented structural reforms. It experienced sustained economic growth averaging seven percent per annum generated by different economic sectors. The government in collaboration with other development partners has been trying to support small and medium enterprises (SMEs) by various means, including technical assistance, capacity building programs, and incentive schemes. However, unfortunately, industrial development in Uganda until now has not been successful in following the pattern of industrial development in the region.

In spite of the economic structural transformation over the past two decades, the economy still faces challenges (MFPED, 2010). These challenges include : persistently high unemployment particularly of the youth; inadequate skills development which limits entrepreneurship and innovation; inadequate infrastructural networks such as roads, railway, energy, waterways, and internet usage which raises the cost of doing business and undermine private sector competitiveness; and a low manufacturing base. These constraints have undermined achievement of faster socioeconomic transformation and sustainable development.

Indeed for industrialization process to be sustainable, it requires a set of core competences such as skilled human resource, technological innovation and enhanced knowledge capacity, access to affordable finance and infrastructure, comprehensive and coherent policy processes and a culture of entrepreneurship and competitiveness. The creation and subsequent growth of enterprises with a substantial growth potential is vital to the economic prosperity of industrialized countries (NAEC, 2004) Similar to other developing countries in this respect, Uganda recognizes the ability of micro, small and medium scale enterprises (MSMEs) to generate socio-economic benefits, value addition to local raw materials, employment creation, income generation opportunities and wealth, promotion of entrepreneurship and enhancing of exports. They constitute an important dimension in the innovation process (Beal, 2003; Hammer et al., 1997; Byaruhanga, 2005; Tirthankar, 2007).

The International "Doing Business Survey 2010" report ranks Uganda 129th out of 183 countries on a wide range of business indicators. Problems are identified in particular registering property, trading across borders, protecting investors, starting a business, enforcing contracts, and getting credit. These impediments, among others, are affecting the competitiveness of the economy, with

the main issues being access to finance, infrastructure, tax administration, work ethics, and government bureaucracy (World Bank, 2011).

In Uganda, the industrial sector predominantly consists of MSMEs which accounts for 95% of the entire sector and employs more than 2.5 million people. These MSMEs constitute 90 percent of the private sector, contributes 20% of GDP and are very dynamic with 80 percent being located in urban and peri-urban areas country wide and, are largely involved in trade, agro-processing, and small scale manufacturing (GoU, 2010). With the majority focusing on low-value services, its unlikely therefore that if left alone will be a platform for significantly transforming the economy as the case in the rest of the world. These small businesses have several disadvantages that hinder their success. They have difficulties in securing the resources they need for survival (Ferguson and Olofsson, 2004). Because of this, over 80-90% of the new businesses started each year fail worldwide within the first five years of operation (Aerts et al., 2007).

Although the private sector has grown rapidly between 2001 and 2007, growth in the number of firms has been concentrated in small firms with low value addition. The number of registered businesses in Uganda in 2007 was 25,000 from 800,000 in 2001 with majority located in central region of the country (GoU, 2010; Kasekende et al., 2003). The service sector is the fastest growing in Uganda predominantly in telecommunications, hospitality and trade sub-sectors (MFPED, 2010). Due to globalization, internal challenges and international competition, MSMEs have faced global challenges and like the rest of the world, less than 30% of the start-ups are not able to see their first birth day in Uganda (Hatega, 2006).

Yet the rest of the world that has tried business incubation have claimed success rate of over 85%. Incubators have been considered as a remedy for the disadvantages that small and new firms encounter by providing numerous business support services. They are useful in fostering technological innovation, entrepreneurship, commercialization and industrial renewal. For this reason many countries have increasingly been engaged in establishing business incubators (Akcomak, 2009; Lalkaka, 1997). It is also widely acknowledged that incubators are a technology transfer mechanism, means of promoting entrepreneurship and the commercialization of new knowledge and innovations (Phillips, 2002).

Uganda Government's past Poverty Eradication Action Plans (PEAP I &II) (MFPED, 2004), and in the recently launched National Development Plan 2010/11 -2014/15 (NDP, 2010), its strategy for poverty eradication is based on the transformation of the economy through private sector investment, industrialization and export led growth (i.e. emphasis focused on economic transformation and wealth creation). This calls for commitment to continue harnessing synergies and inter/intra sectoral linkages; encouraging foreign investments and exports with high-value addition and enabling the innovative entrepreneurship by working closely with the private sector,

civil society and the academia in order to achieve the NDP objectives, the Country's vision and the MDGs.

Recently EAC & COMESA launched Customs Union and Common Market protocols (Mugisha, et al., 2009; Lunegelo et al., 2009), that abolish any kind of trade protectionism and streamlines the flow of goods and services within the region. The economy will however be faced with other kinds of non-tariff barriers such as standards and regulations, and physical barriers at borders. There is a fear that stronger and well equipped regional enterprises will out-compete struggling SMEs. What remains to be done therefore is to focus on business development services, implement policy measures and institution building mechanisms geared to facilitate and promote domestic firms in their quest for competitiveness. Also strengthening public institutions and policy makers in dissemination of a set of regularly produced and standardized indicators including Science, Technology and Innovation indicators.

With the regional integration and an increasingly competitive environment, there is strong need for industrial restructuring and strengthening of technological capabilities in Uganda for innovations, diversified production and value addition to take place. However, the Ugandan experience in the incubation process is still at an early stage and this research aims at better understanding and innovative ways of business incubation in respect to the impact, coordination, design, development and management processes as well as the entire science, technology and innovation system.

The Author has been involved in facilitating cluster initiatives under the Innovative Systems and Clusters Program of Makerere University, industrial development policy formulation, and technology transfer programs in the country. During this period, it was observed that lack of infrastructural facilities, adaptation of science, technology and innovation; and poor business support services are the major complaints hindering industrial transformation and entrepreneurship development. This is the main objective of this research and it is in line with the vision and objectives of the National Development Plan and the objectives of the Millennium Development Goals.

This research is motivated by the emerging importance of innovative clusters and the realization that Science, Technology and Innovation are fundamental to understanding the field of business incubation. One of the strategies that this research proposes government should adopt in enabling innovative entrepreneurship; promoting science, technology and innovations; value-addition, changing peoples' mindset and culture; business services and global industrial network for the industrialization process is through innovative institutions and services such as Business incubation systems.

This thesis summarizes research within the field of entrepreneurship and industrial development. It is organized in three parts with the first part presenting the introduction-background information, problem statement, objectives, significance for the research and research questions.

A review of the key concepts from the industrial development and business incubation literature as it pertains to this research; and, a description of the methodological considerations, data collection methods used and analysis. The second part presents the papers on which the research is based that have been published or presented in refereed journal and conference proceedings respectively. Finally, the third part contains the summary discussions, conclusions, the way forward and references.

1.2 Research problem

The micro, small and medium sized enterprises and start-up businesses in particular, especially in the manufacturing sector in Uganda are faced with major challenges for survival and success. There are many artisans with potential to start-up enterprises or better improve on their products production processes and prototypes if technically supported.

Uganda has a latent mass of trainable workforce, a large base of educated workers, scientists, potential innovators who would contribute towards private sector job creation through research and development; and starting commercial enterprises, yet it is not happening. Many Ugandan training institutions and agencies have offered business management and technical courses, business plan competitions for graduate students and entrepreneurs, but little further support to implement the skills and knowledge acquired during training into commercial opportunities.

Attempts were made to introduce the concept of business incubation in Uganda in 1960s, and from the late 1990s up to to-date, other institutions and organizations have been established to implement the concept. However, the world of incubation is not-well known in Uganda. There is little information (no academic comprehensive study) on the process of creating an effective incubator, i.e. coordination, design, development and management processes as well as the entire science, technology and innovation system in Uganda. This situation has necessitated a research to investigate how to overcome these mentioned gaps, re-examine the current approaches to developing enterprises, the potential role of business incubation strategy in stimulating entrepreneurship and fostering industrial development in Uganda.

1.3 Objectives

The main objective of the research is to come up with a model of small business incubation for open innovation that can stimulate industrialization in Uganda.

To achieve the main objective, the research has the following specific objectives;

(i) To study experiences in other countries worldwide in respect to business incubation, industrial development and government support

(ii) To identify factors that affect performance of business incubators and growth of incubated businesses in Uganda

(iii) To link open innovation approaches to an appropriate Ugandan business incubator model

This Licentiate is covering the work done in order to achieve objective one and partly objective two. The other specific objectives will be covered in the Doctoral thesis.

1.4 Significance

Start-up firms or small businesses that start in business incubators stand a higher rate of survival and success by benefiting from the business support services provided. Rising factor costs and intensifying competition has promoted cost and risk sharing schemes among firms leading to networks of firms and R & D alliances. These networks and alliances, in turn stimulate the growth of institutions/enterprises designed to identify problems and provide solutions involving specialized knowledge. Business incubators as a high value-added services environment if successfully implemented, together with the clustering program, can play a key role in addressing the mentioned challenges in the process of industrialization. The incubators can also strengthen the effective partnership between the government, researchers (academia) and the business community (triple helix).

The research objectives are in line with the objectives of the Uganda national development plan and its specific development indicators; i.e. employment creation and value addition, increasing the level of industrial sector development, promoting science, technology, innovation and ICT to enhance competitiveness, and improving the country's competitiveness position.

The research is seeking to develop a set of appropriate strategies of how to address the key issues from assessing the inexperienced or potential entrepreneurs' ideas until their visions are realized. It will focus mainly on the business incubation process and application of methodologies and tools.

The research findings will therefore;

(a) Provide credible information for entrepreneurship development, promotion of science, technology and innovation system in Uganda

(b) A business incubator model that will provide a basis for Uganda government to realize her vision in promoting science, technology and innovations (commercialization of technologies including new products developed from universities (spin-offs)); public private partnerships in industrialization process,

(c) Contribute to the literature and thorough understanding of the incubation concept and processes especially best suited to the Ugandan situation. In addition, fully academic researched knowledge on the entire incubation system will lead to addressing the implementation gaps not only in Uganda, but also regionally.

1.6 Research Questions

During the research study, the research seeks to answer the following questions:

1) What factors affect industrialization process, the performance of business incubators and growth of small and medium industrial businesses in Uganda?

2) What are the general emerging trends in incubation industry in terms of supply and demand services and practices?

3) To what extent has the triple helix (academia, government and Industry) helped in facilitating the start-ups, open innovations and growth of SMEs?

4) What lessons can be applied to the Ugandan situation for the business incubators to be developed further?

This licentiate thesis is offering answers to questions 1, 2 and partly 3 and 4

1.7 Expected Outputs

(i.) The research will provide some useful insights; define policy recommendations for the government, Universities/ Research Institutes and private sector firms, business incubator managers, and the synergies between the triple helix actors

(ii.) The research will contribute to the literature of business support services, innovation and entrepreneurship development and will enhance the knowledge and skills within the incubation industry

(iii.) The research output will be used to create awareness to the policy makers and financiers, researchers and the business community in Uganda. As business incubators for open innovation pick up in Uganda and become effective, the manufacturing base will broaden which inevitably builds industrial competence and firms will be competitive.

(iv) There will be both Licentiate and Doctoral thesis, publications in peer reviewed journals and conference proceedings.

(v) A business incubation model for industrial development of Uganda

1.8 Research Scope

The research will focus on the Ugandan small and medium sized industrial manufacturing firms. The sample will include metal and non-metal manufacturers, Agro-processing and ICT services, i.e. fabricated metal and non-metallic products, wood and wood related products, electrical and electronic products; foods and beverages, textile fashion and clothing. To enhance the research results, the researcher will take into consideration of the development of the incubation systems in Sweden, as an example of developed countries, Tanzania and Uganda, serving as developing countries in East African Region.

ıputs

Process

Expected Outputs

urces of Knowledge
Ideas, and Resources

Open Innovation
Business Incubators
–Processes and
Management issues

Business incubation model for Ugandan industrial development,
Educated and trained professionals in high-tech businesses

CHAPTER TWO: CONCEPT DISCUSSIONS AND THEORETICAL FRAMEWORK

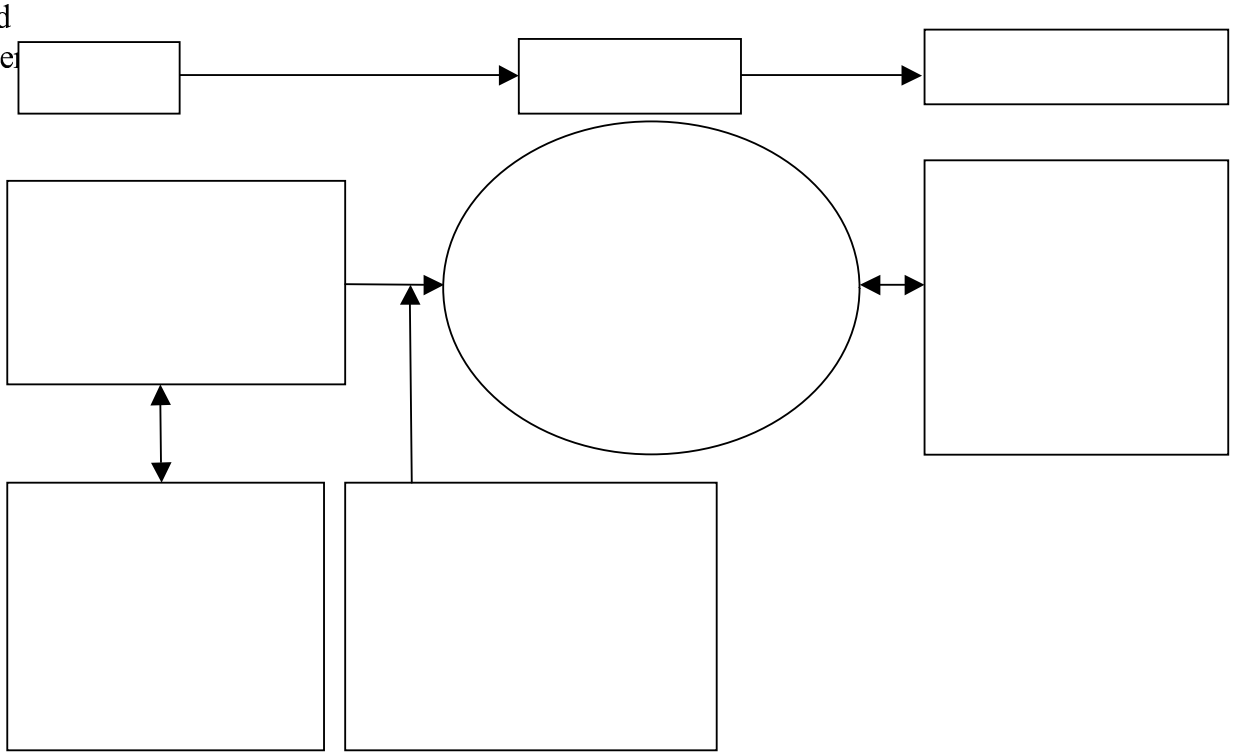
2.1 Conceptual Framework

The World in which research, development and innovation take place has changed fundamentally. Today, open science and open innovation co-exist, creating new opportunities and interdependences. New management practices are required to handle the situation (Verheugen, G. and Potocnik, J. (2005). This research focuses on the role of open innovation business incubators in the commercialization and industrialization of scientific findings. Figure 2-1 shows the input variables into the incubation process. The research will investigate how the incubation process should be done to enable the creation of successful start-ups.

re 1: A Conceptual Framework for the Study on the Role of Open Innovation Business Incubators

blic and private
rtners; Institutions
d communities;
ooks; Authors own
ademic and
actical exper

-[Transferring knowledge;
-creating synergies; and
promoting
entrepreneurship].



Source: Author (2011)

In this conceptual framework, a business incubator is a means to an end, and not an end in itself. Open innovation business incubator is proposed as an organization providing infrastructure to support innovative companies overcome the barriers linked to the complexity of the innovation process and creation of new ventures. Attention is on the fundamental incubation process and the incubation outcomes.

It's assumed that for the incubators to create an impact, it needs a holistic approach of all resources, i.e. the inputs, the processes within in order for the outputs to realize (in other words, taking ideas from inception to impacts).

The supply of knowledge, ideas and resources (knowledge, skills, capital) and transfer of all these within the incubator environment is essential in the process of supporting entrepreneurs and new venture businesses. In this research, we are concerned with the ideas or theories employed collectively in order to enable open innovation business incubators produce the desired outcomes, in particular, the relationship between knowledge, individuals and organizations.

2.2 Various Concepts Discussions

When we talk about industrial development, a number of concepts play a pivotal role in the analysis. In this section, some main concepts related to industrial development in Uganda and used in this study are as mentioned below.

2.2.1 Industrialization

Industrialization has been described as closely associated with technological progress, a series of profound socio-economic change in the organization of production and work, and has been instrumental in giving shape to the modern political landscape (Bairoch et al., 1996; UN/ECA, 2000). That is, in most advanced countries, industrialization has been a process of transformation from a traditional to a modern society based on industrial outputs and manufactured exports indicators (UNIDO, 2005). Industrial development is the process of building technological capabilities through learning and translating them into product and process innovations in the course of continuous technological change.

Technological capability refers to the ability to make effective use of technological knowledge in production, engineering, and innovation in order to sustain competitiveness in price and quality. Such capability enables a firm to create new technologies and to develop new products and processes in response to the changing economic environment (Linsu, 2000; Page, 2010-Wiegratz, 2009).

True success, accordingly is created through establishing dynamic economies, the concretization of economies of scale, establishing of more export processing/ special economic zones/ industrial parks, the encouragement of diversification and improvement in access to markets (Page, 2009). John Page (2009) further acknowledged that the success of the manufacturing industry is pivot in the achievement of Africa's development initiative.

Furthermore, importantly for industrial development is capability. The ability to make capacity operate competitively requires something more: the tacit knowledge, skills and experience related to specific technologies that is collected by enterprises and cannot be imported or bought

in. The process involves creating new skills, partly by formal education but, usually more importantly, by training and the experience of new technologies. It requires obtaining technical information, assimilating it and improving upon it. It entails building institutional rather than individual capacity, with new managerial and organizational methods, new ways of storing and disseminating information and of managing internal hierarchies. It also needs intense interaction between enterprises and support institutions. Finally, it requires the factor markets that provide skills, technology, finance, export marketing and infrastructure to respond to the new needs of enterprises.

2.2.2 Entrepreneurship

The word "entrepreneur" is derived from a French word that describes people who provide a service (Todorovic, 2006). Many researchers recognize entrepreneurship as being of fundamental importance for economic development (Wiklund, 1999). The definition of entrepreneurship has evolved over time as the world's economy has changed as well. There are many definitions of entrepreneurship that can be found in the literature describing business processes. Entrepreneurship is the act of being an entrepreneur, which can be defined as one who undertakes innovations, finance and business acumen in an effort to transform innovations into economic goods.

Some scholars have defined entrepreneurships as: the process of initiating a business venture, organizing the necessary resources, and assuming the risks and rewards. While in 1934 Schumpeter who popularized the concept defined it in terms of a person's ability to be innovative, in terms of goods and services produced, methods of production, markets, sources of supply and industrial organization. The underlying entrepreneurial attitudes and behaviors are three key dimensions: Innovativeness, risk taking and proactiveness (Morris et al., 1999). Innovativeness refers to the seeking of creative, unusual or novel solutions to problems and needs. These solutions take the forms of new technologies and processes, as well new products and services. Risk taking involves the willingness to commit sufficient resources to opportunities having a reasonable chance of costly failure. Proactive is concerned with implementation with doing what is necessary to bring an entrepreneurial concept to fruition.

Entrepreneurship is considered as an approach to management, defined therefore as a process by which individuals – either on their own or inside organizations – pursue opportunities without regard to the resources they currently control in an innovative, risk-taking and proactive manner (Todorovic, 2006; Brown et al. 2001; Morris et al., 1999)

From the above definitions, entrepreneurship covers an individual's motivation and capacity independently or within an organization to identify an opportunity and to pursue it in order to produce new value or economic success. Entrepreneurs pursue opportunities to grow a business by changing, revolutionizing, transforming or introducing new products or services. (Davidsson et al., 2009). The three important themes in this definition are (1) the pursuit of opportunities, (2) innovation, and (3) growth link entrepreneurship to industrialization process. For both start-up

companies and existing firms, entrepreneurship spurs business expansion, technological progress and wealth creation (Lumpkin & Dress, 1996).

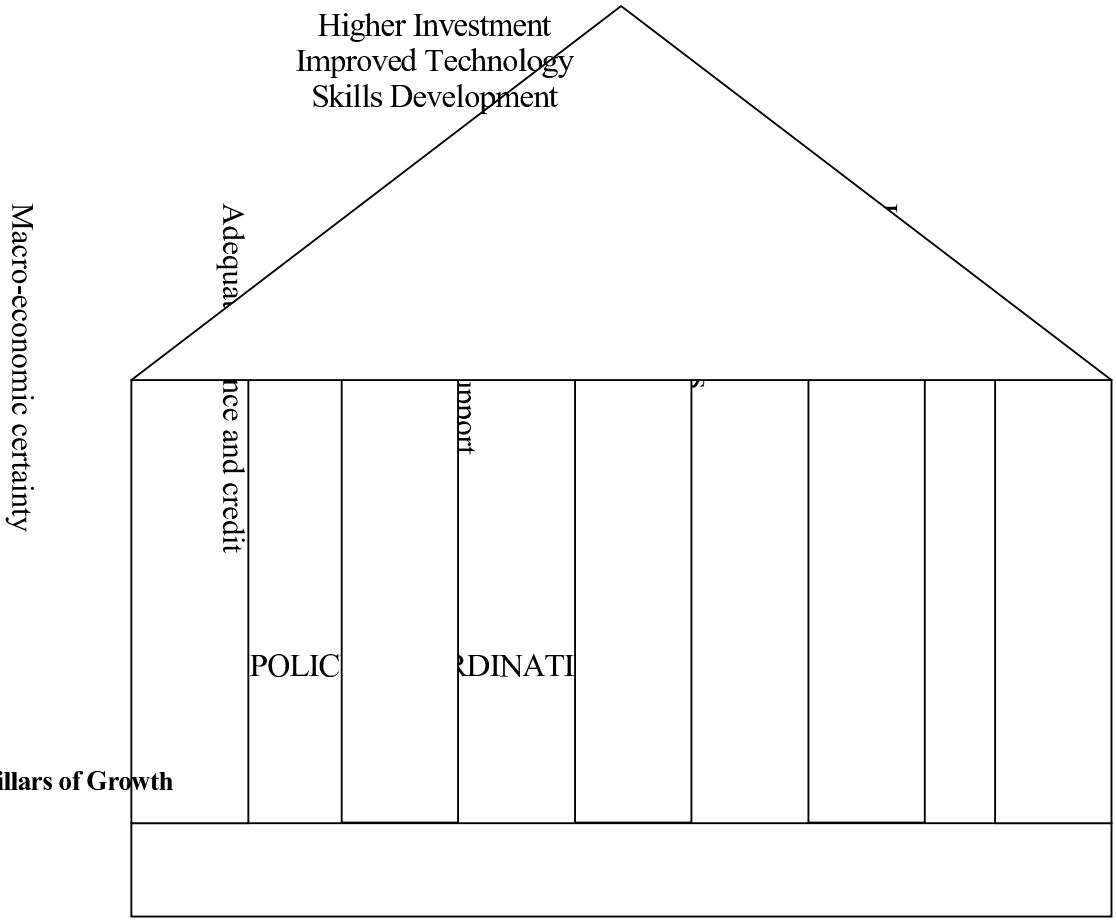
2.2.3 Entrepreneurship and Industrialization

Industrialization is both the process of building up a country's capacity to convert raw materials into new products and the system that enables production to take place. The issue of entrepreneurship and its relationship to the industrialization process has long occupied the attention of development planners. In particular, the key role of manufacturing industry for growth based mainly on technology driven increase of productivity and some essential co-factors, like human skills, capital or appropriate institutions is globally undisputed.

International literature suggested that operating in clusters may help small enterprises to overcome their growth constraints (McCormick, 1999; Andersson et al., 2004; Solvell, 2009). Creating favorable conditions for entrepreneurship does indeed help the process of industrialization, and business incubation focusing on national/regional strengths through clustering and networking is believed to help small enterprises grow and contribute to industrialization. Therefore small enterprise development has been linked to the industrialization process (McCormick, 1999; Romijn, 2001).

What is needed thus is to create favorable conditions to achieve the above objectives. Facilitating entrepreneurs will contribute to industrial development which is a key role of the developmental state. The emergence of the cluster based development strategy termed as "new innovation system" based on the cooperation among universities (research institutions), industry and government has been reported to have brought a wide range of support services worldwide for development of knowledge based businesses, with linkages to universities, research institutes, venture capital and international joint ventures. Clusters affect competitiveness within countries as well as across national borders (Porter, 1998).

The major problems in Africa such as; inadequacy of infrastructure and skilled industrial human resource, lack of technological capacities (industrial, technological information and innovation, low investment or the inability to exploit and process immense natural resources), and technological knowledge all contributed towards the down turn of industrial production throughout the 1980s, 1990s and 2000s. The industrialized countries success is explained from history to have lied mainly in their ability to learn how to improve performance in a variety of fields, including, macro-economic environment, institutional development, technological adaptation, competitive and productive infrastructure development, use of natural resources, organization, markets, and their strong focus on improving their skills as a way to solve problems and competitiveness. Figure 2-2 shows the pillars of growth as explained above.



ıre 2-2: Pillars of Growth

2.2.4 Science, Technology and Innovation

Science and technology are essential tools in meeting development goals, especially those contained in the United Nations Millennium Declaration (UNSC, 2009). Science, Technology and Innovation (STI) activities have been one of the driving forces of economic and social change for centuries. Similarly, STI activities have accelerated growth and brought about social change through the movement of people, goods and services and an increased capacity to generate, transmit and use STI knowledge (Ertl et al., 2007; OECD, 2006)

Science, technology and innovation are important and necessary to increase competitiveness, prosperity and quality of life. STI is used to mean the generation, use and diffusion of all forms of useful knowledge as well as the evolution of associated institutional arrangements (UN, 2003; Gault, 2008; OECD, (2007)). Technology change is at the heart of development worldwide. Technology is hereby defined as knowledge that contributes to the creation, production and improvement of economically and socially useful products and services. Such knowledge thus

relates not only to physical artifacts but also to forms of organization for their production, distribution and use.

Technological knowledge relies heavily on the mode of learning, on adapting to new technologies, on educational systems, the STI as well as the industrial policies, the nature and composition of the private sector and the capabilities already inherent in the public sphere. Science, technology and innovation are often considered as important drivers for economic development and growth. Particularly indigenous capabilities in STI are essential for the achievement of both short- and long-term development goals.

Innovation is seen as one of the most important ingredients in the success of organizations, the producer of solutions to problems that are not entirely understood or widely perceived and the generator of opportunities that may not have existed before or were not exploited. In other words, it is the process of doing or introducing something new either an idea or an invention translated into a good or service for economic gains irrespective of whether they are new to their competitors, countries, or the world. Innovation could be subdivided into many types, for example process innovation, market innovation, product innovation, factor innovation, and even organizational innovation (OECD, 2005; Pittaway et al., 2004; Hippel, 1988; Hanel 2007; Mairesse and Mohnen, 2007).

It often involves new technologies or technology applications. It increases the productivity and choice of goods and services available to the consumer. It cannot directly be measured but instead be inferred using indicators for example, number of patents filled, number of new products introduced, or expenditure on R & D. The body of policies, regulations, institutional and infrastructural arrangements and activities concerned with the creation, acquisition, dissemination and utilization of scientific and technological knowledge, is generally referred to as the national science, technology and innovation (STI) system.

Tracking the emergence of new technologies, products or processes can provide valuable feedback and information on the rate and nature of technological innovation. Therefore, STI indicators are also key elements in industrialization process. The development and diffusion of new technologies plays a central role in improved productivity and competitiveness. While the global economy is being reshaped by new ICTs and by radical technological changes in a number of other S&T disciplines, understanding the process that leads to innovations and to their dissemination, their indicators both within and across sectors, is still deficient in Uganda's situation.

Uganda, like many other African countries has not been developing primary science, technology and innovation indicators and to make them accessible to public and private sector decision makers for social economical development and investment purposes. Uganda suffers many limitations and inadequacies in relation to institutional arrangements, infrastructure and policies seriously hindering her ability to innovate in many directions. Therefore, national plans aimed at

the creation of STI capabilities will need to allocate a great deal of attention to the evaluation of innovation at the level of business enterprises, the level of individual segments and sectors. Activities related to enterprise creation, incubation and promotion undertaken in universities and research centers of a country like Uganda, must receive adequate attention in initiative design, to improve national STI monitoring capabilities and develop innovation culture.

2.2.5 Open Innovation

Open innovation can be defined as 'the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively' (Chesbrough et al., 2006, 2003). Depending on its business model, a firm decides whether or not external and internal knowledge is valuable to be further developed and commercialized into a new business. Open Innovation means that valuable ideas can come from inside or outside the company and can go to market from inside or outside the company as well. This approach places external ideas and external paths to market on the same level of importance as that reserved for internal ideas and paths to market in the earlier era.

According to Penin (2009), open innovation must encompass three constitutive elements: (i) Voluntary knowledge disclosure from "participants"; (ii) knowledge being open (which is equivalent to say that "spillovers are not controllable", and (iii) continuous and dynamic interactions among "participants" (open innovation means that anybody can participate and is therefore potentially a participant). There are several advantages that firms can benefit working in an open innovation style and practices according to Vanhaverbecke et al., (2008); Keupp and Gassmann, 2009; Laursen and Salter, 2005);-

- Innovating firms benefit from early involvement in new technologies or business opportunities. Open innovation allows innovating companies to sense developments in a wide range of externally developed inventions by buying minority stakes in (high-tech) start-ups, participating in venture capital funds, or by providing educational investments in promising projects at universities or research labs

- Innovating firms also benefit from delayed entry or delayed financial commitment. Open innovation practices offer firms more flexibility about when to start the internal portion of the innovation process: a company can start exploring the commercial possibilities of a technology outside initially, via relationships with universities, SMEs and other innovation sources

- Open innovation offers firms the advantage of an early exit, and the ability to realize some value from projects that do not go forward internally. Open innovation is characterized by the possibility that innovating firms can always license or sell

technologies or spin-off ventures that are not promising enough and/or that do not fit with their business model or core competencies.

- Open innovation allows firms to benefit from delaying an exit. If the firm chooses to syndicate its investment in the venture and invite other investors in, the firm also benefits from 'other people's money' supporting the development of the venture. This is capital efficient for the firm, though it does relinquish a substantial degree of strategic control to the outside investors. In this way, the open innovation paradigm allows firms to maintain flexibility while keeping their different venture options open.

Therefore, for the developing countries such as Uganda that are disadvantaged in terms of science, technology and innovation activities (low level and low value-added industry position) adopting open innovation or collaborative innovation practices would enhance intentions for industrial transformation.

2.2.6 Triple Helix and Clusters

The 'Triple Helix' is a spiral model of innovation that captures multiple reciprocal relationships at different points between industry, academia and the public sector in the process of knowledge capitalization and social development (Etzkowitz, 2002; Jerome et al., 2010; Gunasekara, 2006; Simba, 2010). The triple helix denotes the university-industry-government relationship as one of the relatively equal, yet interdependent, institutional spheres which overlap and take the role of the other. Emerging literature that examines university-industry-government networked infrastructures supports these triple-helix collaborations as the key to improving the conditions for innovation, productivity, and wealth in a knowledge-based society (Campbell, 2005; Leydesdorff, 2001).

The university is a firm founder through incubator facilities; industry is an educator through company universities and government is a venture capitalist through small business innovation research (SBIR) and other programs. Innovation clusters are the linkages, interactions, relationships and development of different but inter-dependent entities (i.e. education, research, and development, industries, financial institutions) to form a virtuous circle of innovation and entrepreneurship. A cluster is a geographic concentration of competing and cooperating companies, suppliers, service providers, and associated institutions (Porter, 1998; Solvell, 2009; Ketels, 2009).

Clusters constitute important knowledge spillovers for businesses. Clustering is generally defined as a process of firms and other actors co-locating within a concentrated geographical area, cooperating around a certain functional niche, and establishing close linkages and working alliances to improve their collective competitiveness. The physical proximity of the factors outlined above furthers the creation of formal and informal linkages and networks among firms, higher education and research institutions, financial establishments, public agents and other local organizations, where information can easily flow and propagate. Clustering is seen as a key

means of driving regional development by building private and public sector partnerships to mutual benefit through government and regional investment in innovation incubators, science parks and cities, and technology transfer offices (Slovell et al., 2003).

2.2.7 Business Incubation

Business Incubation is a unique and highly flexible combination of business development processes, infrastructure and people, designed to support entrepreneurs and nurture and grow new and small businesses, products and innovations through the early stages of development and/or change (Rice, 2002; Philips, 2002). There are several definitions and approaches to business incubators available in academic literature and many have been adopted by industry associations and policy makers in different countries reflecting local cultures and national policies. However, the general definition of business incubator by the National Business Incubation Association as mentioned on their website (www.nbia.org) is:

Business incubators nurture the development of entrepreneurial companies, helping them survive and grow during the start-up period, when they are most vulnerable. A business incubator's main goal is to produce successful firms that will leave the program financially viable and freestanding. The most common goals of incubation programs are creating jobs in a community, enhancing a community's entrepreneurial climate, retaining businesses in a community, building or accelerating growth in a local industry, and diversifying local economies.

Despite the efforts to develop a general definition for business incubation, there are still a variety of models of business incubators. In business incubation, there is some degree of Government, Academia and industry involvement (Chandra, 2007). The most common classification of business incubators is based on funding. There are those that are: (i) public funded such as those set up by government agencies in science/technology/business parks, research institutions and universities (ii) privately funded such as those in privately run organizations and enterprises. Recent studies introduced the mixed-models of business incubators such as public-private partnerships incubators (Lalkaka, 2000).

The term 'incubator' was derived from the fundamental meaning of the term: The artificial nurturing of the chicken egg in order to hatch them faster in a sheltered environment. The same hatching concept is applied to the incubating of companies; it speeds up new ventures' establishments and increases their chances of success. An incubator thus hatches new ideas by providing new ventures with physical and intangible resources (Becker and Gassmann, 2006).

Business incubation concept rests on the argument that if weak but promising new businesses with a potential of growing into successful ventures can be identified at an early stage and helped, failures, loss of resources can be reduced and more ideas can be developed (Hamdani, 2006). Business incubation originated in the U.S in the late 1950s in an effort to re-use

abandoned or underutilized buildings, create wealth and employment and contribute to local and regional economic development (Wiggins and Gibson, 2003; Hackett and Dilts, 2004). However, the concept has evolved over time contrary to what was originally claimed.

Incubators are of basic importance in the process of establishing links between research and business. They provide support services to start-up firms, "temporarily'; enabling young entrepreneurs with a scientific background to build up their business management know-how and develop their innovative businesses. Incubation takes place in both physical and virtual incubators. The later use the internet to provide support services to the enterprises, which could not be located in the limited physical space available for start-ups. Across the incubator movement, the management problems of incubator clients are met with the delivery of a variety of value-added management services. The driving force (in incubator programs) is the supply of expertise, capital and support that comes from assistance activities directed towards filling the voids in entrepreneurs' abilities (Duff, 1994).

2.3 Industrialization in Uganda

The country is well endowed with natural resources and a healthy climate. Although, there is abundance of raw materials, they are not exploited and effectively utilized. The industrial sector occupies a central position in the Government's vision and the policy actions are geared towards economic and social transformation. The industrial sector is contributing 24% of the country's GDP, while agriculture, services and others contribute 22%, 48%, and 6% respectively (UBOS, 2010). The relative small share of industry's contribution and the larger share of services are uncharacteristic of a low-income country in terms of value added and employment.

Industrial Development in Uganda is an integral part of the Government's overall National Development Plan, 2010/11 -2014/15 that is to be achieved by transforming Uganda into a modern and prosperous/industrial country. The economy is predominantly agricultural and heavily reliant on the export of primary raw commodities with a relatively small industrial sector whose share of GDP has increased steadily over the past decade through expansion, diversification and establishment of new industries.

Apparently, the manufacturing sector in Uganda has difficulties realizing the potential for innovation, productivity improvement and sectoral growth (product diversification, and market penetration). These inadequacies undermine the country's ambition to industrialize and the competitiveness of industrial and related sectors in Uganda. The basis for Uganda's future prosperity and its ability to invest in the improvements desired will depend on the competitiveness of its existing and future industries as well as strong policy implementation capacity. This can only be done by advancing knowledge, value addition, promote high performance and governing practices, science, technology and innovation, as well as building the skills of the manufacturing workforce.

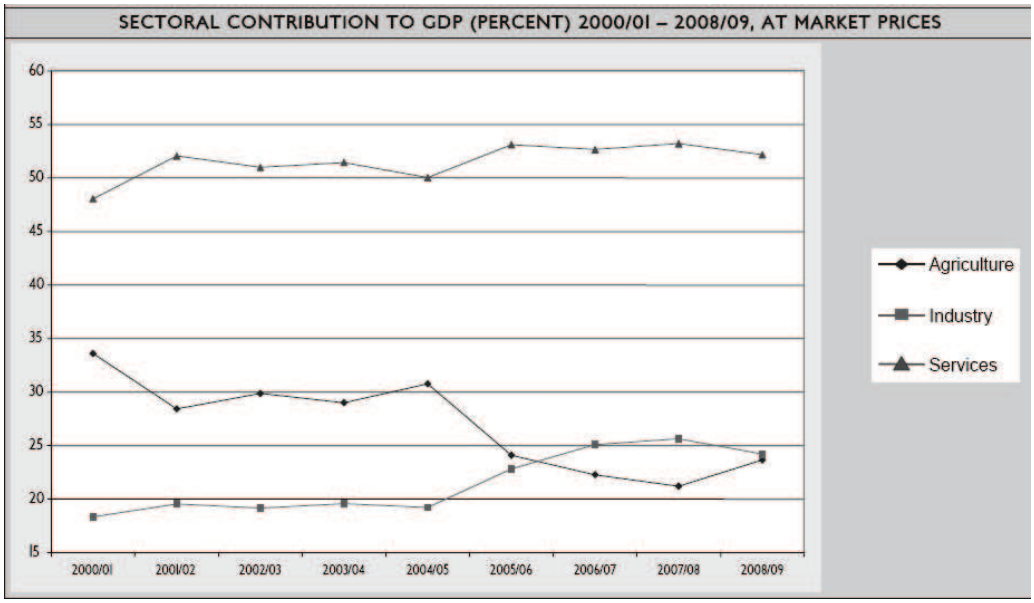


Figure 3-2: Sectoral Contribution to GDP

Source: Uganda Bureau of Statistics Database

In Uganda, the industrial sector is dominated by MSMEs which accounts for 95% of the entire sector and employs more than 2.5 million people. The MSMEs constitute 90 percent of the private sector, and are very dynamic with 80 percent being located in urban and peri-urban areas country wide. They are largely involved in trade, agro-processing, and small scale manufacturing. MSMEs represent one of the most viable vehicles for sustainable grass-roots economic growth in the country (GoU, 2010).

The New Policy Framework and investment priorities outlined in the recently published National Development Plan (NDP) are expected to increase the pace of structural transformation of the economy. The current national industrial policy also spells out aspects of national development and proposes several interventions targeted at improving the performance and contribution of the industrial sector. The policy focus includes:

1. Extracting and developing natural domestic resource – based industries such as petroleum , cement, and fertilizer industries; and promoting competitive industries that use local raw materials
2. Agro-processing; focusing on food processing , leather and leather products, textiles and garments, sugar, dairy products, and value addition in niche exports
3. Knowledge –based industries such as ICT, call centers, and pharmaceuticals that exploit knowledge in science, technology and innovation
4. Engineering for capital goods, agricultural implements, construction materials, and fabrication/ Jua Kali operations (MSMEs)

Under the economic priorities in the recently launched NDP was enhancing economic development opportunities and not only in major urban centers but throughout the country. Towards this goal, the government is developing an industrial park in every regional center to

support investors with work spaces, serviced with the necessary facilities such as electricity, road networks and water. So far, development of 25 parks is in progress, with the three Kampala industrial and business parks located in Namanve, Luzira and Bweyogerere.

Generally countrywide, the government is working to improve the road network, energy supply, ICT and much improvement in water supply. Uganda has in addition shown a comparative advantage in providing education services in the region. For instance, Uganda has one of the top ranked universities in Sub-Saharan Africa excluding South Africa, Makerere University. There is an advantage of highly educated and trained labor force, with availability of land for both industrial and agricultural development.

However, with the comparative advantages mentioned above, Uganda is still constrained from manufacturing of capital goods and services due to weaker business environment, high costs of infrastructure and high trade costs. To this effect, attention should be given to human resource development; skills and technology development for components of value chains; innovative institutions and services; provision of efficient infrastructure services, fostering regional integration and coordination, reinforced financing and risk mitigation mechanisms; and enabling policies.

It is worth noting that Ugandan population growth rate is rapidly expanding and accessibility to education continues to improve, employable citizens being churned out of the education institutions overflowing the job market, hence the rise in unemployment. Universal Primary Education (UPE) was formally launched in Uganda in 1997 and has to date resulted in the enrollment of over 8 million pupils from Primary One to Primary Seven (UBOS, 2010). In addition, the government also commenced the Universal Secondary Education/Universal Post Primary Education Training [USE/UPPET] Programme in 2006 and the rate of transition from primary to post primary has increased by 30%. The secondary school enrollment is over One million from Senior One to Senior Six.

The government policy to liberalize the education system has led to an increase in the number of private higher learning institutions. Uganda has a total of 27 universities, out which 5 are publically owned and 22 are privately owned while the total number of institutions is 139 including universities, colleges and other tertiary (Non-University) institutions.

Table 2- 1: Primary and Secondary Enrollment

Category of School Enrollment	**2005**	**2006**	**2007**	**2008**	**2009**
Primary 1-7: Grand totals	7,223,879	7,362,938	7,537,971	7,963,979	8,297,780
Secondary	728,393	814,087	954, 328	1,088, 744	1,194,454

S1-S6					

Source: UBOS Abstract 2010

Table 2-2: Higher Institutions Enrollment 2006-2007

		2006			2007		
Institutions	**No.**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
Universities	26	46,475	34,712	81,187	55,169	41,880	97,049
University colleges	12	46,475	34,749	81,224	11,094	8,939	20,033
Technical Colleges	6	1,848	132	1,980	1,844	116	1,960
Commercial Colleges	48	9,786	9,053	18,839	8,512	8,671	17,183
Management	8	2,000	2,156	4,156	1,789	2,046	3,835
Health/Medical	15	2,108	1,024	3,132	2,167	1,116	3,283
Agricultural & Forestry	6	1,370	281	1,651	1,305	407	1,712
Theological Colleges	2	850	248	1,098	1,024	64	1,088
Law Devt Centre	1	500	300	800	500	300	800
Grand Total	**124**	**111,412**	**82,655**	**194,067**	**83,404**	**63,539**	**146,943**

Source: Uganda Bureau of Statistics Abstract 2010

Due to the increase in the number of higher education and tertiary institutions, more graduates are getting out of these institutions. With the government's policy of focusing on disciplines key to national development, the enrollments in science and technology has continued to rise, for instance there was a 5 percent increase rate from 2005 to 2006 (NCHE, 2007). There is need for a serious effort to have internships with the labour market and practical training in the world of work. It is therefore imperative for higher education institutions and the economy to develop mechanisms for continuous and sustainable interface between institutions, R&D, and the market.

In spite of the commendable economic performance, the country continues to face some challenges which have undermined achieving much faster economic growth and socio-economic transformation. In particular, although the industry sector now accounts for 24 percent of GDP, industrial development in Uganda is still faced with inter alia, the following constraints

- Inadequate technologies for the processing of agricultural and mineral products
- Inadequate industrial institutional support services for the development of a competitive industrial sector
- Lack of entrepreneurship development and MSMEs support institutions
- Limited scope and linkages for forward and backward integration of industries
- Lack of engineering industries, especially industries producing capital goods, intermediate goods, spare parts and components, all of which have restricted Uganda's choice of technologies for industrialization, in particular for product design, production and maintenance know how
- Inadequate skilled industrial human resources including managerial and critical skills such as entrepreneurial capabilities, engineers, technologists, and technicians
- Inadequate infrastructure conducive for industrial development and utility services, especially insufficient energy supply, poor road networks, lack of railway networks, little piped water for production, etc.
- High cost of accessing capital and low technology development; all of which contribute to the high cost of production for domestic industries and are barriers to industrialization

The industrial sector is for instance contributing 24% of the country's GDP, while Agriculture, services and others contribute 22%, 48%, and 6% respectively (UBOS, 2010) compared to Tanzania with 24.2% industry sector contribution to GDP, (URT, 2010). The low contribution of the industrial sector to the annual GDP is attributed to slow growth in the manufacturing sector. With the need to change the mindset of Africans and Ugandans in particular with respect to doing business and work attitudes, business and technology incubators will contribute to addressing the above constraints.

2.3.1 An Overview of Micro, Small and Medium Enterprises in Uganda

There is great diversity in the definition and classification of micro, small and medium sized enterprises (MSMEs) among countries. Several criteria are used to define small businesses. The most widely used key criteria in categorizing enterprises include number of employees, annual sales turnover, and capital/total assets. The Ministry of Finance, Planning and Economic Development (GoU, 2007) gave the following definitions:

Table 2-3: Definition and Classification of MSMEs

CRITERIA	MICRO ENTERPRISE	SMALL ENTERPRISE	MEDIUM ENTERPRISE
Number of employees	< = 4 employees	< = 50 employees	> = 50 employees
Sales Turnover	< = 12 million UGX	< = 360 million UGX	> = 360 million UGX
Total Assets/Capital	< = 12 million UGX	< = 360 million UGX	> = 360 million UGX

By these definitions, MSMEs contribute approximately 75 percent of Uganda's gross domestic product (GDP) and employ approximately 2.5 million people, signifying their importance in the economic development of Uganda. But, at the same time, MSMEs have operational and structural challenges. Studies have shown that 70% of the new firms in Uganda don't survive first year (Hatega, 2006), while in Europe they don't survive the third year and that the number considerably falls to 15-20% among those that are incubated (Akcomak, 2009).

The obstacles that affect MSMEs' ability to compete favorably include: limited information on financing products; poor managerial practices; lack of technical training and advice in small businesses; problems in accessing resources and inputs, technology, skills; inability to access product/process standard and certification services; constraints of packaging, labeling, branding and marketing; and other infrastructural support (lack of work place and storage facilities, etc.) required for effective operations as business enterprises. Many of which operate in the informal sector with little collaborative relationships (MFPED, 2007; MTTI, 2008).

Micro, small and medium enterprise development is the responsibility of a wide range of government ministries and institutions, private sector associations and agencies. A large number of non-governmental organizations are also included in MSME development. A well coordinated policy framework and institutional mechanism to support MSME development is still lacking. However, the promotion and development of micro, small and medium enterprises is the responsibility of the Ministry of Tourism, Trade and Industry with the support of the Ministry of Finance, Planning and Economic Development, but the role clarity is somewhat lacking.

Therefore the ultimate responsibility for the development and promotion of MSMEs sector in Uganda cannot be pointed out in perhaps a clear manner. Despite the existence of business, vocational, management skills institutions, member business associations, chambers of commerce up to the grass-root levels and other donor support programmes for MSME development in the country, there is sometimes duplication of work/programs across agencies, government departments and ministries - which certainly derails efforts to develop the MSME sector.

It is stressed that technological innovation and the associated institutional adjustments underpin long-term growth and must be at the center of any strategy to strengthen the private sector (UN, 2005). The emergence of the cluster based development strategy termed as "new innovation system" based on the cooperation among universities (research institutions), industry and government has been reported greatly to have brought a wide range of support services worldwide for development of knowledge based businesses, with linkages to universities , research institutes, venture capital and international joint ventures. Clusters affect competitiveness within countries as well as across national borders (McCormick, 1999; Porter, 1998)

Additionally, business incubation focusing on national/regional strengths through clustering and networking is believed to help small enterprises grow and contribute to industrialization (McCormick, 1999). Business Incubators often provide young firms with a shared space business and professional services, and access to sources of funding that are difficult for young firms to acquire on their own. A great majority of incubators are connected to institutions such as universities, communities, research institutes, consortiums, government administration councils, and Non-government organizations.

2.3.2 Building Entrepreneurial Communities in Uganda

Enterprise Development is growing in popularity as an approach to community economic development. Its goals are to create wealth for owners and employees by helping entrepreneurs start and grow their businesses. Conceptually, entrepreneurial functions and activities may be performed by individuals or by corporations. They may involve relatively small amount of resources as in the case of family small scale enterprises or they may be large scale venture capital operations. They may be conducted by a new business enterprise established for the entrepreneurial tasks or carried out within an established firm as a new line of activity, hence intra-preneurship.

Entrepreneurship and entrepreneurs are usually associated with the initiation of business ventures that promise to be profitable, the responsibility of making basic business policy decisions that determine the course of the enterprises and the innovations concerning new products or new production methods or forms of business operations. An entrepreneur is invariably the one who commits the capital and bears the risk (Sieh, 1989; Lichtenstein et Al., 2004)

This definition highlights two important attributes of the entrepreneurial process: opportunity and innovation. Micro, small and medium enterprises have been recognized in the national economies for their contributions, employment creation, skills development, regional economic growth. Uganda's entrepreneurship sector is among the most vibrant in the world according to the recent global entrepreneurship surveys, but faces a challenge of keeping businesses afloat.

Uganda has also taken strong considerable efforts in restructuring the existing higher institutions of learning and supported establishment of new ones with particular emphasis on building entrepreneurial skills, started promoting students capacity to transform ideas into business proposals, application of information and communication technologies, as well as actual products and services for local and regional markets.

However, with the students/ graduates developing practical skills in enterprise creation and tested innovative ideas, they will need support institutions and infrastructural facilities, such as financial institutions, venture capitalists, business and technology incubators to nurture new enterprises through providing critical services in the early stages of enterprise development.

Importantly, entrepreneurs would be better equipped to succeed in their investment plans if they have available the required skills and capabilities at the level of firms and support institutions. With this approach, the benefits of BIs can be attained in a distributed manner and can efficiently stimulate industrial development.

Uganda has got a number of business support organizations offering services intended to help SMEs/firms grow and break even. These organizations include those set up by private sector operators and those that are affiliated to the government. The key among government ministries and agencies include: Ministry of Tourism, Trade and Industry, Ministry of Agriculture, Animal Husbandry and Fisheries, Ministry of Finance, Planning and Economic Development, Uganda Investment Authority, Uganda Revenue Authority, Uganda National Bureau of Standards, Uganda Export Promotion Board, Uganda Industrial Research Institute, Management Training and Advisory Center, etc. while the private organizations include: Private Sector Foundation of Uganda, Enterprise Uganda, Uganda Manufacturers Association, Uganda National Chamber of Commerce and Industries, Microfinance institutions, Uganda Small Scale Industries Association, and Non-Government Organizations.

The services that they offer vary and they include:

- Entrepreneurship training programs that range from marketing and selling strategies to financial and business management;
- They also facilitate and structure business linkages especially linking small and medium enterprises to larger and older organizations;
- They also help firms install and implement quality control systems to improve the products and services.
- They also offer business start up training to youth planning to set up businesses and help SMEs to participate in international trade fairs where they market and create awareness for their products.
- The government has also promoted the policy of microfinance as a tool for powering micro, small and medium enterprises in offering credit facilities.
- Some offer grants as seed money for acquiring machinery, rent offices, training, etc.

There have been some good results from these programs, but there are also a large number of problems. Thus, with all the above interventions, the statistics on SMEs failing are appalling. In order to propel businesses forward and support their operations to higher and acceptable standards which will lead to productivity, sustainable growth and industrialization, investing in infrastructure especially in the institutional and support infrastructure/ facilities is more appropriate and only then will the above measures attain the sustainable impact. One of the proposed institutional support infrastructures is through business incubation centers.

CHAPTER THREE: METHODOLOGICAL CONSIDERATIONS

3.1 Introduction

This chapter introduces the research strategy and the methodological techniques applied. The limitations have been also defined. The research strategy adopted was inspired by Participatory Action research. It also involves interviews and surveys from different stakeholders within Uganda, Tanzania and Sweden. The work presented so far is what has been done within the Ugandan situation and in literature review. Such a focus led to involve many stakeholders including representatives of several government ministries and agencies, community based and business development organizations or associations, environmental organizations, academia, private businesses and cooperative societies. It is both practice- and theory-driven research for potential benefits. An action research approach was seen to be appropriate.

3.2 Participatory Action Research

Action research is known by many other names, including participatory research, collaborative inquiry, emancipatory research, action learning, and contextual action research/ action learning, but all are variations on a theme. "Action research...aims to contribute both to the practical concerns of people in an immediate problematic situation and to further the goals of social science simultaneously. Thus, there is a dual commitment in action research to study a system and concurrently to collaborate with members of the system in changing it in what is together regarded as a desirable direction (Dick, 2000) Accomplishing this twin goal requires the active collaboration of researcher and client, and thus it stresses the importance of co-learning as a primary aspect of the research process" (O'Brien, 2001; Dan MacIsaac, 1996).

Participatory Action Research provides means to measure results against initial goals and identify critical elements within a project to advance the desired outcome (Rydhagen, 2002; Simba, 2010; Otine, 2011; Lating 2009). The methodological approach was inspired by the Participatory Action Research (PAR), as a collaborative approach which involves all partners in the process and recognizes their strengths. It is motivated by the triple helix concept and trans-disciplinary knowledge production (Mode 2) (Gibbons et al., 1994). The research has adopted both quantitative and qualitative methods (Yin, R. K., 2009; Creswell, J.W. 2008; Driscoll et al., 2007).

To address and achieve objective one, and partly two of the research, in addition to updating the earlier information gathered during the previous studies, the following studies and surveys were done;

(i) Formulation of the National Industrial Policy

(ii) Needs Assessment survey for the artisans, handicraft and small agro-processors under the innovation systems and clusters program

(iii)The Science, Technology and Innovation Indicators status in Uganda

(iv) Introduction of the Value addition and utilization of locally available resources program named 'One Village One Product Program' in Uganda

3.3 Data Sources

Multiple data collection methods were employed for data collection from the primary data and secondary data sources. We administered questionnaires and conducted interviews with stakeholders, held group discussions and analysis. The purpose and focus of the data and information collection was to identify the relevant literature and background information concerning the subject; the approved policies, proposed initiatives and the implementing agencies/ service providers and how they can deliver effectively to meet the needs of their clients.

The main objectives were to add to the existing knowledge of the needs of the MSMEs and start-ups, identify awareness, requirements and barriers particularly when starting or growing a business in order to find most appropriate ways to enhance service delivery, promote science, technology and innovation and how best to engage the triple-helix for effective business support services.

Ultimately, the research is investigating the elements, strengths, and weaknesses of the existing BIs locally, regionally and internationally. It is also focusing on the actors, the linkages and the factors that affect the successes or failures. The research has limitations particularly in obtaining data during the interviews and surveys. Access to some private companies and some sensitive institutions like banks, security organizations, and health centers for their organizational and internal issues was not possible. Where they did agree, it was sure that data was not genuine and this could undermine the accuracy of the information.

3.3.1 Secondary Data Review

An extensive literature review from a wide range of selected articles from journals, government policies and publications, technical documents, reports and books was carried out to inform both the approach used, the focus of the work and analysis of the content. This involved conceptual and literature review on industrialization, entrepreneurship and business incubation and triple-helix; and their impact on business development and industrialization process. This led to an in-depth understanding of the incubation process, the actors and the environment. It helped in identification of the problem and the mitigating factors to improve the situation in Uganda. The analysis also informed the design and conduct of interviews and surveys.

3.3.2 Primary Data Collection

Primary data collection covered informal group discussions in different workshops and meetings attended to introduce the research topic and the scope in order to buy their support when it comes to data collection.

Semi-structured Questionnaires for the interviews and Surveys were developed, pre-tested and used to collect data face –to – face from the stakeholders in Uganda to enable the collection of in-depth qualitative information i.e. views and experiences from business owners and stakeholder organizations/ support service providers. Informal sessions with stakeholders were organized whereby stakeholders were randomly selected based on the sub-sectors selected and interviewed according to the set questionnaires. The semi-structured interview format was selected and used since it allowed those interviewed to add comments and issues to those already identified in prepared sub-sections and questions.

This research coincided with the earlier plan for conducting the Research and Development, and innovation survey, which were very relevant to this research. So these surveys were conducted to give background information. The innovation survey assembled data on innovators and non-innovators, depending on the structure of the questionnaire and the nature of the data. "Innovators" were defined as enterprises or institutions or organizations that have over the last three years introduced a new product or a new process, have tried, or are still in the process of doing so, where "new" was defined as significantly improved and completely new, and where a distinction is made between products new to the firm (but not necessarily new to the market) and products new to the firm and to the market. A sample of stakeholders in this case for R & D and Innovation surveys, included; government, businesses, education institutions, business support service providers and associations.

3.3.3 Analysis

Although, data collected was mixed, some with incomplete quantitative data, information about funds and expenditure and thus important data to assess genuine situation was jealously guarded. The analysis of data was done based on the data collected, the qualitative and quantitative and conclusions were drawn. Analysis of the data collected helped the authors to develop strong evidence from the investigations and in generation of the papers that were published and presented in the conferences and workshops. This contributed in the dissemination of the results and obtaining further comments for future improvements.

All the ethical rules and regulations have been followed bearing in mind the confidentiality issues. The Analysis methodology mentioned above was inspired by distributed knowledge processes (Nowotny et al., 2011). It is focusing primarily on the issues of long term strategies, innovation indicators as well as collaboration and partnerships.

The references for this Part I are found at the end of Part III (page 87)

PART II

CHAPTER FOUR: INTRODUCTION TO THE PAPERS

This licentiate thesis is a compilation of four papers as outlined below.

Paper I: Mutambi, J. (2008). *Advancing Value Addition and Competitiveness through Standardization to Promote Manufacturing*.

Proceedings of the 2008 Annual International Standards Conference (AISC) June 09th – 12th, 2008, Kampala Uganda

Given today's increasingly competitive business environment, this paper introduces the importance of manufacturing sector as the main engine of structural transformation and critical to changing and modernizing Africa's economic structure. Manufacturing and processing of value added products for domestic consumption and export is important for Uganda's economy and Africa in general to realize Millennium Development Goals.

The paper gives the overview of manufacturing and how it can be the driver of growth and productivity in other activities: agriculture, information-based services, finance, construction, logistics and so on. It further explains Africa's relatively weak position and performance with reference to determinants of industrial development, in particular human resource development, infrastructure, technological effort and government policy frameworks.

Although Uganda has taken major initiatives to improve the enabling environment for private sector led industrialization, it is still faced with major obstacles for sustainable industrial development and investments in the country. The key drivers for investment, productivity improvement, and competitiveness all in the perspective of advancing manufacturing and value addition and their linkage to globalization were discussed.

It concludes by providing recommendations to the constraints which include: Government to recognize the catalytic role of manufacturing; consider factors for advancing value addition, productivity and standardization; Formulation of strategic policies and adaptation of modern technologies; and promotion of cluster based approaches.

Paper II: Mutambi, J. (2009). *Institutional and Support Environment to Cluster Based Development Approach in Uganda.*

Proceedings of the 12th TCI Learning Clusters Annual Global Conference, 13th October 2009, Jyvaskyla, Finland

Due to globalization and liberalization, the business environment has become so competitive and demanding in terms of quality, speed of response, price and volume. Most of the SMEs in Africa and in Uganda in particular have not been able to respond to this challenge. Uganda government while recognizing the contributions made by SMEs, like any other developing country has no choice but to provide policy and institutional support towards development of SMEs. This paper presents the related support initiatives and institutions and the kinds of support to cluster based development approach in Uganda.

It further discusses the specific areas that need to be addressed in order for the small and medium firms to become competitive and improve their productivity especially those involved in manufacturing activities and services sector through clustering concept. It concludes by recommendations, among them strengthening networking and collaboration between the firms and among the cluster key actors.

Paper III: Mutambi, J., Byaruhanga, J. K., Buhwezi, B. K., Trojer , L. and Lating, P. O. (2011). *Transferring Best Practices for Uganda Technological Innovation and Sustainable Growth*

Proceedings of the 2nd International Advances in Engineering and Technology Conference of Makerere University, 31st Jan-2nd Feb, 2011, Entebbe- Uganda. ISBN: 978-9970-214-00-7

Uganda is not alone in the drive to promote Science, Technology and Innovation (STI) as a means to social economic development. Promotion of STI is high on the Agenda of African Union countries. Indicators are useful not only for monitoring global scientific and technological development trends but also for formulating, adjusting and implementing STI policies. Scientific and industrial development evaluations and policy-relevant assessments are based on relatively sophisticated combinations of statistics on science, technology and innovation, such as various inputs, outputs, and process indicators. This paper indicates how Uganda has not been producing primary STI indicators like many of other African countries. The STI indicators paper is aimed at providing primary indicators using a survey and questionnaires methodology to evaluate the performances of businesses, institutions and government agencies in respect to technological innovations, human resource development and training, expenditure on Research and Development, etc.

The paper discussed the core indicators of Research and Development (R&D), and Innovation. The paper further explored the potential benefits of business incubation. It concludes by indicating that most innovations take place in small and medium enterprises, and that more support is needed for Research and Development and innovation activities.

Paper IV: Mutambi,J., Byaruhanga, J. K., Buhwezi, B. K. and Trojer , L. (2010). *Research on the State of Business Incubation Systems in Different Countries: Lessons for Uganda*.

African Journal of Science, Technology, Innovation and Development, Vol.2, No.2, 2010, pp. 190 – 214.

Uganda, like any other country in the world recognizes and promotes micro, small and medium size enterprises for their role in economic and social development. A lot of support programs such as technical assistance, capacity building-training programs and other incentive schemes have been provided, but this has not created an impact on business growth and industrial development. One strategy proposed to nurture new venture small firms and foster their survival and growth which can lead to industrial growth is through business incubation.

In this paper, an overview of the status of business incubators in different countries, developed and developing was presented. The role played by business incubators was discussed and the main lessons learned for Ugandan situation were presented in the final part of this paper.

4.1 Paper 1

Advancing Value Addition and Competitiveness through Standardization to Promote Manufacturing

Joshua Mutambi

Abstract

The Manufacturing Sector is one of the main sectors in the Uganda economy and it is divided into formal and informal manufacturing. The total contribution of the manufacturing sector to GDP was 8.4 percent in 2006. (Business Register Report 2006/07-UBOS). Overall there was an increase of 32% of the manufacturing businesses in 2006/07 compared to 2001/02 in Uganda. Manufacturing is the process of taking resources and through packaging, processing, fabrication and/or assembly transforming the resources to a physical product demanded in the market place.

The businesses in this sector include those engaged in the following activities: Processing of meat, fish and dairy products; coffee processing; grain milling; tea processing; bakery and manufacture of other food products; manufacture of beverages & tobacco; manufacture of textiles and leather products; sawmilling, printing & publishing; chemicals and chemical products; manufacture of plastics; manufacture of metal products; and manufacture of furniture.

A thriving manufacturing sector is vital to the developing economies and their citizens as manufacturing businesses generate jobs, hence incomes to support service industries and public services. However, the sector is faced with changing challenges, and advancing value addition and competitiveness through standardization will respond to the sector's value and opportunities, which will promote high performance practices, Science, Technology and Innovation, as well as building the skills of the manufacturing workforce.

Manufacturers in Uganda like their counterparts in the region face stiff global competition and must continually improve their products and processes to stay competitive. Their success will depend on continuously integrating new technologies and innovations, adding increasing value to products, reducing waste to processes and having access to resources such as capital, raw materials and most importantly a high skilled, flexible and involved workforce. (Supply chain).

To maintain the growth of the manufacturing sector, both the public and private sectors need to respond by creating new high performance work environments (infrastructure development) and providing flexible, responsive education and job training programs that are competency-based, responsive to the demands in a rapidly changing labour market and are tied to new technologies, customer needs, and evolving production processes.

From the commonly available indicators and factors of competitiveness in comparative framework, it is evident that most African business environments still have serious short comings compared with their international competitors. This paper will discuss factors needed to improve productivity, value addition and competitiveness for the African and the global markets. To achieve manufacturing that meets customer specifications and delivery dates (value addition and competitiveness), the paper suggests broad benchmarks and initiatives that are linked with the solution of problems.

***Keywords*:** Clustering; Competitiveness; Innovation; Manufacturing, Value addition

1. INTRODUCTION

Since the industrial revolution, manufacturing has helped define economic development. Manufacturing is the process of taking resources and through packaging, processing, fabrication and/or assembly transforming the resources to a physical product demanded in the marketplace. In developing nations, manufacturing has consisted primarily of processing raw resources into semi-processed goods. These goods are then further processed into products. The additional processing usually takes place in areas close to the marketplace resulting in a clustering of the required technology, capital, services, management and workforce. Over time this centralization of value added production made regions and cities with large urban populations strong in manufacturing development while developing nations remained dependent on primary resource production.

Manufacturing has been, and remains, the main engine of structural transformation. While its contribution to GDP in most countries reaches a peak at 30-40 percent and then declines as modern services grow, its contribution to development is much more significant. It is this contribution that Africa has failed to tap. Manufacturing is critical to changing and modernizing Africa's economic structure. It is the main avenue for applying new technologies to production and for raising technical and managerial capabilities. It is crucial to raising and diversifying exports, moving the region from its continued dependence on low value-added and unstable primary products. It is necessary to create new skills, work attitudes and institutions. And it can be the driver of growth and productivity in other activities: agriculture, information-based services, finance, construction, logistics and so on.

The manufacturing sector in Uganda is still very young, small and dependent on imported goods. It is characterized mainly by processing of agricultural raw material and production of basic consumer goods. Around 40 percent of all manufacturing firms are engaged in agro-industries, only very few are operating in capital goods industries often with rather low value added, the rest are in industries such as plastics, steel and construction products (Mugisa 2004, 24-5). The

sector is preliminary concentrated on small manufacturing, production for the domestic market and by little standardization of products, thus being affected by specific market characteristics such as small market size, high level of smuggling, and insecurity in the North. A few have successfully penetrated regional (Rwanda, Burundi, eastern Congo) markets, or global (EU, USA) markets. Those engaged in for instance neighboring markets are generally well aware of regional competitive factors and gradually seek to enhance their competitive position. The recent opening of business opportunities in southern Sudan has resulted in a fairly active and strategic response.

Manufacturing has undergone significant change in an era of global competition, new information and production technologies and corporate re-structuring for economic use of resources. For governments, industry associations and community development organizations seeking to foster manufacturing sector development, a key lesson is the ability to take a coordinated and sustained approach to necessary conditions which will greatly increase the chances of success in expanding the sector in order to stay competitive or improve competitiveness in the global markets.(Dr. Aleef Suleman-2005)

Competitiveness in this case means the ability of enterprises to take advantage of the opportunities offered by globalization trends. Society has changed from a closed market and a closed manufacturing place to an open one. It is no longer necessary to have centralized manufacturing facilities. Functions could be distributed. Designs could be done in France, manufacturing done in Mexico, Malaysia or some other country where the costs possibly could be kept low; production planning could be done in USA, marketing strategies evolved in Hong Kong and service parts produced in China or South Africa. Such a globalization leads to a cross cultural dialogue between regional blocks, governments, corporations, societies and most importantly individuals. Manufacturing researchers have concentrated on manufacturing processes, materials and methods. Though these are still extremely important, it is becoming increasingly apparent that we also need to focus on the additional dynamics which is a result of globalization and information explosion.

We need to be aware of the procurement, production and distribution along with the feedback as the main components of manufacturing lifecycle in this globalization process and in order to accomplish this, it is necessary to be aware of the current technologies which includes required standards. (Standardization is the process of developing and agreeing upon technical standards. A standard is a document that establishes uniform engineering or technical specifications, criteria, methods, processes, or practices)

Globalization has shifted the paradigm for manufacturing. The customer is involved with the manufacturing of the product. The most important characteristics of manufacturing due to globalization are:

- Customers involved with the production of the part from cradle to grave (from design to usage: life cycle)
- Customers have access to data instantly
- Customers have access to different manufacturers
- Experts need to cooperate and collaborate with the customers
- Customers will get what they have requested.

The basis for Uganda's future prosperity and its ability to invest in the improvements desired will depend on the competitiveness of its existing and future industries. Competitiveness is not defined as the ability of the country to compete on the basis of its raw materials, cost of labor or other domestic resource costs. Rather, it is based on the ability to strategically position the industries in attractive markets and with attractive products; and this can only be done by advancing value addition, promote high performance and governing practices, Science, Technology and Innovation, as well as building the skills of the manufacturing workforce. An example is Mozal Project Scheme in Maputo –Mozambique (Masaki Miyaji, 2007)

Mozal S.A.R.L		**Mozal Phase 1**	**Mozal Phase 2**
①	Business	Aluminium Ingot Smelter	
②	Location	Maputo/Mozambique	
③	Construction start	May 1998	June 2001
④	Operation start	June 2000	April 2003
⑤	Production Capacity	280,000 tons	280,000 tons
⑥	Shareholders & Equity		
	Mitsubishi Corp	25 %	
	BHP Billiton	47 %	
	IDC	24%	
	Mozambican Govt	4%	
⑦	Total Cost	US$1,200 Mil	US$710 Mil
⑧	Employee	1,135（ as of Aug 2006）	
⑨	Reduction Technology	AP35（ Pechiney Technology） ---Upgraded in 2006 from AP30	
⑩	Electricity Supply	Supplied from South Africa	
⑪	Alumina Supply	Supplied from Australia	
⑫	Aluminium Ingot Offtake	Pro-rata basis	

Key Drivers for Investment:

The private sector will have to adopt a more competitive approach, focusing on higher value products and services, where value is added because of better market linkages, as the main outputs. The classic industrial engineering definition of Value Added is, "actions or activities

that change the form, the fit, the function of the product being manufactured and, this is important, the changes are something the customer is willing to pay to have happen."

In addition, Productivity, which is simply defined as the value per unit of input, the better use of human, capital, and natural resources will all be increasingly the determining factors for Uganda's success and the region as well. Individual firms cannot become competitive and stay competitive in the global market on their own; building competitiveness involves sustained change throughout the value chain: This close interplay between firms, their suppliers and the business environment is why competitiveness theorists and practitioners focus on "clusters" as the locus of action.

Clusters are "geographical concentrations of interconnected companies, specialized suppliers, service providers, and associated institutions in a particular field" (Porter, 1998) .Associated institutions might include: educational and training institutions that build the workforce; research institutions that generate scientific knowledge for technological change; banking and financial institutions; government institutions, whose policies and practices have an impact on the industry including standards developers and regulators (National Bureaus of Standards or Commissions of Standards); and providers of infrastructure, both public and private.

The ability of African countries to develop competitive manufacturing sectors will therefore depend on the quality of African business environments, and labor forces relative to those of the export powerhouses of the developing world. Thus, to advance manufacturing competitiveness, numerous major bottlenecks need to be addressed that will focus on manufacturing modernization, including policy uncertainty, poor access to finance, insufficient energy supply, slow technology transfer, focused training and general business support with governance as a cross-cutting theme.

2. Status of Manufacturing Sector in Africa

Manufacturing sectors in most African countries remain small compared to other developing countries and have remained inward looking with the exception of Mauritius and recently Madagascar. For the sample of African countries, growth in manufacturing over the period 2000 – 2002, was in the range of 3-5 % range annually with the exception of Mozambique which grew at over 9 %. In Mozambique, high growth rates could be attributed to Mega –investments in capital intensive projects like Mozal. In addition, few African firms export at least 20% of their sales, particularly given the smaller size of their domestic markets.

Generally, the manufacturing sector in Africa is characterized by the smaller share contribution in GDP than the average LDCs, smaller size of manufacturing export than the average LDCs and a smaller contribution of the textile industry. The manufacturing development in Asia (East and South East Asia), for instance, started from the textile industry and shifted to the capital intensive

and technologically sophisticated industries (i.e. Automobile and electric appliances industries). The Asian LDCs income levels are quite similar to the African countries, yet African countries have lagged behind in industrial development. Is the difference in business environment, human capital, or industrial policies?

After trade liberalization, massive imports have been realized in African markets including those from South Asia. A few countries had realized increase in exports due to FDI, but have since stagnated or reduced at all in others. Therefore, free trade has not facilitated growth in local firms in Africa unlike in Asia. In a liberalizing world, export success is a good indicator of industrial competitiveness. The table below shows selected economic indicators from the World development indicators which gives the figures and clearly can be seen how low levels of percentages of GDP are for manufacturing growth and exports of African countries.

	GNI per capita, $	Trade % GDP	Ag, % GDP	Investment (FDI*), %GDP*	Mfg, %GDP (growth*)	Mfg exports %GDP*	Mfg, % mrch exports*
Eritrea	160	111	21	39 (5.3)	8 (5.4)	-	-
Ethiopia	100	49	52	18 (1.2)	7 (5.0)	0.5	9.8
Mozambique	210	79	23	40 (8.6)	13 (9.2)	1.1	7.5
Nigeria	290	81	35	20 (2.4)	4 (3.7)	0.2	0.2
Senegal	480	38	18	18 (1.3)	13 (7.3)	7.9	37
Tanzania	280	71	45	17 (3.7)	8 (5.9)	1.5	18
Uganda	250	40	31	20 (2.6)	10 (2.9)	0.3	6.5
Zambia	330	75	22	18 (2.9)	11 (4.5)	3.7	17.0
Kenya	360	57	19	14 (0.4)	13 (1.0)	3.8	22.2
Botswana	2,980	126	2	27 (1.1)	5 (3.3)	-	-
Mauritius	3,850	127	7	25 (2.5)	24 (5.6)	23.4	77.5
Madagascar	240	56	27	14 (1.3)	12 (-4.1)	8.0	49.8
China	940	52	15	37 (3.7)	38 (8.7)	19.3	88.4
Bangladesh	380	33	23	23 (0.3)	16 (5.6)	12.0	92
India	480	31	23	22 (0.6)	15 (5.6)	6.7	76.5
Algeria	1,720	61	10	23 (1.6)	8 (-1.0)	0.8	2.3
Morocco	1,190	66	16	25 (4.2)	17 (4.0)	14.0	64.1
Bolivia	900	49	15	16 (9.3)	15 (1.9)	2.8	16.9**
Guatemala	1750	47	23	17 (1.3)	13 (1.3)	4.1	35
Nicaragua	720	73	18	29 (5.0)	14 (1.2)	2.2	13.2
Peru	2,020	34	8	19 (2.6)	16 (3.5)	2.8	21

*Marked values are 2000-2002; others are most recent. **2002 value; oil/gas have reduced this from 40% in 1999.
Source: World Bank, *World Development Indicators 2004* (Washington, DC: 2004).

Slow growth and low export levels in manufacturing imply that African firms are characterized by low (though varying) levels of competitiveness. This is borne out in the data on specific obstacles to firm development and is also illustrated by a number of broader benchmarks.

Value added per worker (Y:L), the traditional measure of labor productivity Y:L is not a measure of the intrinsic productivity of workers or a direct benchmark of success or efficiency, in part it reflects the level of capital intensity.

Capital intensity measures the success of African countries in fostering labour intensive manufacturing along the lines of their potential competitive advantage in low cost labour. It's noted that capital intensive countries have smaller labor costs as a share of total costs.

In addition, African firms use their large quantities inefficiently; labour costs are one candidate for the source of African firms' lack of competitiveness, high capital intensity and low efficiency. Unit Labor costs measures the average cost of labor per unit of output defined in U.S dollars, as (wL/Q)*1/e; where w is the manufacturing wage; L is the amount of labour employed; Q is the physical measure of output; and e is the exchange rate (domestic currency per US dollar).

By definition, Unit labor costs are high in countries that have high wages and low value added per worker. For a country to have low (competitive) ULC it has to do a combination of three things.

(i) Keep nominal wages low,
(ii) Keep its exchange rate competitive, or
(iii) Increase its labor productivity.

From the above discussions, the following facts can be concluded;

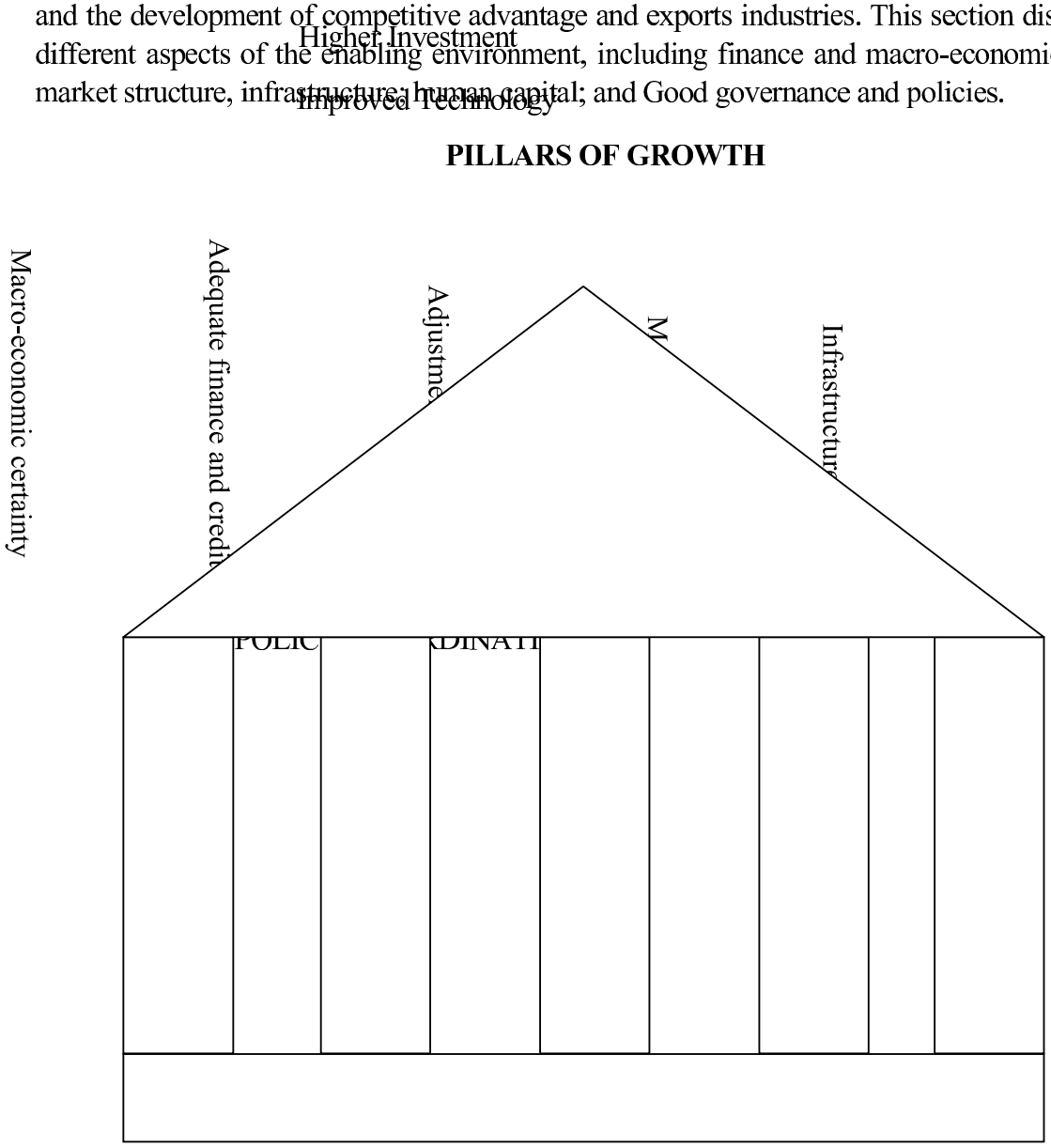
- African firms face relatively high labor costs relative to productivity
- Aggregate costs across African economies are very high, pushing up firms' costs and pushing down workers' real wage incomes.
- African workers' real wage incomes are in fact very low
- Labor costs account for a relatively small share of the total costs of African firms.

Therefore, Competitiveness must come from increased productivity and largely from lower non-labor costs and greater development of worker skills. Emphasis on improving productivity must include the business environment factors that drive up non-labor costs and drive down productivity in Africa. Such factors are associated with weak financial systems, macroeconomic instability, concentrated market structure, infrastructure and service deficiencies, over regulations, corruption, and poor security in some areas.

3. Enabling Environment: Necessary Conditions for Investments and Exports in Africa

The Policies, institutions, and infrastructure maintained by African governments and the effects they have on transaction costs are crucial in encouraging or discouraging, firm specific learning

and the development of competitive advantage and exports industries. This section discusses the different aspects of the enabling environment, including finance and macro-economic stability; market structure, infrastructure; human capital; and Good governance and policies.



3.1 Access to and cost of Finance

One of the most important bottlenecks facing industrial firms in Africa is access to reliable, inexpensive financing. By and large, compared with other developing nations say, East Asia, China and India, most African firms have less access to loans and overdrafts, use more internal funds, and retained earning to fund investments and operating costs, pay much higher interest rates, and are required to register many more assets as collateral. Market failures are rampant, small firms are less likely to get loans, cash flow problems are enormous, as funds are tied up in raw materials, finished goods inventories, overdue payments, and refunds owed by the governments. Weakness in banking sector, supplier-credit facilities, poor information,

communication and weak contract enforcement have led to a heavily cash based environment. Ugandan firms still report serous difficulties with finance. Interest rates and collateral requirements are still very high compared to other developing nations. However, some African governments and the government of Uganda in particular are progressively trying to address some of these concerns.

3.2 Macro-economic certainty

Although most African countries have made the most progress in basic macro economic stabilization, there are many more that have along way to go in building macro-economic environments conducive for private sector development. The uncertainty generated by rapid and variable inflation and exchange rate volatility increases transaction costs and hampers the abilities of firms to plan for the future in Africa compared to other developing countries where inflation and exchange rate volatility are low and external balances are stable. This affects productivity and competitiveness of African firms.

To fix the macroeconomic uncertainty, good monetary policies should be in place: (exchange rate policy, interest rate policy, and government borrowing policy), Fiscal policy-by limiting trade price distortions and have tax policies, strengthen banking sector, strengthen commercial courts and contract enforceability, and creation of industrial finance institutions.

3.3 Market access and adjustment Support

The Manufacturing industry in African countries has faced both market access and adjustment constraints; such as lack of inputs and costs, high local focus, low productivity, limited exports, and high competition. Market access and competition is key in producing efficient outcomes and incentives for value addition and innovation. African markets have remained highly concentrated, due to demand constraints, i.e. low incomes, high interest rates, un-sophisticated consumers, and lack of marketing.

However, some African governments have made some progress in advocating for increased market size and access; and establishment of industrial parks, Export Processing Zones, and recently promotion of industrial clusters to address production of sufficient and high quality volumes for the increasing markets, which in turn require larger amounts of raw materials. There are now some market access opportunities, such as AGOA, EU-EBA, and regional markets, (EAC, COMESA, SADC).

3.4 Infrastructure Constraints

There is a dire need of competitive and productive infrastructure in Africa. Economic sparseness is a considerable obstacle to the quality of infrastructure services on the continent, but it is clear the quality of management of infrastructure systems makes a big difference as well. The sector

has suffered greatly due to poor service providers such as electricity, and railway transport. The most recent progress has been made in telecom industry where the successful incorporation of private providers of cellular infrastructure in Uganda, Mozambique, Kenya, Zambia and other countries, has extended coverage and improved service quality significantly. The least progress has been made in electricity generation and supply with severe consequences for industrial firms. Deficient electricity service severely hurts competitiveness.

Many firms have their own generators, but the cost of privately supplied power is two or three times as high as that of public grids. In some types of production, especially of continuous process items like plastics and soap, the unexpected cessation of power can lead to weeks of lost production while machines are being cleaned.

Little progress has been made so far. Uganda has moved forward with restructuring and has redesigned policies to allow some private participation in energy development but the effects are yet to be seen. Furthermore, domestic transport costs are very high in Africa, and hurt exporters' competitiveness. It is more severe for land locked countries like Uganda, Zambia and Burundi.

3.5 Labor force skills and human capital development

The Quality of labor force and the accumulation of human capital are just as relevant for competitiveness as is physical infrastructure. Many African countries have difficulties in retaining highly educated workers or attracting skilled expatriates. Its observable that increasing efficiency is a key to firms being able to enter export markets, such efficiency will be linked to observable skills firms posses, amount of education and tenure of the workforce.

4 Concluding Discussion and Lessons for Uganda

(i). To be competitive in domestic and international markets (export markets), firms/ countries need to advance value addition, standardization and productivity by;

- Absorbing technology from the developed countries, either by attracting FDIs or improvement of the business environment
- Upgrading of the production systems, introduce new high-tech equipment and cleaner technologies, employing skilled and experienced human resource personnel, invest in skills development, R&D for new products, and improve on quality of products.
- Encourage sub-contracting terms from large companies to small and medium firms. Labour intensive industries, including service industries must also be encouraged as it improves the conditions for transfers of technology and know-how.
- Invest in marketing research and market information systems
- Policy support and harmonization of technical standards and regulations, because standards have increasingly become crucial elements in facilitating transactions and trade within and between countries.

- Establish a national financing fund and support institutions to facilitate the commercialization of R & D.

(ii). The catalytic role of manufacturing industry needs to be acknowledged. It is vital or center for the following;

- Application of technological progress to production,
- Innovation,
- new skills and attitudes,
- modern institutions and legal structures,
- beneficial externalities from innovation and skill creation for other activities,
- direct demand stimulus,
- internalization of the economy, and
- modernization of national industrial enterprises

(iii). Modernization of equipments and strategic policies: In the advanced countries, where all the above mentioned constraints have been addressed, a new technology or a new approach to manufacturing and way of doing business has been adapted. This is the computer integrated manufacturing developed in 1974 by Joseph Harrington, (Advanced Manufacturing Technology, 2002). It encompasses all of the activities and processes necessary to convert raw materials into finished products, deliver them to the market, and support them in the field. These activities include the following:

- Identifying a need for a product
- Designing a product to meet the needs
- Obtaining the raw materials needed to produce the product
- Applying appropriate processes to transform the raw materials into finished products
- Transporting products to the market
- Maintaining the product to ensure proper performance in the field

Technology, measurements or standards are basic industrial needs. Cooperation and collaboration remain key to developing the required tools and capabilities. In modern manufacturing, integration is accomplished by computers and the benefits are as follows: Product quality increases; Lead times are reduced, direct labor costs are reduced, product development times are reduced, inventories are reduced, design quality increases, and overall productivity increases.

(iv). Promotion of cluster based industrial development: A new approach to doing business and economic development planning to continually be able to compete globally has been introduced. This is the Industry Cluster concept. The cluster model emphasizes internal linkages, whereby cluster gains are furthered by local firm cooperation, local institutions, and local social capital.

External linkages also matter, global buyers can help local clusters access distant markets, acquire new forms of knowledge and upgrade.

Porter argues that it is the competition between rival firms in the cluster that drives growth because it forces firms to be innovative and to improve and create new technology. This, in turn, leads to new business spin-offs, stimulates R&D, and forces the introduction of new skills and services.

Local proximity to firms in all aspects of the production process, such as the suppliers, machine builders, assemblers, distributors, and final customers allows the cooperating firms to adopt new technology and innovations rapidly, therefore increasing the overall efficiency of the production process. This approach not only emphasizes growth of manufacturing sector but also more importantly concomitant growth of the supporting industries which incorporate the services sector

In short, cluster development is attributable to several key factors, including technology transfer, knowledge transfer, development of a skilled labor force in related industries, the benefits of agglomeration economies, and social infrastructure. Therefore, governments should build multilayered regional systems, to encourage cluster formations and the creation of high value chains.

In conclusion, to advance manufacturing competitiveness, numerous major bottlenecks need to be addressed; manufacturing modernization, policy uncertainty, poor access to finance, inadequate infrastructure, focused training and general support to National bureaus of Standards and other related standards service providers to achieve international standards equivalency (Accredited labs, skilled standards officials, and harmonized regulations and conformity standards).

References:

(1) Benn Eifert & Vijaya Ramachandran. 2004: Competitiveness and private sector development in Africa
(2) Chang, Y. (2002). Advanced Manufacturing Technologies and Changes in Work Organization. Science, Technology and Policy Institute
(3) Hitoshi Shoji. 2007: Comparative Analysis on Infrastructure Development South East Asia and Sub-Sahara Africa
(4) Mugisa, E. 2004: Uganda's Competitiveness in the EAC and COMESA Region, Report for the PSFU and UPTOP
(5) Masaki Miyaji. 2007: Experiences and Instructions of FDI (Foreign Direct Investment) in Mozal Project, Mozambique
(6) Report on the Uganda Business Register 2006/07
(7) Suleman, Aleef. 2005: Generic problems experienced on African continent.

4.2 Paper II

Institutional and Support Environment to Cluster Based Development Approach in Uganda

Joshua Mutambi

Abstract

Similar to other developing countries, Uganda recognizes the ability of Micro, Small and Medium scale enterprises to generate socio-economic benefits, value addition to local raw materials, and employment generation. To enhance competitiveness, innovation and networking within producer firms, clustering concept needs to be promoted and strengthened. Clusters drive productivity and innovation. Clusters are geographical concentrations of firms, suppliers, support services providers, infrastructure, producers of related products, and specialized institutions that arise in particular fields in particular locations.

Clusters can be initiated or emerge spontaneously based on market forces and the process of cluster formation will occur naturally as new firms form, suppliers develop, infrastructure investments respond to local needs, and specialized institutions and firms locate their operations in the growing cluster area and grow. This therefore calls for policy and public attention.

The key actors in the cluster development are referred to as "triple helix": Government for policies and support institutions; Private sector –business enterprises, large and SMEs, NGOs' and Foundations; and Academia – Universities, and R& D institutions

This paper highlights a number of measures that government has done aimed at stimulating economic growth with a demonstration of facilitating the cluster based development concept in Uganda

Keywords: Clusters; Institutional Support; Small-Medium Enterprises; Triple-Helix; Uganda

1. Introduction

Clusters commonly known as geographical concentrations of interconnected enterprises and associated support institutions are fertile environments for the development of inter-firm linkages, as spatial proximity and shared business interest facilitate collaboration.

The Government of Uganda (GOU) emphasizes on enhancing the performance of the local business community while also promoting the transfer of skills and knowhow to the entire value-chain actors through the Public-Private Partnership. In its pursuit to achieve high and sustainable economic growth and prosperity for All Ugandans, the GOU has the responsibility to create conducive environment for investment and growth (PEAP)

In recognition of the importance of small scale firms that require initial support to enter far-reaching business networks, the government has initiated various appropriate policies and programs. As a member of the EAC, it's stipulated in the EAC Treaty as well. Article 80(1)(c) of the Treaty for the Establishment of the East African Community provides that one of the strategy and priority areas for regional cooperation in investment and industrial development in the EAC region shall be facilitating the development of small and medium scale industries including sub-contracting and other relations between larger and smaller firms. To me that is the cluster based concept, which should be taken advantage of.

There is a political will to promote clusters; the government highly supports researchers and scientists in areas that are relevant to transforming the economy. GOU recognizes that Science and technology are key in the improvement of health, agriculture, industrial development, economic competitiveness and environmental sustainability." For instance, every year a national science week is held to raise awareness on the essential role of science and technology in Uganda's socio-economic development and to award prizes to the best innovative role models including medical doctors, teachers, technologists, researchers, engineers, nutritionists and science and technology-related entrepreneurs.

2. Related Support Initiatives to Cluster-Based Development Approach

Based on the above policy strategies, the government wishes to strengthen the SMEs or firms with the capacity to a collective vision of the opportunities available to them, and seize these opportunities through coordinated collective initiatives. The following programs and institutions are in place explicitly intended to promote capacity building in formal or informal income-generating activities at the national as well as at the local levels of government. The areas of support include; access to finance, access to knowledge and skills, and others like marketing access.

The identified existing programs and institutions supporting the operations of cluster - based firms and individual firms including associations to improve their effectiveness among others are;

a] The Competitiveness and Investment Climate Strategy (CICS)

The Competitiveness and Investment Climate Strategy (CICS), 2006-2010 Under Ministry of Finance, Planning and Economic Development. The CICS whose theme is 'Enhancing competitiveness through Public-Private Partnership' seeks to position Uganda to deal with the next generation of competitiveness challenges, by building on earlier efforts to improve the business environment, boost domestic activity and increase participation in the global marketplace. It also emphasizes the development and facilitation of clusters as a strategy. CICS has organized the cluster forum group meetings, the fourth one was held recently in august to discuss the popularizing of clusters development concept.

b. Presidential Science awards (2004)

In 2004, H.E the President of Uganda Yoweri Museveni introduced the Presidential science awards to promote the development and application of science and technology for economic transformation. The first Presidential Science and Technology Excellence Awards were presented to winning scientists in 2006. The second set of awards was announced in 2007 and presented to the winners at the closing ceremony of the National Science Week in 2008.

Achievements in scientific and technological innovation and application in the fields of agricultural sciences, veterinary sciences, military sciences, natural sciences, engineering, biotechnology, earth sciences, medical sciences, space sciences and information and communication sciences are also recognized. There is a potential of having these researchers attached or assisting clusters in all these fields.

c. Prosperity for All Programme

In order to improvise finances and capacity building for a number of people in rural areas the President of Uganda initiated the **Prosperity for All Programme** being his vision to try and put in place varied but integrated socio-economic programmes that mainly target the rural poor in order to transform them into productive and prosperous communities. It is prosperity for all through production, value addition, agro-processing, improved marketing, savings and accessibility to affordable credit.

This programme today has enabled the creation and development of a number of SMEs in both the Urban and Rural areas as it has enhanced resource accessibility both financially and socially.

d. Microfinance Outreach Plan- Ministry of Finance, Planning and Economic Development

Microfinance Outreach Plan is a major initiative of Government of Uganda and Stakeholders in microfinance industry. The Matching Grant Facility Capacity (MCAP), an important component, is intended to facilitate accelerated growth of a sustainable and working microfinance capacity building market with well-informed consumers and better equipped suppliers of the services.

This component is intended to expand the outreach of financial services to rural areas. The interventions would involve the penetration of rural areas to increase the presence and accessibility, of MFIs and financial services, as well as developing, testing and promotion of new products to meet the needs of small holders and rural communities.

e. One Village One Product (OVOP) program - Ministry of Tourism, Trade and Industry (MTTI)

Ministry of Tourism, Trade and Industry (MTTI), through its Department of Industry and Technology, mandated to promote, expand and diversify an environmentally sustainable industrial base in collaboration with its statutory institutions, such as UNBS, UIRI, MTAC, has launched and established an institutional mechanism to promote and coordinate One Village One Product (OVOP) program this year which will include the cluster –based approach activities.

Cluster -based development approach to promote SMEs was approved in the National Industrial Policy (2008). The modalities of coordination will soon be finalized between Makerere and Ministry.

The (OVOP) programme (2009) is being implemented through improving the production, value addition and marketing of Value added products that can compete locally, regionally and internationally by utilizing primary agro-products and natural resources in which communities have comparative advantages. This program will strengthen the development of clusters in the country.

It is built on three principles, namely (i) self-reliance and creativity (ii) human resources development, and (iii) thinking locally but acting globally. Local people take the lead, independent of external prompting and largely on their own creativity and self-reliance, to make unique products from local resources for their own good and to capture markets external to their locality. In the process they develop their expertise through production of competitive products, their livelihoods improve due to enhanced incomes, and their communities develop closer bonds at the same time.

With reference to value addition and job creation the Government has promised to support where possible all small and medium industries/enterprises in terms of technology acquisition, skills development and market linkages. The clusters will again benefit out of this initiative.

Additionally, as a sign to improve agricultural productivity and agro-processing, Government has allocated Ush60b to agricultural enterprises through the commercial banks.

f. Private Sector Foundation of Uganda (PSFU)

PSFU is Uganda's apex body for the private sector. Right from its inception, PSFU has been Government's implementation partner for several projects and programmes aimed at strengthening the private sector as an engine of economic growth.

PSFU runs various programmes that benefit SMEs including clusters such as; the implementation of the Business Uganda Development Scheme (BUDS), Enterprise Skills linkage program, etc.

g. Enterprise Uganda

Enterprise Uganda offers a comprehensive range of integrated and tailor-made business support services which begin with diagnostic Studies on the businesses promoted by the participants including rural outreach. The 'Business Health Check' is a complementary service to the participants to establish constraints that may be holding back the realisation of their business potential. The post-entrepreneurship services include general management training; export market development and sourcing of credit and other business advisory services.

h. Uganda Export Promotion Board (UEPB)

Uganda Export Promotion Board coordinates all activities that lead to export growth on a sustainable basis. To accomplish this, the Board carries out market studies, develop products to suit market place requirements, undertake promotional programs in target export markets, conducts exporter training for international trade, engages in various export policy formulation and development activities and generates critical market information for the country's business community.

The Board facilitates SMEs and other Ugandan companies' participation in trade fairs, arranges trade support missions, and conducts market studies and training for exporters amongst various activities to promote exports. It manages an Information Centre for generation and dissemination of market information to SMEs. UEPB has mostly been helping SMEs and the clusters in the handicraft and honey sectors.

i. Uganda National Chamber of Commerce and Industry (UNCCI)

Uganda National Chamber of Commerce and Industry (UNCCI) is the umbrella organization of the business private sector in Uganda. It draws its members from several economic and social sectors including Industry, Trade, Agriculture, Tourism and Services and Agricultural Processing. They have hosted international forums to create market linkages, give business development grants, and capacity building support to business community.

j. National Agriculture Advisory Service (NAADS)

Realizing the importance of agriculture to the economy and to place greater emphasis on extension delivery, NAADS was established. NAADS mission is to increase farmer's access to information, knowledge and technology for profitable agricultural production. The NAADS programme operations are guided by Commercialization, Farmers Empowerment, Fostering Farmers Participation, Increasing Institutional Efficiency, as well as Gender Mainstreaming. Through Commercialization, the farmers are expected to shift from subsistence through market-oriented production in the medium term and ultimately to commercial production in the long term.

Farmer participation involves all categories of farmers identifying agricultural advisory needs, setting priorities, formulating plans, and monitoring and evaluating outputs and outcomes.

k. Uganda Investment Authority

UIA is a One-Stop facilitator for investors of various levels of investment foreign and domestic, mandated by an Act of Parliament (1991) to attract, promote and facilitate investment. UIA assists investors at various levels to expediently implement their business plans. As such, UIA markets Uganda's investment opportunities to targeted investors all over the world, coordinates the national investment marketing program, monitors international investment trends and serves as the first and most comprehensive point of contact for investors in Uganda.

Among the services rendered to SMEs by UIA include but not limited to,

i. Helping SMEs to implement their project ideas through professional training and advice and assistance in locating relevant project support services;
ii. Assisting SMEs in seeking joint venture partners and funding;
iii. Ensuring protection for intellectual property and trade secrets where technology transfer is involved;

The following clusters have benefited in one way or another from the above initiatives;
Katwe metal Fabricators, Jinja maize-millers, Luwero Basketry and handicrafts, Textile and garments, Lira bee keepers, etc.

3. Discussion and specific areas of focus

(i) There is need to create strong institutional linkages at various levels. Networking is one of the most important infrastructures in cluster development. The academic institutions should seriously support the beneficiaries of the above programs in technology evaluation, management support and consulting services.

(ii) Marketing assistance for exportable products are being extended by the Ministry through holding trade fairs and exhibitions or supporting potential firms to attend the major exhibitions locally and internationally.

(iii). The Ministry is developing the Standards and Quality Policy that will give strategic guidance in product standardization and certification. However, the UNBS and UEPB are there to facilitate and do the necessary measures in respect to Standards and quality control, and marketing of the products internationally respectively.

(iv) Need to support for infrastructure development, (i.e. energy, transport, water, etc) and the Public Private Partnership policy

(v) Strengthening of the Standards and testing laboratories infrastructure for industrial competitiveness

4. Conclusions

- A Cluster initiative is an organizing mechanism, focusing on collaborative activities to upgrade the cluster's competitiveness
- Cluster initiatives are complementary to industry associations, and not competitors
- For transformation, all problems are well known what is required is to focus and address them
- Emphasis should shift from strategic planning to strategic doing
- As the government and other support organizations are implementing the cluster development in different programs and approaches, the role of the academia in

development of the cluster concept needs to be scaled up more to support research and innovation.

6. References

1) Government of Uganda (GOU)-"Budget Speech Financial year 2009/10" by the Ministry of Finance, Planning and Economic Development.

2) GOU-"National Industrial Policy 2008" by Ministry of Tourism, Trade and Industry

3) GOU-"Ministerial Policy Statement 2009/10" by the Ministry of Tourism, Trade and Industry

4) Ministry of Finance, Planning and Economic Development, Competitiveness and Investment Climate Strategy (CICS), 2006-2010, December 2006

5) Ministry of Finance, Planning and Economic Development, Poverty Eradication Action Plan (PEAP), 2004/5 – 2007/8, December 2004

6) UNIDO, Uganda Integrated Industrial Policy for Sustainable Industrial Development and Competitiveness, 2006

4.3 Paper III

Transferring Best Practices for Uganda Technological Innovation and Sustainable Growth

Joshua Mutambi, Joseph. K. Byaruhanga, Bernard K. Buhwezi, Lena Trojer, Peter Okidi-Lating.

Abstract

Uganda, like many other African countries has not been developing primary science, technology and innovation Indicators and to make them accessible to public and private sector decision makers for social economic development and investment purposes. Indicators have not been given serious attention as engines of long-term development.

This paper reports the results of a research undertaken to develop a set of relevant science, technology and innovation Indicators for Uganda. From a population of 7,336 firms, 300 firms were sampled for innovation surveys and 200 institutions for the Research and Development survey. The data collected were represented in tables and was grossed up. Data entry was taken in CSPRO and the analysis was done using STATA statistical software

There is a global perception that businesses in developing countries like Uganda are generally dominated by Small and Medium enterprises; and that is where most innovations were happening. This paper will discuss the core indicators of Research and Development (R&D) and Innovation; the empirical data of the state of Uganda's Science, Technology and Innovation Indicators. The paper further explores the potential benefits and the best practices in incubation process.

The major conclusions are; prioritizing science and technology policy will create more opportunities and build capabilities for innovations and technology. The monitoring of industry, government and university R&D programs is crucial to successful policy making and analysis.

Keywords: Business Incubation, Innovation Indicators, Research and Development Indicators, Triple Helix, Uganda

1.0 INTRODUCTION

1.1 Background

Uganda is an agro-based land locked small open economy country with a population of about 30 million people. With its endowment of natural resources and salubrious climate, Uganda's industrial profile is still dominated by agro-industry and not innovation led. However, the government is aggressively promoting value addition, competitiveness and industrialization as

whole. Both theoretical and empirical literature shows that a high degree of efficiency in the industrial sector can contribute to increased production, product innovation, high value manufactured exports and high foreign earnings. It is through industrialization that wealth can be created and higher incomes realized from natural resources and raw materials transformation. This requires a set of core competences such as skilled human resource, technology, access to finance and infrastructure which enable competitive transformation of inputs into outputs (products or services) which can be traded in markets. Technology offers the possibility for increased quality, productivity, speed to market and the potential for satisfying unmet human needs.

1.2 Measuring Science, Technology and Innovation Indicators

Innovation is not a one way sequence unleashed by scientific development only, but rather an interactive process that largely exceeds the boundaries of formal R&D activities. Innovation requires talent and talent is mobile which can be attracted anywhere in the world. The development of new information and communication technologies (ICTs) opens up unprecedented opportunities to ensure universal and access to scientific data and information to enhance the global knowledge pool. This new perspective of innovation process is well captured in the so called "Open Innovation" according to Chesbrough (2003).

Evaluations and policy-relevant assessments are based on relatively sophisticated combinations of statistics on R&D and innovation, such as various input, output, and process indicators. With the recently developed National Development Plan (NDP), 2010 for Uganda and her Vision of "A transformed *Ugandan society from a peasant to a modern and prosperous country within 30 years*", Uganda's industrial development can be best assessed when put in the context of global trends. Achieving the NDP strategies, the New Economic Partnership for African Development (NEPAD) Consolidated Plan of Action, etc. involves focusing on performance of outputs, outcomes and impact. The comparison can be disconcerting but without a reality check it is hard to appreciate what is at hand and the remedial strategies required.

1.3 Problem Statement

Science, Technology and Innovation Indicators are crucial for monitoring global scientific and technological development trends. Indicators are useful for formulating, adjusting and implementing STI policies. Uganda like many other African countries has not been developing primary science, technology and innovation indicators and to make them accessible to public and private sector decision makers for social economic development and investment purposes. Without indicators, little will be known about R&D activities, status of innovation, performance and position of the state within local and global markets will be missing

1.4 Main Objective

The purpose of this research was to develop and establish a set of relevant science, technology and innovation indicators for Uganda. It will make important contributions to both intellectual understanding and broader practical developments for STI policy.

2.0 METHODOLOGY

2.1 Study Approach

The survey followed the Frascati Manual Guidelines and Oslo Manual developed by the Organization for Economic Co-operation and Development (OECD). The survey was carried out through interviews in the form of questionnaires for both qualitative and quantitative questions. The qualitative questions covered information about product and process Innovation as well as organizational and marketing innovation, source of information and partners in R&D and innovation activities. The quantitative questions covered the basic economic information of the institution or business, the expenditures, number of personnel, the outputs and sales, among others. Though the survey was both qualitative and quantitative, the paper has focused on the quantitative results. A population of 7,336 firms for the survey, covered years 2006, 2007 and 2008.

2.2 Sampling Method

The sampling frame was the VAT register, formal sector. The average annual turnover was the stratification variable for size. The sample for R & D had a sectoral coverage of 9 sectors: Agriculture and Fishing; Mining and Quarrying; Manufacturing; Electricity, gas and water; Trade; Transport; Finance and Insurance; Real estate and business services; Community, social and personal services.

A total of 300 businesses were sampled for Innovation surveys while a total of 200 institutions including, Government, NGOS, Higher education & Research Institutions, and business sector/Private companies were sampled for the R & D survey.

For Government both budgetary and non-budgetary institutions were sampled.

2.3 Data Collection

Three different questionnaires were designed to cover the following;

Business, Government, NGOs and Public Institutions, Universities and Research Institutions for Research and Development survey. For Higher institutions of learning questionnaires were administered to specific selected faculties in both public and private universities; and research Institutions.

The approach to measuring innovation and Research and Development indicators was based on empirical survey results from public and private sectors and academia with structured questions including size of the firms, technological innovation, expenditure on R&D, source of funding, researchers by sector and factors constraining innovations. Stakeholder workshops were also conducted in 2009/10.

2.4 Data Analysis

Questionnaires were checked for completeness and consistence and information was requested from respondents where further clarity was required.
Data entry was taken in CSPRO and the analysis was done using STATA statistical software.
The data collected were represented in tables and was grossed up. Once data was analyzed, it was matched with the available data from other administrative data sources and this was the first major innovation and R&D survey in the country.

3.0 RESULTS

The following paragraphs summarize the results of the investigation through surveys.
(a) Innovation Survey Indicators
(i) Number of Innovative firms by employment size

Table 3.4: Number of Innovative firms by employee size

Employment Size	Innovative Firms			Non-innovative firms		
	2006	2007	2008	2006	2007	2008
Between 1-9	904	996	936	674	396	316
10 - 49	928	952	1,103	1,375	1,447	1,813
50 - 249	382	489	526	1,614	1,713	505
➢ 250	108	110	110	0	52	182

(ii) Percentage share of firms that introduced innovations and performed R&D among innovators
Table 3. 5: Percentage share of firms that introduced innovations and performed R&D among innovators

	Product Innovation	Process innovation	Service Innovation	Performed R&D
Percent share of firms that introduced	28.2	7.5	11.8	9.5

(iii) Totally new to the Ugandan market (product, service and process) by year
Table 3. 6: Percentage share of firms that introduced totally new to the Ugandan market and their turnover by year

Year	2006	2007	2008
Share in percentages	45.3	50.2	68.4
Percentage Turn Over (UGX) of Innovative businesses	53% (out of 1.6 bn)	48% (out of 2.8bn)	60% (out of 2.5bn)

(b) Research and Development Survey Indicators

(i) Gross Domestic Expenditure on R&D (GERD) as an Indicator of R&D Activities-in Uganda (2007)

Table 3.7: Gross Domestic Expenditure on R&D (GERD) as an Indicator of R&D Activities-in Uganda (2007)

	Total	Business Sector (BERD)	Government Sector (GOVERD)	Higher Education (HERD)	Private Non-Profit (PNPERD) incl. donors
(GERD) by Sector of Performance	359.8	14.8	165.5	179.5	-
Percentage Shares	100.0	4.1	46.0	49.9	-
By Source of Funding	100.0	4.2	37.1	46.0	12.8
Researchers by Sector of Employment	100.0	5.0	50.2	45.0	-
R & D personnel by Occupation Total (HC)	1768	89	889	790	NA

(ii) GERD by Type of R&D:- Basic Research 10.2%, applied research 59.3%, Experimental research 30.5%

4.0 DISCUSSION

Survey results and analysis revealed that Uganda needs to do much more in supporting research and technological innovations. Uganda is grossly deficient in technology and lacks adequate indigenous capability of technological masterly. There has been little attention paid to the generation of minimum level of indigenous technology necessary to absorb technology from foreign sources and adapt them to gain comparative advantage in the market. Observed also is cultural deficiencies in entrepreneurship, low level of competitiveness, concerted policy making efforts notwithstanding. There are other bottlenecks that must be addressed, like inadequate infrastructure, limited access to credit, weak industrial support institutions, etc (GOU, 2008)

In respect to measuring science, technology and innovation indicators, there are now many indicators of activities such as, knowledge creation (R&D performance and funding), knowledge transfer (invention, innovation,), knowledge use (diffusion of knowledge, technologies and practices), and knowledge infrastructure and governance (the development of human resources for all of these) (NEPADOST, 2006).

The common core indicators of Research and Development are: (i) Researchers (head count); (ii) Gross Domestic Expenditure on Research and Development (GERD) activities by source of

funds, performance sectors and type of research; (iii) R&D personnel by level of qualification and function (iv) Researchers by gender and field of study; (v) Government, higher education and business enterprise expenditure on R & D (OECD, 2002)

The core indicators of innovation include: firm general information; product and process innovations; organization and marketing innovations; innovation activities and expenditures; sources of information and cooperation; effects of innovation and factors hampering innovation activities; and intellectual property rights (OECD, 1997)

Comparing the innovative performance with respect to the employment size as in Table 3.1and 3.3, as a general observation most innovative firms had fewer than 50 employees according to the survey. There is a global perception that businesses in developing countries like Uganda are generally dominated by Small and Medium enterprises

Some of the countries such as those in North and South America, European Union, China, Asian tigers, and South Africa that have promoted Research and Development, incubation and growth of innovative firms, have realized the benefits of technological innovation, science and technology development. This can be observed in the World Economic Forum reports, the Global Competitiveness Index reports, and the NEPAD Africa's Science and Technology Consolidated Plan of Action of 2005.

Uganda, although the results are still low, it is progressively increasing support to science and technology development. This can be explained by the number of foreign direct investments that has increased in Uganda since 2005, and also by the government's policy on liberalization and improvement of the conditions of doing business in the country and the recently support from the government to research and development as indicated in Table 3.4.

With respect to R& D indicators in Table 3.4, such as No. of R& D personnel agrees with the data given by the Uganda National Council of Science and Technology; and United Nations Educational, Scientific and Cultural Organization (UNESCO), in S&T database 2007 indicated that GERD as %age of GDP for Uganda was in range of 0.00- 0.25; Researchers per million inhabitants was between 0 – 100. , As reported by the World Economic Forum, Uganda has some good scientific research institutions geographically concentrated in and around Kampala

Also from the data, in the Ugandan situation, the product and service innovators share of firms was found higher than the share of firms that introduced process innovation. This analysis concurs well with the Global competitiveness Index 2007 where Uganda's economy was ranked fairly well in innovation (position 73,) and in market efficiency (position 85). (Wagner et al, 2008).

In respect to transferring best practices, traditionally Uganda's universities were involved in education and basic research, but have recently become engaged in supporting business development activities, such as business/technology incubators. To increase entrepreneurial talent and support outstanding ideas, they have undertaken curriculum development for courses on entrepreneurship, coordinated business plan competitions as well as providing entrepreneurial outreach programs. This is part of triple helix in problem identification, solving and strategic brokering that characterize technology transfer, collaboration and open innovation.

To guide government support measures, the most relevant policies in respect to technological innovation and industrial sustained growth that have been put in place include; the National Industrial Policy-2008; Science, Technology and Innovation Policy-2009; Trade Policy-2007; Energy Policy, harnessing and utilization of Information and Communication Technology, Uganda has in addition adopted the African Science, Technology and Innovation Indicators Initiative under African Union coordinated by the New Economic Partnership for African Development (NEPAD).

Based on the definition of Open Innovation "*that valuable ideas can come from inside or outside the firm and can go to market from inside or outside the firm as well as they look to advance their technology*" (Chesbrough, 2003), to foster innovation and promote entrepreneurship development in business incubators for open innovation, the potential benefits are from: interactive and dynamic capabilities through knowledge, technology and market exchanges unbounded and at low cost from users, employees, suppliers, customers, researchers, etc. New knowledge, skills and services will be incorporated and diffused in a more significant way. Different firms during the survey had differing capabilities for interaction and this resulted into minimizing the risks, maximizing innovation outcomes, skills enhancement, and collaboration

Business incubators relate to internal and external logistics, commercialization systems and support services which respond to requirements of job creation, improved productivity, rapid product introduction, entrepreneurial development, industrialization and economic development. The study shows that the best practices in incubation process includes but not limited to; selecting good location and planning functional buildings; building a dedicated, trained management team; selecting potential entrepreneur tenants; identifying strong sponsors; mobilizing investments for incubators and tenants; Adding value through quality services for tenant companies; creating strong linkages to professional and business communities; monitoring performance and assessing impact; and a clear mission and strategic planning for the future.

5.0 CONCLUSIONS

From the research findings and analysis, it can be concluded that this aim of developing indicators has been achieved and can be improved upon by a series of other surveys. The

information compiled can be used to improve the existing policies and STI strategies. For Uganda to build incremental domestic technology capacity and local innovators,

- it will rely on the development of a robust public-private partnership domain for sufficient funding.
- Adopt best practices in technology transfer, such as the use of indicators, and the reports to cover indigenous innovation status as well
- To improve on the awareness and the quality of the data for international comparisons, publish and disseminate the results
- There is need for adequate financial resources for technical, statistical and analytical capacity and tools to aid planning, management and monitoring of the sector based on sound evidence. It will also be possible to jointly monitor and analyze the relationship between R&D, innovation, productivity and other dimensions of firm performances.

6.0 REFERENCES

Chesbrough, H. (2003), *Open Innovation: The New imperative for Creating and Profiting from Technology*,. Boston: Harvard Business School Press, 2003, ISBN: 1-57851-837-7.

Gault, F. (2008), *Science, Technology and Innovation Indicators: Opportunities for Africa*, African Statistical Journal, Vol. 6, 141-162.

Government of Uganda, (2008), *National Industrial Policy: A framework for Uganda's transformation, competitiveness and prosperity*, Ministry of Tourism, Trade and Industry

Chesbrough, H., Vanhaverbeke. W. and West. J, eds. (2006), *Open Innovation: Researching a New Paradigm*. Oxford: Oxford University Press,. ISBN: 0-19-929072-5.

NEPADOST, (2006), *African Science, Technology and Innovation Indicators (ASTII) Towards African Indicator Manuals*: A Discussion Document Summary

Organization for Economic Cooperation and Development, (2002), *Frascati Manual: Proposed Standard Practice for Surveys on Research and Development*, Paris: ISBN: 92-64-19903-9.

Organization for Economic Cooperation and Development/Eurostat, (1997), *Oslow Manual: Proposed Guidelines for Collecting and Interpreting Technological Innovation Data*. Paris and Luxembourg:

The World Economic Forum: The Global Competitiveness Report 2010

The Republic of Uganda, (2010): *National Development Plan, 2010-2014*: Ministry of Finance, Planning and Economic Development-

Wagner, C. S., Farley, S.E., (2008), *Science & Technology for Growth and Development: From Case Studies to Policy for African Countries, SRI International Technical Project* Final Report (P18045)

4.4 Paper IV

Research on the State of Business Incubation Systems in Different Countries: Lessons for Uganda

Joshua Mutambi, Joseph K. Byaruhanga, Lena Trojer, and Kariko B. Buhwezi

Abstract

Small and Medium sized enterprises have proven to be capable of catalyzing national economies owing to their high growth potential, their role in promoting innovations, employment creation and economic development. However, in the early days of their growth period, these firms face difficulties that may lead to their failure. Business incubation has been identified as an effective growth mechanism for such entrepreneurial firms. This paper mainly looked at the concept and description of business incubation, development process and contribution of incubators to start-up firms. It examined the impact to regional entrepreneurship and economic development globally. The paper concluded by highlighting the existing incubators in Uganda and identified recommendations for strengthening the business incubation in Uganda.

Keywords: Business Incubation Systems; SMEs, Entrepreneurship; Industrial Development, Least Developed Countries, LDCs, Sub-Saharan Africa

JEL Classification: O55, O14, M13

1. Introduction

Small and Medium Enterprises (SMEs) have more significant role in improving economic growth and industrial development of nations by contributing to the creation of employment, income generation opportunities and wealth, promotion of entrepreneurship and enhancing of exports. They constitute an important dimension in the innovation process (Beal, 2003; Hammer *et al.*, 1997; Byaruhanga, 2005; Tirthankar, 2007). The paper's discussion is informed by reviews of relevant publications, workshop reports, survey reports and stakeholder discussions in respect to the contribution of SMEs, and how they could be enhanced to sustainable growth through business incubators that have received considerable attention in the world.

The SMEs in the Least Developed Countries (LDCs), where most of the Sub-Saharan African countries fall, producing products and services with moderate quality, applying low level technologies and faced with other obstacles have been facing tough competition with the imported products. However, globalization has opened up new businesses and market

opportunities. In case of African and particularly the Sub-Saharan countries, the regional integration process through various groupings such as the Common Markets for East and Southern Africa (COMESA), Southern Africa Development Community (SADC) and the East African Community (EAC) have expanded and strengthened the linkages with the global economic structures and processes (UN OSAA, 2009)

Within rural and semi-urban areas, there often exist significant pressures to start new businesses, adopt new technologies, and produce products that conform to standards required by the markets and to those established by the regulatory authorities. However, small and new businesses have several disadvantages that hinder their success. They have difficulties in securing the resources they need for survival (Ferguson and Olofsson, 2004). Because of this, over 80-90% of the new businesses started each year fail worldwide within the first five years of operation (Aerts *et al*., 2007).

Incubators have been considered as a remedy for the disadvantages that small and new firms encounter by providing numerous business support services, and they are useful in fostering technological innovation, entrepreneurship, commercialization and industrial renewal. For these reasons, most countries have increasingly been engaged in establishing incubators (Akcomak, 2009).

This research paper addresses the following questions:

(1) Discuss the conceptualization and theory of business incubation

(2) What are the experiences and performance impacts of business incubators in different countries?

(3) What lessons can be learnt from the developed countries by the Least Developed countries, particularly for Uganda

The paper emphasizes Uganda which is situated in a region that includes some of Africa's most economically important countries but also a member of the Least Developed Countries in the Sub-Saharan Africa as a case study. Uganda is a member of EAC common market, COMESA, WTO and other international bodies. Uganda today has a great potential to become the key investment and business hub in the East African region. As new challenges and demands are derived from global economic competitiveness, an understanding of business incubators and opportunities is critical to provide future direction for the incubation process, required services and desires of entrepreneurs in Uganda.

Due to the key structural constraints to Industrialization in Uganda, the role of the State in these circumstances is still very vital as lessons learned from the developed countries (UNCTAD, 2009). Industrialization offers prospects for the expansion of employment and

income. At the same time, it helps to create the idea on the innovation and better technology changes that brings production improvement thereby accelerating the growth of productivity and quality. A new industrial policy for Uganda was therefore enacted in 2008 which is attuned to the needs of domestic enterprises, more cognizant of the need to build linkages with Trans National Corporations and to leverage untapped commercial opportunities produced by university research.

The paper therefore is organized as follows: a section on entrepreneurship and industrialization, literature review on business incubator's historical development and objectives; status of the business incubators and their impact in the World; the overview of the attempt to establish incubators in Uganda and summary of the recommendations and conclusions.

Methodology

This paper is a product of a study carried out on the literature concerning the development of business incubators in the world from the published materials, text books, conference presentations and the authors experience in Industrial policy formulation, innovation systems and cluster development facilitating activities, and interactions among the triple helix actors.

Entrepreneurship and Industrialization

Industrialization is both the process of building up a country's capacity to convert raw materials into new products and the system that enables production to take place. The issue of entrepreneurship and its relationship to the industrialization process has long occupied the attention of development planners. In particular, the key role of manufacturing industry for growth based mainly on technology driven increase of productivity and some essential co-factors, like human skills, capital or appropriate institutions is globally undisputed.

A recent international literature suggested that operating in clusters may help small enterprises to overcome their growth constraints (McCormick, 1999). Creating favorable conditions for entrepreneurship does indeed help the process of industrialization, and business incubation focusing on national/regional strengths through clustering and networking is believed to help small enterprises grow and contribute to industrialization. Therefore small enterprise development has been linked to the industrialization process (McCormick, 1999).

What is needed thus is to create favorable conditions to achieve the above objectives, and facilitating entrepreneurs will contribute to industrial development which is a key role of the developmental state. The emergence of the cluster based development strategy termed as "new innovation system" based on the cooperation among universities (research institutions), industry and government has been reported to have brought a wide range of support services worldwide for development of knowledge based businesses, with linkages to universities, research institutes, venture capital and international joint ventures. Clusters affect competitiveness within countries as well as across national borders (Porter, 1998).

Primarily, the capacity to access, adapt, disseminate and generate new technologies that are crucial for start-ups and SMEs has to be based not only on industrial policy but also other related and sound policies such as Science and Technology policies with dynamic systems of national innovation in place.

The tie between basic research, science and development can also be strengthened by establishing University Incubators. Particularly the University Incubators can support the potential entrepreneurs by providing a mentor, seed financing, networks and business training. The Universities can provide access to laboratories, high tech equipment and highly educated specialists in order to commercialize academic research by developing products or licensing the technology (Becker and Gassmann, 2006).

2. Literature Review

Theoretical Conceptualization and Objectives of Business Incubation Process

The term 'incubator' was derived from the fundamental meaning of the term: The artificial nurturing of the chicken egg in order to hatch them faster in a sheltered environment. The same hatching concept is applied to the incubating of companies; it speeds up new ventures' establishments and increases their chances of success. An incubator thus hatches new ideas by providing new ventures with physical and intangible resources (Becker and Gassmann, 2006). They have been operated by community development efforts or municipal organizations to fuel economic growth and job creation through government funding since the 1960s.

Business incubation concept rests on the argument that if weak but promising new businesses with a potential of growing into successful ventures can be identified at an early stage and helped, failures, loss of resources can be reduced and more ideas can be developed (Hamdani, 2006).

During the past 3 decades, States, regions and cities have initiated economic development programs aimed at: (1) maintaining industries and firms, (2) recruiting established firms from other areas, and (3) creating new industries and enterprises. With respect to the third objective, there has been a proliferation of business and technical assistance programs aimed at increasing the formation, survival, and success rates of small and medium sized enterprises. These include Small Business Development Centers, Small Business Institutes, Enterprise Forums, University-based entrepreneurship centers, special programs offered through Chambers of Commerce, Business incubators and so forth (Rice, 2002).

By comparison, business incubators offer the opportunity to deploy multiple modes of assistance, including continual interaction, because companies and the incubator staff are co-located in the same facility. The spectrum of services offered by an incubator is extremely varied, including strategic business planning, administrative services, technical assistance and guidance on issues of intellectual property, (particularly in the case of technology incubators), to connect with

financing and networking activities, to infrastructural facilities, etc. (Nolan, 2002; Lalkaka, 1997; EC-CSES, 2002; Sun *et al*., 2007).

Business incubation is a globally well-tested over 50 years systematic approach with diverse objectives primarily aimed at growth-oriented start-up enterprises to help them grow with the efficient use of business resources, to become sustainable and competitive companies. For example, according to (Nolan, 2002; EC-CSES, 2002; GBIN, 2009) these very diverse objectives include:

1) Generating employment;
2) Commercializing ideas and university research with spin-off companies;
3) Development of entrepreneurial culture and supporting innovations in communities;
4) Upgrading the technological standing of firms in a given locality;
5) Encouraging young graduates to create their own businesses;
6) Improving survival rates for new start-up businesses;
7) Development of new industry sectors and economic diversification;
8) Expanding the supply of infrastructure;
9) Empowering the socially disadvantaged groups;
10) Creating export revenues, and;
11) Increasing competitiveness of an existing sector.

Conceptually "Incubation" is a more diligent and planned process to strengthen clustering or co-location of firms and therefore needs a careful attention to the problems of the prospective occupants, extending well beyond providing infrastructure and office services. Business incubation is a process enacted by business incubators, angels and venture capital organizations in order to facilitate the entrepreneurial process (Hackett and Dilts, 2004).

In 2009, of the total 7,000 worldwide, the numbers in industrializing countries are more than half the total, especially in China, Korea, Taiwan, Brazil and Mexico. In Europe, the majority are in Germany, France and U.K. While incubators in industrial countries serve a variety of objectives, those in the industrializing countries are predominantly focused on technology (Lalkaka, 2009). Majority of the Least Developed Countries' incubators aim at fostering entrepreneurship, innovations and value addition (manufacturing) in promoting industrialization (UNCTAD, 2009).

Historical background of Business Incubators in the World

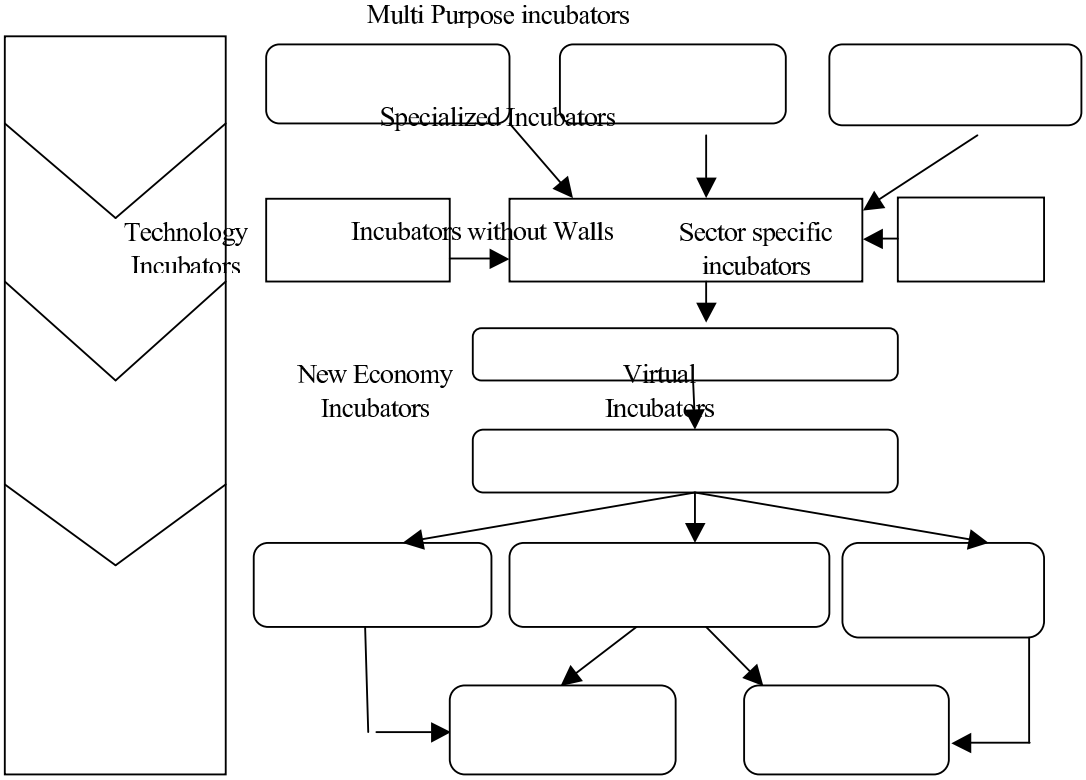
Over the last 50 years, business incubators have evolved in different ways .The first incubator was established in 1959 in Batavia, New York in the United States, but until the 1970s' this concept was unique (Wiggins and Gibson, 2003; Hackett and Dilts, 2004). Since the first incubators were founded in the late 1970s and early 1980s (the so called "First generation" or "traditional incubators" (EC-CSES, 2002) was characterized by a strong "real estate" component), the main objective has been and still is to nurture entrepreneurial start-ups that will

19 /0s Managed workshops Enterprise Agencies Industrial estates

Business Centers **Business Incubator Concept** Science Parks

grow rapidly, create wealth and employment and contribute to local and regional economic development.

Figure 4: The Evolution of Business Incubator Model



Source: EC-CSES (2002)

The earlier incubators focused their efforts on new technologies, light manufacturing and services. Later, the "Second Generation" of incubators in the 1990s added on counseling, skills enhancement, networking services, management, access to professional support and seed capital. However, as the industry has matured, the types of businesses incubated have significantly broadened (Wiggins and Gibson, 2003). The coming of the knowledge-based business incubators in the late 1990s and increasing importance of universities in incubation, resulted into strong development of what analysts have termed as the "Third Generation" of business incubators heavily technology oriented. From these humble beginnings, the incubator industry has matured into an international economic- development tool. Figure 1 shows the evolution of business incubation.

There are several definitions and approaches to business incubators available in academic literature and many have been adopted by Industry Associations and Policy makers in different countries reflecting local cultures and national policies. Most of them are characterized by a specific physical location and co-operation between public and private sector institutions in the form of actions essentially aimed at building bridges between academia and industry, promoting

innovation in small and medium enterprises (SMEs) and encouraging investment in technology – based start-up firms.

A description of activities the incubators perform according to (UN-CE, 2001; EU-CSES, 2002; Scaramuzzi, 2002; Hamdani, 2006; Rumen 2009; Akcomak, 2009; Chandra, 2007; Lalkaka, 1997; Zedtwitz and Li, 2004; Hackett and Dilts, 2004) define that incubators:

- Provide secure, affordable, flexible, well equipped physical space including communication infrastructure ;
- Provide professional, business, management, and technical consulting (in areas where they don't have the relevant knowledge and expertise) services together with access to seed and working capital, public grants, loan financing, venture capital, and R&D partnership funding, and state equity financing;
- Are often associated or connected with institutions such as universities, research institutes, communities, consortiums, government administration councils, and Non-government organizations;
- Create an interactive community of entrepreneurs, academic and business interests that stimulate and encourage the sometimes fragile incubation process, including the disadvantaged population, and finally;
- The most important element that identifies, incubators from the rest of similar establishments is that it provides high level business support/management services under one roof for entrepreneurs and new ventures that have medium and high level technological focus to create synergy (Akcomak, 2009). The environment within the incubator created through the interaction between the incubator managers and incubatees, and among the incubatees themselves is seen by majority writers as a very important facet of incubation.

Chien, (2007) described a business incubator as an innovative development tool of human resource development (HRD) used to foster growth and diversify the venture base. Human resource development; networking and knowledge acquisition, adaptation and dissemination that take place within enterprises, universities and research institutions supplemented with appropriate policies will lead to the business incubators' importance in attainment of their objectives.

The general definition of business incubator by the National Business Incubation Association is[1]:

> *Business incubators nurture the development of entrepreneurial companies, helping them survive and grow during the start-up period, when they are most vulnerable. A business incubator's main goal is to produce successful firms that will leave the program financially viable and freestanding. The most common goals of incubation programs are creating jobs in a community, enhancing a community's entrepreneurial climate, retaining businesses in a community, building or accelerating growth in a local industry, and diversifying local economies.*

Development and effective management process of business incubators

In the 1980s, many industrialized countries and industrializing countries created business incubators in hopes of stimulating jobs, technology transfer and economic development in their communities; some have been successful while others the success has been slow or not there at all. This has been due to a variety of factors; such as differences in regional characteristics, the policy and regulatory environment, economic factors in play, different stakeholders involved, culture and attributes of the incubator firms, the vision of the incubator and the mode of management.

Chien (2007) study concluded that there is a relationship with the role of HRD in the incubator management and the effectiveness of incubator development to fulfill its goals. Confronted with lack of trained personnel and expertise in managing various stages of the change more research to study the success rates and to analyze the failures has been done. In countries with effective institutional environment, good policies and organizational mechanisms, a lot more successes of incubation systems has been realized as will be discussed in later sections.

Like any other business, the success of business incubators depends on the incubator development, financing, effective management and performance process, and among the important factors in successful management of incubators is the cooperation among variety of stakeholders (incubation network system). However, the role of management is far more than provision of workspace in the facility; it involves all types of support that would help the firms to flourish including facilitating employees training in specialized techniques and linkages with support institutions such as university ties.

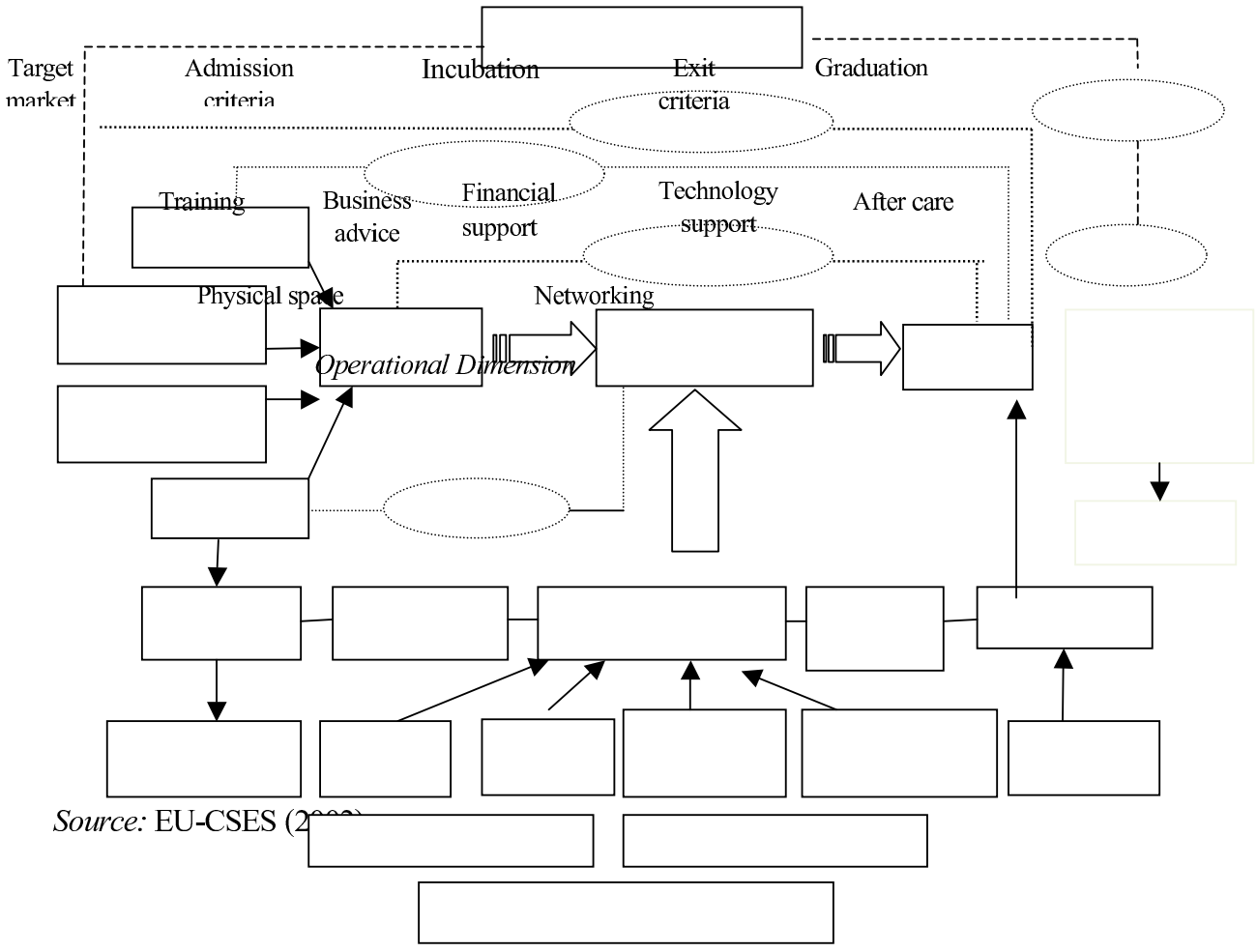
Therefore, the mission and vision of the incubator and how it will be implemented by incubator management is very important. The driving force in incubator programs is the supply of expertise, capital, and support that comes from assistance activities directed towards filling the voids in entrepreneurs' abilities. Thus, the development and performance of incubators is important to entrepreneurs. Management of incubators can affect the firms' survival and growth.
In general, there are two groups of incubators: profit (these incubators help the start-ups by offering rental space, capital, financing solutions, and business mentoring etc. at subsidized rates) and Not for - profit (these incubators are set up by public and non public-organizations that wish to promote businesses in an area, a specific industry, economically empower the disadvantaged or to promote the entrepreneurial spirit (spin-offs) at a university or research institute.).

Business incubation is a cross-cutting process embracing a range of components including business and entrepreneurial support and finance. The model is as shown below:

In developing countries and especially in Sub-Saharan Africa, business incubators can provide the following opportunities;

- Provide entry into business and financial networks (connections)
- Create a regional "critical mass" for rural development
- Build upon existing entrepreneurial resources
- Build upon existing programs for small businesses
- One stop-shop for technical management, financial assistance and improved worksite

Figure 5: Business Incubator Model



Source: EU-CSES (2

Research on incubators defines the incubation process as comprised of three stages Pre-incubation, the incubation stage and the post – incubation. Since the aims of incubators are to foster innovative enterprise development, and can be successfully focused on creating competitive enterprises with high job creation potential, regardless of whether or not the business concept is innovative, they can serve as important levers to forge positive change that creates a more enabling environment for innovative entrepreneurs across the economy.

However, the best way of achieving the intended objectives, is to have more communication within the incubator management and tenant entrepreneurial firms. It requires active linkages between financiers, academia, policy makers and the business community (Incubation system). More focus also should be on the entrepreneurial incubation process and the outcome. This has thus resulted in the need to consider HRD^2 as an important part of the incubator management and development process, and in the process of technological innovation human resource development plays a significant role in improving the effectiveness of management technology and in achieving organizational objectives (Chien, 2007; Wang and Zang, 2005).

Significance of Business incubators

Looking at the role of incubators in the entrepreneurial process, Wiggins and Gibson (2003) argued that incubators must do five things well in order to succeed. (1) Establish clear metrics for success, (2) provide entrepreneurial leadership (3) develop and deliver value-added services to member companies (4) develop a rational new company selection process (5) ensure the member companies gain access to necessary human and financial resources.

While innovation is considered by many as the foundation of growth, the innovation process in the Least Developed Countries follows a different pattern. It is not a perfected or a common occurrence. Learning and innovation may arise from a variety of sources, such as research and development (R&D-which is codified knowledge), tacit learning –by-doing, investments in new machinery and equipment, technology suppliers, mobility of labour etc. For many low –income economies, especially the Sub-Saharan Africa, however the opportunities for industrial learning have been limited compared to the developed market economies where firms are heavily supported by a dense array of institutional support institutions that buttress institutional learning on a continuous basis (UNCTAD, 2009).

By establishing business/ technology incubators and linking them to cluster initiatives, it will stimulate networking among firms, especially with firms located close to each other. It will also enhance university –industry collaboration via university incubators. In establishing linkages and collaboration with other firms or institutions, firms can outsource knowledge and technology.

Therefore, promotion of incubation as the essential tool in cluster development makes sense, as cluster development strategies can consider the adequacy of available facilities for the development of identified clusters. The availability of work premises and business support services for potential entrepreneurs and expansion of existing businesses is an important component of maintaining the long-term success of a cluster.

3. Status of Business Incubators and their Impacts in the World

The long term evolution of incubators has revealed that the concept evolved from a simple tool for economic development into a high-tech, sector specific and increasingly profit-oriented tool to promote entrepreneurship. It is now an accepted practice across the world both for established economies and emerging economies. The European Union countries, Asia and pacific countries, Middle East countries, North and South America, including African countries are implementing business and technology incubation programmes. The business incubator impacts are the longer term consequences of activities, linkages and outcomes. These can be grouped into five broad areas; (1) launching sustainable businesses, (2) job creation, (3) taxes, (4) social impact.[3]

North America

The National Business Incubation Association estimates that North American incubator clients and graduates have created about 500,000 jobs since 1980. Even better, for every 50 jobs created by an incubator graduate, about another 25 jobs are created in the community. Incubator graduates create jobs, revitalize neighborhoods and commercialize new technologies, which strengthens local, regional and even national economies.

The 1990s, witnessed further development of incubators throughout the United States of America, for instance, in 1981, there were 8 incubators and by 2000, there were 900 incubators in the US (Peters *et al*., 2004).

Regarding start-up businesses, in 2001 alone, North American incubators helped more than 35,000 start-up companies that employed nearly 82,000 workers and generated annual earnings of more than $7 billion with 900 incubators (Sally Linder/NBIA, 2003) while In 2005, assisted more than 27,000 businesses that provided employment of over 100,000 workers with over 1000 incubators in operation. There are 120 in Canada, with 2,958 client businesses generated revenues at the end of the year 2005, created full and part-time employment of over 13,000 people; the average survival rate of companies in Canada that go through business incubation has been shown to be higher than 80% after five years (CABI, 2005).

Business incubation experience in other Regions

Incubators differed from the existing industrial parks and estates as the focus shifted away from real estate development and subsidized rents to value added business services.

European Union Region

The EU started supporting the development of incubators in mid1980s as part of its regional policy. Whilst initially EU focused on establishing incubators in 'lagging' regions, in recent years it works more on incubators as support for high knowledge-intensive start-ups as part of the 'Lisbon Agenda' (European Union- Regional Policy, 2010). EU programs providing assistance to incubators include: the European Regional Development Fund (ERDF); European

Social Fund (ESF); Leonardo Programme mainly for training; Sixth R&D Framework Programme, and others.

The existence of EU-wide support networks such as, EBN (European Business & Innovation Centre Network), 'Gates to Growth', and 'Science Alliance' and the strong National associations such as in, France, Germany, UK, Finland and Sweden effectively promote the growth of business incubators.

Promoting incubation and growth of innovative firms is also singled out in EU2020 strategy, proposed by President Barroso, as one of the ways of creating value basing growth on knowledge. The Deputy Director General, Enterprise and Industry, European Union- Regional Policy, (2010) said "Business incubators have a long history in supporting research and development based start -ups from academic and research institutes.

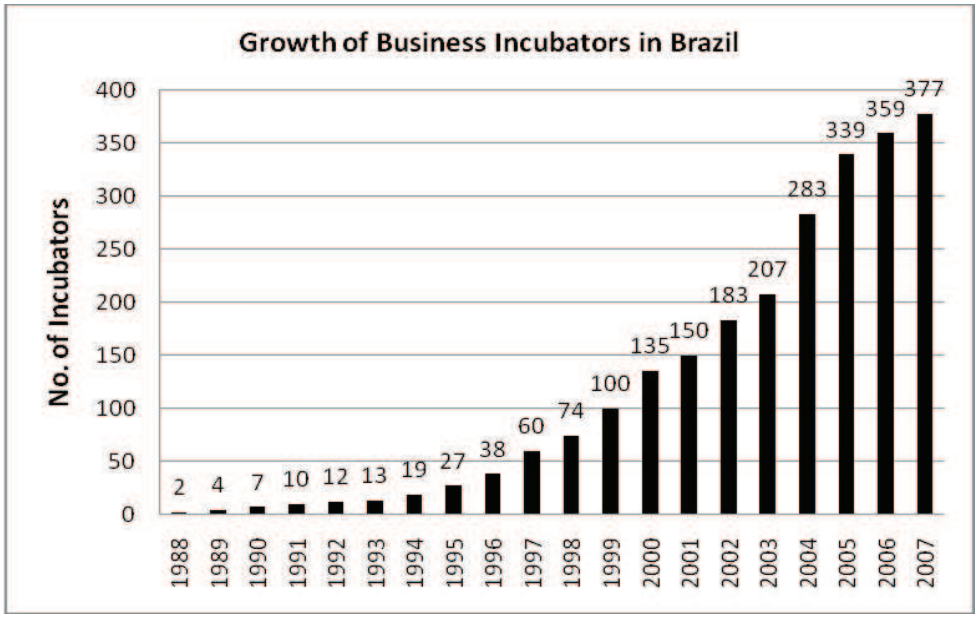
Overall, Western, Central and Eastern Europe have a wide range of incubator models with countries at very varying stages in the process of business incubation (EC-CSES, 2002) with a total of around 1,200 incubators generating over 40,000 gross new jobs/per year. The survival rate is relatively high, on average 85%, and 77% of all incubators are not-for profit.

There are approximately 300 business incubators in UK that support a range of high-growth technology businesses in sectors such as biomedical, IT, and the creative industries. In Sweden, there are a total of 55 business incubators (www.sisp.se). Many incubators also offer a "virtual" incubation service where advice and support is provided to start-up businesses located outside of the incubator.

Latin America and Caribbean

Brazil is the leading country in the incubation business in Latin America as in terms of number of incubators in operation and annual growth rate. Brazil is the fourth ranking business incubation market in the world. Incubators in Brazil have witnessed meteoric growth from just two in 1988 growing to nearly 400 in 2007 (Chandra, 2007). Other countries like Mexico, Chile and Colombia followed the same. Table 4 shows the growth of business incubators in Brazil.

Figure 6: Growth of Business Incubators in Brazil



Source: Chandra (2007)

Funding: Business incubators in Brazil are funded by the coalition of partners, government, federal agencies and non-government sources. The incubator initiative in Brazil was started by the key individuals from the academia, industry and government. It is today viewed as a hybrid organization that facilitates interaction between the triple helix of university, industry and government spheres (Chandra, 2007).

Networking: The existence of National Association of incubators and science parks prays a key role in strengthening synergies in different kinds of incubators and by encouraging participation from universities and research institutes while persuading different entities to support incubators. Business incubators in Brazil provide the usual raft of services, tangible and intangible with an emphasis on networking.

The Asian and Pacific Region

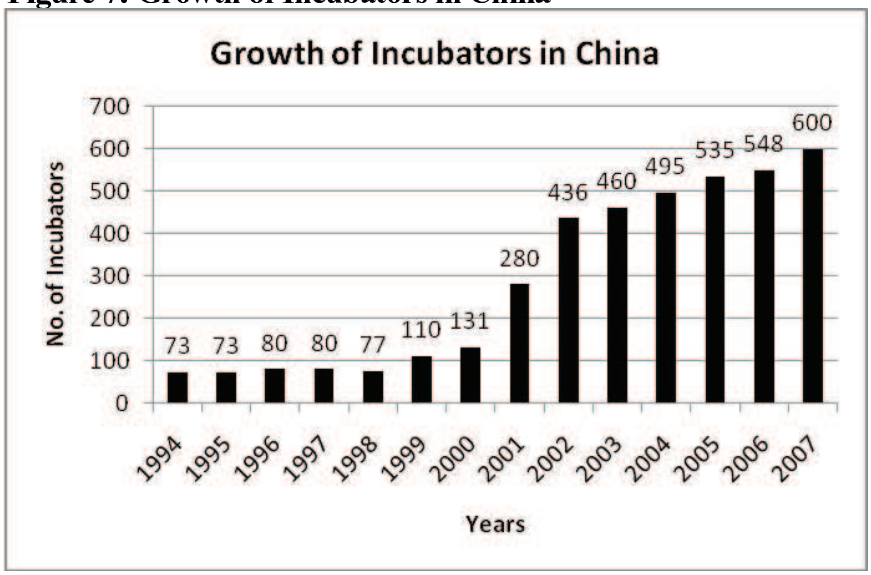
The main goal of incubation systems in Asia was to promote continuous regional and national industrial, economic growth through increasing employment, general business development and to stimulate specific economic objectives such as industrial restructuring as well as wealth generation and utilization of national resources. China, Japan, India, Korea, Malaysia, Indonesia and other members of the Asia and Pacific region embraced business incubation. Asia leads in establishment of Business incubators. There are over 1,500 incubators in operation in Asia alone. China alone has over 600 incubators compared to just over 50 incubators in India (15 of which are technology Business incubators) and 100 incubators in the planning stage by the government of India, Japan (200 incubators), Taiwan (70 incubators), Malaysia (20 incubators), about 300 in South Korea and Australia (20 incubators) (Cho and Eunsuk, 2009).

Table 8: Growth of incubators in China

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
No. of incubators in China	80	77	110	131	280	436	466	489	534	548
No. of tenant companies	2670	4138	5293	7693	12821	23373	31385	33048	39,491	41,434
Total employees in tenant companies	45600	68975	91600	128776	263596	414995	-	-	720,000	792,590
Accumulated number of graduated companies	825	1316	1934	2770	3994	6927	9,565	11671	15,815	19,896

Source: Zedtwitz and Li. (2004) and Min (2007).

Figure 7: Growth of Incubators in China



The experiences and characteristics of incubation industry in China shows that; much attention and great support from central government, pour strong drive to incubation industry; Incubator has become an important carrier to build an innovation-oriented country and the cradle to cultivate technology enterprises and entrepreneurs. The trend is that more companies are getting incubated as more incubators are established, and the total number of employees increasing (Min, 2007). China further enhanced capacity and fast development of national incubator facilities to over 600 incubators.

In Korea, another leading successful country in business incubation in Asia, the concept has been a success because of the good policies on small and medium businesses by the government, especially during the 1990s, when they needed to create jobs, revitalize the local economy and develop national innovation systems (Cho and Eunsuk, 2009). 95% of the Korean Incubators are located on universities or research centers and most of the start-up businesses, 71.1% are mainly in engineering or sciences fields.

The total number of employees of incubators' clients in South Korea was 22,538 in 2006 and increased to 22,982 by 2009 from 269 incubators with 4,532 business clients showing job creation effects. While, the total sales volume of the incubators' business clients were $2 billion in 2006, which increased to $2.3 billion in 2009, showing the results of start-up policies.

Australia

Australia has a stock of about 100 business incubators in the public hands since they were instituted in the 1980s.They represent a significant infrastructure and human capital asset, backed by their local communities (BIIA, 2008). The achievements of business incubation in Australia since they started the industry include:

- 103 business incubators
- 3,500 graduated businesses
- A minimum of more than 10,500 full time equivalent (FTE) jobs have been created

In New Zealand, the growth in tenant firms exists since 2005/6 to 2009, was from 100 to 170 respectively, and the employment generated also increased considerably in 2008/9 reaching 1000 full-time equivalent (FTE) employees.

Africa

Compared to other regions of the world, business incubation is in its infancy in Africa especially in the Sub-Saharan Africa and the opportunities for innovation and entrepreneurial networking are not as developed as in regions with a longer history of incubation, for instance America North, Eastern Europe, Asia and Pacific, and Latin America.

In Africa, according to the study carried by Irwin *et al.*, (2009), 21 countries well spread from around the continent have attempted to establish business incubators of which many are providing business development services, sometimes described as virtual incubation, rather than providing physical space. The countries with their percentages include; Angola (3%), Botswana (2%), Djibouti (2%), Ethiopia (6%), Ghana (5%), Kenya (6%), Madagascar (2%), Mauritius

(2%), Morocco (2%), Mozambique (3%), Namibia (2%), Nigeria (13%), Rwanda (3%), Senegal (2%), South Africa (27%), Sudan (5%), Swaziland (2%), Tanzania (5%), Tunisia (2%), Zambia (2%) and Uganda (6%).

The status of the managing incubators is mixed, which include the universities or academic institutions, the government, the Non-government organizations and the private sector. The targeted business sectors include; Technology and manufacturing, Agriculture and agro-processing, Sciences, and ICT. The Cape Town-based Bandwidth Barn has been in operation since 2000 and is today regarded as one of the leading ICT business incubators in the world. The Bandwidth Barn is a fully-owned subsidiary of the Cape IT Initiative (CITI), a development and promotions agency for the ICT sector in the Western Cape.

Also according to the study done by the Economic Commission for Africa (Kamoun *et al.*, 2009) in selected 17 countries of North Africa and Southern Africa, a total of 18 incubators and 40 business incubators have been created. The majority was located in Tunisia, Morocco and Egypt where networks of incubators have been created.

The Uganda experience

The Ugandan manufacturing sector is not yet technology-intensive or innovation –led. It is dominated by production activities that are standardized and require low technology by global standards. However, Uganda's economic framework strongly emphasizes on public-private partnerships. New policies on science, technology and innovations, national industrialization, and the overall national development plan reflect the involvement of the private sector and the push for the "triple helix" of government-academia – industry collaboration.

In Uganda, attempts have been made to set up incubation centers since the post independence days, (1960's) to provide support to SMEs, research and development, innovation and learning activities, and nurturing start-up businesses. Universities and Research institutions have also started to establish small business incubators as a way to help spin-offs business start-ups while providing laboratories for students and entrepreneurs in which to experience the real world of business.

The following are the traditional and the new establishments that are offering incubation services:

(a) The Uganda Management Training and Advisory Center (MTAC)

(b) Uganda Gatsby Trust (UGT)

(c) Uganda Industrial Research Institute (UIRI)

(d) The Textile Development Agency (TEXDA)

(e) The Presidential Initiative on Banana Industrial Development (PIBID)

(f) Makerere University: (i) Faculty of Computing and Information Technology: National Software Incubation Centre (NSIC); and (ii) Department of Food Science and Technology: The Food Technology and Business Incubator.

In all the above Ugandan incubation system, there are still main weaknesses such as; insufficient business support services, inadequate physical and operational infrastructure, inadequate capabilities to exploit the opportunities in the emerging sectors such as ICT, biotechnology and new materials, low level of private sector participation in R&D activities and insufficient risk capital funding.

4. Conclusions and Recommendations

The development of business incubator involves numerous stakeholders that have an interest in the success of the initiative. Tenants occupy the incubators only temporarily during the critical first few years when high overheads, lack of business experience and resources are faced in many new and small businesses. Human capital is core in promoting incubators as it provides the capacity to create, innovate, and exploit new ideas.

- In keeping with global trends, to strengthen the small business environment by implementing and promoting more explicit links between business incubation and a broader portfolio of business growth and investment strategies will realize more beneficial effects.
- The principal factor that contributed to European successful implementation of the business incubation systems has been the development of national innovative capacity and adoption of the regional innovation system model by states which assume that the most fundamental resource is knowledge and most important process is learning and that learning is predominantly an interactive social process. Hence, the need for Business incubators to promote transfer of knowledge, creation of synergies and promotion of entrepreneurship development and ultimately industrial growth
- Other strong factors that have helped advanced countries (North American, European and Asian) which other developing countries especially in Africa can learn from are; the strong technological entrepreneurship infrastructure and the unique cultural and social characteristics of the people, (i.e. entrepreneurship and the developmental state). In other words, government support is indispensable.
- The business incubation environments should be able to meet the needs of both female and male business owners and entrepreneurs (gender perspective). The right choice of the location will speed up their further progress, they should be close to knowledge-intensive areas surrounded by universities and research institutes or in science and technology industrial parks.

- There is need to strengthen the public-private partnerships:-Partnerships can also help to promote new forms of financing and improve capacity building measures thereby contributing to the sustainability of the incubatees.
- There is need for strong policy and strategic making that will lay very strong foundation for incubation development in developing countries at national and regional levels. A policy referring to a policy defined, understood, articulated and implemented at all levels.

It is concluded that incubation success, especially in developing countries is the pivotal wheel of industrialization and national competitiveness, which is the reason many governments should pay attention with strong support. However, emphasis should be put on management and operation of the incubators even with good infrastructure and technical capabilities.
It can be further concluded that successful entrepreneurs and viable business ideas come from all sources, from universities, corporations and the grassroots. Hence, business incubators can contribute to stimulating more entrepreneurs to pursue their dreams of creating their own company.

Notes

[1] See their website: www.nbia.org

[2] HRD is the integrated use of training and development, organization development, and career development to improve individual, group and organizational effectiveness (Chien, 2007).

[3] See: www.infodev.org.

References

1. Aerts, K. Matthyssens, P. and Vandenbempt, K. (2007), 'Critical role and screening practices of European business incubators,' *Technovation*, vol. 27, no. 5, pp. 254 - 267.
2. Akcomak, S. (2009), 'Incubators as tools for Entrepreneurship Promotion in Developing countries' November 2009, *Research paper No.2009/52 in UNU-WIDER*
3. Beal, T. (2003), '*the strategic contributions of small and medium scale enterprises to the economies of Japan and Malaysia'*; the seventh international conference on global business and economic development, Bangkok, Thailand, January 2003 (pp1337-1354); http://www.aabi.info; accessed in Feb 2010
4. Becker, B. &. Gassmann, O. (2006), 'Corporate Incubators: Industrial R&D and What Universities can learn from them' in *Journal of Technology Transfer*, 31 (4/5), 469-483. Available at http://www.alexandria.unisq.ch/publications/39345 (last accessed: August 2010)
5. Business Innovation & Incubation Australia Inc (BIIA), (2008), '*Leveraging the stock of business incubators in Australia: Developing Innovation – A new approach'*, http://www.industry.gov.au/innovationreview; accessed in May 2010

6. Byaruhanga, J. K. (2005), '*Policy Impact on Technology acquisition by small scale enterprises in Uganda study*'; UNESCO
7. Canadian Business Incubation (CABI) Report-Statistics Canada, 2005, '*Characteristics of Business incubation in Canada*', available at: http://www.cabi.ca/docs/ accessed on May 2010
8. Chandra, A. (2007), 'Business Incubation in Brazil: Creating an Environment for Entrepreneurship (October 1, 2007)'. *Networks Financial Institute Working Paper No. 2007-WP-25*. Available at SSRN: http://ssrn.com/abstract=1058901 (last accessed May 2010.
9. Chien, C. T, (2007), '*the role of HRD in Business incubator centers'*, available at: www.midwestacademy.org,(last accessed: May 2010).
10. Cho, B. J. and Eunsuk S (2009), 'The role dynamics of the IKED, Government Agencies, Supporting institutes and Incubation Centres in Korea,' in *APJIE Volume 3, No.2, 2009, pp: 57-75*, accessed in Feb 2010
11. European Commission-CSES (2002), 'Benchmarking of Business incubators' *final report, funded by European Commission Enterprise Directorate- General*; http://www.iban.it/ftp/biblioteca/bench_inc.pdf ; Accessed on 12th July 2009
12. European Union- Regional Policy, (2010), '*The SMART guide to Innovation –based incubators (IBI),*' http://ec.europa.eu/regional_policy/index_en.htm
13. Ferguson, R. and Olofsson, C. (2004) 'Science parks and the development of NTBFs – location, survival and growth', *Journal of Technology Transfer,* Vol.29, pp.5-17. Available at http://www.minetech.metal.ntua.gr/download/papers_adop/paper_42.pdf; last accessed in August 2010
14. Global Business Incubation Network (GBIN), (2009), '*Innovation and entrepreneurship through business incubation*,' www. spicegroup.de/summit/downloads
15. Hackett, S.M. and Dilts, D.M.,(2004), 'A Real Options-Driven Theory of Business Incubation,' in *Journal of Technology Transfer*, Volume 29, Number 1, January 2004, pp. 41-54(14), available at: SSRN: http://ssrn.com, accessed in May 2010
16. Hackett, S. M. and Dilts, D. M. (2007). 'Inside the Black Box of Business Incubation: Study B - Scale Assessment, Model Refinement, and Incubation Outcomes,' in *Journal of Technology Transfer*, Vol. 33, No. 5, 2008, accessed at SSRN: http://ssrn.com/
17. Hamdani. D, (2006) 'Conceptualizing and Measuring Business Incubation,' *Working paper of Science, Innovation and Electronic Information Division*. Available on www.statcan.ca, and last accessed in February 2010.
18. Hammer. B and T. Del Rosalio (1997), 'A Global channel for improving the environment performance of small enterprises,' *Background paper for an OECD -workshop*; Paris, November 1997, http://www.cleanerproduction.com/Pubs/pubs/OECDpaper.html
19. Irwin, D and Jackson, A. (2009), '*Benchmarks for incubator workspace in Africa*,' available at www.irwingrayson.com

20. Kamoun.F, Chaaboun.J and Kamugasha. D (2009), 'Technology parks, incubation centers, Centers of excellence: Best practices and Business Model development in North and Southern Africa,' *Report of the study funded by Economic Commission of Africa.*
21. Lalkaka, R. (1997), '*Lessons from International experience for the promotion of business incubation systems in emerging economies*,' UNIDO, Vienna, available at: www.unido.org, accessed, 16July 2009.
22. Lalkaka, R, (2009), 'National Innovation Systems: The role of Academia, Enterprise, and State,' in *Asia Pacific Journal of Entrepreneurship*, Vol. 3 No. 2, 2009. Accessed on; www.aabi.org in May 2010
23. McCormick, D. (1999), 'African enterprise clusters and industrialization: Theory and reality,' in *World development* Vol. 27, No.9, pp. 1531 – 1551. www.elsevier.com
24. Min, M.Y. (2007), '*Technology business incubators in China- a policy tool to promote innovation and entrepreneurship*,' Ministry of Science and Technology-P.R.China; http://www.ctp.gov.cn
25. Nolan, A. (2002), 'Public policy on Business Incubators: an OECD perspective,' *Conference Presentation*; accessed from http://www.smartlink.net.au/library/nolan/businessincubation.htm.
26. Peters, L., Rice, M., and Sundararajan, M., (2004), 'The Role of Incubators in the Entrepreneurial Process,' in *Journal of Technology Transfer*, Vol. 29 No.1, pp 83-91, http://www.springerlink.com/content/h6216302904t6038/fulltext.pdf, accessed in May 2010
27. Porter, M. E. (1998), 'Clusters and the new economics of competition,' in *Harvard Business Review*, November-December 1998; available at: http://www.econ-pol.unisi.it/didattica/ecreti/Porter1998.pdf
28. Rice, M. P. (2002), 'Co-production of business assistance in business incubators, an exploratory study,' in *Journal of Business venturing* 17 (2002)163-187.
29. Rumen, D. (2009); 'The Paradigm of Knowledge-Oriented Industrial Policy,' in *the Journal of Industry, Competition and Trade*, Volume 9, Number 4 / December, 2009; http://www.springerlink.com/
30. Sally Linder/NBIA, (2003), *2002 State of the Business Incubation Industry*,
31. Scaramuzzi, E. (2002), 'Inc*ubators in Developing Countries: Status and Development Perspectives*,' The World Bank, Washington DC, May 2002; http://www.bii.ge/eng/studies_&_Papers/[6].incubators.pdf; Accessed 16th April 2009
32. Sun, H., Ni, W., and Leung, J, (2007), 'Critical Success Factors for Technological Incubation: Case Study of Hong Kong Science and Technology Parks, in the *International Journal of Management* Vol. 24, No.2, 2007. Accessed from http://media.web.britannica.com/ebsco/pdf, in May 2010

33. Tirthankar, M. (2007), 'Small and Medium enterprises in BIMSTEC-Synergies and Emerging issues for cooperation,' *Center for studies in international relations and development (CSIRD), Kolkata*; Available at: www.csird.org.in, accessed in May 2010
34. United Nations Conference on Trade and Development (UNCTAD), '*the Least Developed Countries report, 2009,'* United Nations Publication, ISBN 978-92-1-112769-0.
35. United Nations Economic Commission for Europe (UN/ECE), 2001,*'Guidelines on Best Practice in Business Incubation,'* http://www.bii.ge/eng/studies_&_Papers/[2]accessed in May 2010
36. UN OSAA, (2009), '*Economic Diversification in Africa: A review of selected countries*,' UN OSAA, 2009. www.un.org/africa/osaa/reports/economic_diversification, accessed in May 2010.
37. Wang, Z. and Zang, Z. (2005), 'Strategic human resources, innovation and entrepreneurship fit: A cross regional comparative model,' in *International journal of manpower,* Vol. 26, No.6, 2005; pp. 544-559.; www.emeraldinsight.com, accessed in Feb 2010.
38. Wiggins, J. and Gibson, D.V. (2003), 'Overview of US incubators and the case the Austin Technology Incubator,' *Int. J. Entrepreneurship and Innovation Management*, Vol. 3. Nos. ½, pp 56-66. Available at: www.bth.se/eng/library; accessed in May 2010.
39. Zedtwitz, M. V. and Li, Q. (2004), 'Internal incubators as change agents; the case of organizational innovation in Chinese State Owned enterprises,' *Paper presented at IAMOT conference, 2004*, Washington DC. Available at www.iamot.org

PART III

CHAPTER FIVE: DISCUSSION AND CONCLUSIONS

5.1 Brief Summary of the Papers

Paper I*:* Introduces the general business environment and the state of manufacturing sector in Africa and Uganda in particular in the broader perspective of industrial sector. Given the importance of manufacturing to the national Gross Domestic Product contributions, the problems, constraints as well as challenges and opportunities for investments and manufacturing sector development were presented. The bottlenecks to Africa's industrialization in particular competitiveness and key drivers for investments were discussed.

The recommendations were outlined in the conclusions including adapting of new approaches and initiatives for industrial development as they have accelerated developments in Asia and European countries.

Paper II*:* Discussed a number of support institutions and support mechanisms for accelerating and upgrading the SMEs and in particular support to new initiative of innovative cluster based development approach. Although the existing SI may not be functioning to the required levels due to various reasons including limited coordination, the policy and regulatory framework however has been improving.

The focus on the triple-helix and clustering concept was highly recommended since it strengthens collaboration and networking; training and innovation; and competitiveness and productivity improvement.

Paper III: The focus was on developing and establishing relevant science, technology and innovation indicators for Uganda. The paper addressed the core indicators of research and development, and innovation. There was an understanding of innovation, innovation activities, R and D activities, inputs and outputs. The Oslo Manual (OECD, 2005) distinguishes four types of innovations: product innovations (new goods or services or significant improvements in existing ones), process innovations (changes in production or delivery methods), organizational innovations (changes in business practices, in workplace organizations or in the firm's external relations) and marketing innovations (changes in product design, packaging, placement, promotion or pricing). An innovative firm can be defined as one that has successfully introduced one of these types of innovations in the period under consideration, but it could also be enlarged to firms that have not yet introduced the innovation, but have unsuccessfully tried or are still in the process of implementing the innovation. Product innovations have moreover been distinguished by their degree of novelty (new to the firm, region-first, country-first, or world-first). As an alternative, being innovative could be measured on the input side by the fact of

having pursued innovation activities, such as R&D, acquisition of external knowledge, training for new products and processes and their market introduction.

The paper confirmed the importance of important variables like size, market, technology, human skill resources, collaborations and government support. It introduced the importance of open innovation and business incubators in respect to enterprise development, technology transfer and innovations.

The paper highlighted the factors that due attention should be given to achieve technological innovation. It further gives the percentages of the gross domestic expenditures on Research and Development; the numbers of innovative enterprises by employment sizes.

It concludes by stressing that creation of awareness on the key concepts of STI in the country, prioritizing STI policies and strategies will create more opportunities and build capabilities for technological innovation. To foster innovation and promote entrepreneurship development adopting business incubators for open innovation will yield more potential benefits.

Paper IV: The business incubator industry is a powerful tool for the creation of SMEs, for supporting them in start-up and for increasing their growth rate. The paper provided the state of business incubation in different countries, how they have grown and the lessons for Uganda. Improving and promoting entrepreneurship, new enterprises and indeed the operating potential for SMEs in general is essential for all national economies.

It introduces the business incubation system and how in order to boost entrepreneurship, promote value addition and innovation, foster skills development and competitiveness all largely coincide with the national aspirations of a modern, middle-income and industrialized country. The conclusions made will assist the author in the analysis and deciding on the correct and most suitable model for Uganda.

5.2 Concluding Discussions

This thesis has discussed a wide range of issues that are related to the desired structural transformation of the Ugandan economy towards industrialization process. The strengths, challenges and opportunities were presented in different papers. Today, industrialization is not driven by resource endowments alone, but by technology, knowledge, skills, information, innovation, research and development, and networking (UNIDO, 2005). Important in this process are functioning , efficient, responsive and interactive Support institutions which help firms to develop and upgrade local capabilities, and support them in their effort to link, leverage and learn from foreign or advanced sources of information, knowledge, technology and skills.

Government's Long Term Strategy

Uganda still an agricultural based economy with substantial natural resources and a relatively economic growth rate would like to transform its economy into an industrial and prosperous modern society (NDP, 2010). Uganda has the opportunity of being the central hub of the great lakes region although it is land locked. With her rising population growth and rural-urban migration which is accelerating urbanization, formal job creation has continued to lag behind expectations in spite of strong economic growth and a relative degree of poverty reduction. The objective of small enterprises growth and poverty reduction strategies implies efforts to focus on youth, especially university and other tertiary institutions' graduates, rural-urban migrants, and the urban poor to earn more income and participate in a private sector- led economy.

The government policy has tried to target such specific groups of people or potential entrepreneurs who are poor, unemployed or without opportunities and majority without higher education. As a result these groups are least likely to create successful businesses and expand employment. Therefore, regardless of policy priorities, improved education access, technical training and entrepreneurship education are crucial and government intervention is very important

Importantly to note, there has been an improvement in the policy frameworks and the drive towards entrepreneurship and private sector development. The government is now promoting universities in fostering entrepreneurial activities towards development of entrepreneurship. With a number of capacity building support programs and initiatives in the country, many people and households are diversifying their income-generating activities into non-farm activities, though often only on a small-scale base, with a focus on local markets and employing very few people per business. The household diversification into non-farm activities i.e. informal businesses, trade and manufacturing mainly fabrications and agro-processing is probably helping in raising their household incomes (Bakeine, 2009).

However, this has brought many new comers in the services and industrial sector as entrepreneurs or employees with little or no training in their current economic occupation. During the surveys (STI and ISCP assessment surveys) it was revealed among SMEs that quite low levels of business, managerial and technological skills have had adverse effects on their enterprise upgrading and growth. Yet, it has been recognized that the competitiveness of small companies is increasingly perceived in terms of their internal capabilities to choose, use, adapt and develop technology.

Furthermore, on ground even the more qualified graduates and entrepreneurs find it difficult (or not attractive) to enter industrial or other processing activities that are related to relatively high levels of technology investment, networking, institutional support, or skills formation; they rather seem to operate in sectors with lower requirements, such as the local service sector (finance/microfinance, transport, consultancy and trading). These aspects limit the positive

impact of entrepreneurial dynamics in the country on innovation, industry, job and growth creation as well as overall economic diversification and development. The involvement of academia in industry business relationships can contribute greatly, especially in terms of technology transfer. One of the suitable ways is formation of business incubators linked to universities.

Science, Technology and Innovation Indicators

The STI Indicator approach is useful for identifying the linkages and outcomes of STI activities which can then be used analytically to shed light on the impacts. The first results for the STI indicators in Uganda were rather on the lower side being the first time to conduct STI survey (2009/10). There was low proportion of business enterprise expenditure on R&D with few researchers in gross expenditure on R&D. From other statistics, we can deduce that there is little linkage between industry and other public research sectors i.e. government agencies and higher institutions. There is coordination failure between and within institutions, and hence, absence of effective linkages between various elements of science, technology and innovation system in Uganda. Therefore linking knowledge and productive activities must predominantly involve the government, academia and industry.

Furthermore, the capability to generate innovation in the production of goods and services is very limited not only in small and micro-enterprises, but also in medium sized ones. The scarce resources in government and private sector are spread too thin over too many activities to facilitate emergency of sectoral innovations. It was also observed that there is insufficient specialization and differentiation in the functions among the organizations that perform R&D and other innovation – supporting activities. When attention is focused on specialization and coordination, financial support, technical and non-technical assistance, human resource capacity, addressing market linkages and strengthen partnerships, there will be a difference in the future STI indicator trends.

With respect to innovative enterprises, from the findings, there are many innovative firms in the category of small firms that employ less than 10 employees, fewer in medium sized and again more in the large category. This is expected since for small firms and especially start ups, most products and processes will be new to them and probably to their markets. This clearly indicates the need to support incubator projects (incubators that suit and adapt to local conditions and opportunism). This can be explained from the significance of business incubators from the literature as; (a) mechanisms for technology transfer and innovations, (b) self-sufficiency and survival, (c) economic and industrial development. In particular, from the above discussion, there are three key components that need special attention, the size of the enterprise, the conditions or environment and the linkages. These are also referred to in the Oslo manual, 2005 as "Actors, the framework conditions and transfer factors/ linkages and networks".

This thesis stresses the regular development of STI indicators, especially indicators of impacts and strongly calls for a framework to guide statistical work and provide better understanding of how different indicators are connected. Governments should adopt a mix of policies to remove or reduce obstacles that hamper science, technology and innovation: For instance, easing access to finance, making more skilled labor available, or facilitating more collaboration to cooperate with other firms, technological institutions and government. Further action is necessary such as the improvement of indicators measuring knowledge flows, quality of STI statistics and linkages.

Collaboration and Partnerships

Collaborations and Partnerships can significantly facilitate the transfer of scientific knowledge in the development of tangible products and processes. Over the past decade, consensus has been growing regarding public-private partnerships (PPP) in Uganda and a PPP Bill is yet to be approved by parliament (MFPED, 2010). From literature, it is suggested that technological learning, organizational and institutional capacity building will help to develop producers and that learning will be most effective when producers can interact with each other and with other groups, especially customers.

This confirms the argument by the author that open innovation business incubator practices linked up in cluster based business approach can stimulate such achievements to occur. Laursen and Salter, 2005 also confirmed that firms who have open search strategies—those who search widely and deeply—tend to be more innovative. Evidence has shown that controlled collaboration of government, academia and industry facilitates innovation and creative development while providing balance between knowledge, social benefit and profit motivations (Leydesdorff, 2005). It is also said that the better the markets, resources and information that the enterprises can access, the easier it will be for them to overcome their internal constraints, raise productivity and become more competitive. Jin Cho, (2009) had the same argument that incubation success, especially in developing countries is the pivotal wheels of industrialization and national competitiveness.

There is no doubt that many existing and future businesses will require technology, business processes, human resource, and capabilities to be at or close to regional/international (best practice) level. This argument is supported by Romijn, (2001) who asserts that technological competence is an important determinant of small manufacturers' ability to hold their own in a context of liberalization and globalization. Also from literature (Chien, 2007; Wang &Zang, 2005) argue that there is need to consider seriously human resource development as an important part of the incubator management and development process. The path Uganda has taken in liberalizing education and other tertiary institutions is right, in that human resource development (improving education and skill levels) is considered an important strategy for business growth and national competitiveness (Sun et al, 2007). Therefore there is need to collaborate and develop facilitators that will help the SMEs' members with relevant services and

activities that will help them to execute their objectives with maximal professionalism and efficiency (the triple-helix model of collaboration).

Therefore, tackling these issues can result in improvements on various fronts of economic and social development. The adjustment requirements at the level of public and private support institutions as well as commitment to expenditure priorities, policy and project implementation are also substantial. For instance, in OECD countries, the SMEs support function is undertaken by organizations/institutions with specialist resources and skills relevant to this function (OECD, 2007). Improvements in the dimensions and challenges mentioned in this summary discussion are crucial, given the aspirations of the country as an export-oriented, middle-income, industrialized economy within the next 20 years. It will need strong collaboration and partnership between the public and private i.e. the government, academia and the industry.

The overall analysis of this thesis, the findings, views and recommendations presented can be seen as a range of background inputs for this study about industrialization, business incubation and entrepreneurship and the linkages between them.

5.3 Scientific Contributions and Originality

The development of primary STI indicators in Uganda was done during this research, which gave the initial baseline data and indicators that can be updated regularly when funds are available. This is a main contribution from this research.

The author under this research also initiated "One Village One Product" Program in Uganda using the virtual business incubator model that is under observation. It is providing a demonstration of using business incubation process. Although innovation plays a key role in our considerations, business incubators are not exclusively devoted to high-tech and innovative enterprises.

The research explored how incubators and start-ups have grown across the world whilst at the same time showing Africa lagging behind. The need for research for both the rest of Africa and other developing countries like Uganda cannot be understated.

5.4 Way Forward

For the subsequent stages of this research, and to handle the rest of the objectives, another survey is in progress. The survey areas were selected from the regional urban centers based upon the emerging of manufacturing and services activities. Areas where market is not a major problem, but local SMEs and the youth are faced with many difficulties and challenges such as poor infrastructure, lack of serviced work premises, inadequate technologies, access to financing, business management skills, global competition from cheap imported products, and low access to information and knowledge for production and markets. Four urban regions were selected in Uganda, i.e. Central-Kampala and Masindi, Northern –Lira and Gulu; Eastern part-Jinja and

Mbale; and Western part-Masaka and Mbarara. In addition, it also includes the relevant ministries and institutions/agencies that are involved in business development services. Other countries that have been included in the study areas are Sweden and Tanzania

The questions are based on the business incubation theory; on the major activities offered by business incubators, their functions and management process, factors for their successes or failures, their rate of attracting demand, the benefits and to understand what the effects of these are on industrialization process. As indicated in the literature review, participation of stakeholders is very important. Therefore, the survey will be through administering questionnaires and interviews by structured questions, group discussions as participatory method to assess the performance indicators for business incubation process in business incubators and their demand from the potential tenants.

Finally, the most appropriate model will be decided upon to guide the government or decision makers in the roll-out of business incubation scheme in order to increase the success of implementation. The model will include assessment framework with indicators which can be used to plan, monitor and evaluate their performance. This will further raise awareness on the role of business incubators to policy makers, academicians and practitioners. Hence it increases interdisciplinary partnerships and collaborations.

References

Akcomak, S. (2009), 'Incubators as tools for Entrepreneurship Promotion in Developing countries' November 2009, *Research paper No.2009/52 in UNU-WIDER*

Andersson,T.; Serger, S.S.; Sörvik, J. & Hansson, E. W. (2004). *The Cluster Policies White Book.* ISBN: 91-85281-03-4 Publisher: IKED

Bairoch, P.; Richard, K.; Wright, (1995) *Globilization Myths: Some historical reflections on integration, industrialization and growth in the world economy* UNCTAD/OSG/DP/113- www.unctad.org/en/docs/dp_113.en.pdf

Bakeine, A. (2009). *Uganda Country Study: Raising productivity and reducing the risk of household enterprises*. World Bank Project.

Beal, T. (2003). The strategic contributions of small and medium scale enterprises to the economies of Japan and Malaysia. *In the proceedings of the seventh international conference on global business and economic development*, Bangkok, Thailand, January 2003 (pp1337-1354); http://www.aabi.info; accessed in Feb 2010

Byaruhanga, J. K. (2005). Policy Impact on Technology acquisition by small scale enterprises in Uganda study. UNESCO

Campbell, D.J. (2005). University /business research networks: new challenges for knowledge production and advanced innovation systems. In E. Carayannis (Ed.), *Knowledge Creation, Diffusion, and Use in Innovation Networks and Knowledge clusters*. Praeger Publishers, London. ISBN: 1-5670-486-4. http://www.uni-lu.ac.at/wiho/downloads/campbell_university_business.pdf

Chandra, A. (2007). Business Incubation in Brazil: Creating an Environment for Entrepreneurship (October 1, 2007). *Networks Financial Institute Working Paper No. 2007-WP-25*. Available at SSRN: http://ssrn.com/abstract=1058901 (last accessed May 2010.

Chesbrough, H.W., Vanhaverbeke, W. and West, J. (eds.) (2006) *Open Innovation: Researching a New Paradigm.* Oxford University Press, Oxford

Chien, C. T, (2007). *The role of HRD in Business incubator centers*. Available at: www.midwestacademy.org,(last accessed: May 2010)

Creswell, J.W. (2008). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage Publications, Inc. ISBN: 1412965578

Dan M., (1996). *An Introduction to Action Research*. Retrieved in August 2010 from http://physicsed.buffalostate.edu/danowner/actionrsch.html

Dick, B. (2000). *Postgraduate action research: important choices*. Available on line at http://www.uq.net.au/action_research/art/pgar.html

Driscoll, D. L.; Appiah-Yeboah, A.; Salib, P. and Rupert, D. J. (2007). Merging Qualitative and Quantitative Data in Mixed Methods Research: How To and Why Not. *Ecological and Environmental Anthropology*. Vol. 3, No. 1 (2007)

Ertl, Heidi, Bordt, Michael, Earl, Louise, Lacroix, Anik, Lonmo, Charlene, McNiven, Chuck, Susan Schaan, Uhrback, Mark, van Tol, Bryan and Veenhof, Ben (2007), *Towards Understanding the Impacts of Science, Technology and Innovation Activities*, in Science, Technology and Innovation Indicators in a Changing World: Responding to Policy Needs, Paris: OECD, pp.101-122.

Etzkowitz, H. (2002). *The Triple Helix of University-Industry-Government: Implication for policy and evaluation.* Working paper, 2002, Science Policy Institute, ISSN 1650-3821

Duff, A. (1994). *Best Practice in Business Incubator Management Report*. Booragoon, WA, Australia: AUSTEP Strategic Partnering Pty Ltd, 1994.

Gault,F. (2008). Science, Technology and Innovation Indicators: Opportunities for Africa. *The African Statistical Journal*, Volume 6, May 2008

Gibbons, M., Limoges, C., Nowonty, H., Schwartzman, S., Scott, P and Tow, M. (1994). *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*. SAGE Publications India Pvt Ltd, New Delhi 110 048. ISSN 0-8039-7793-X, ISBN 0-8039-7794-8 (pbk)

Goh, A. L.S. (2006) Evolution of industrial policy making in support of innovation: the case of Singapore. *Int. Journal Innovation and Learning*, Vol. 3, No. 1, pp. 110-125.

GoU. (2007). *The MSME Draft policy Document for Uganda.* The Commonwealth Secretariat. www. Finance.go.ug

GoU. (2010). *National Development Plan (2010/11-2014/15).* www.finance.go.ug

Gunasekara, C. (2006). Reframing the Role of Universities in the Development of Regional Innovation Systems. *The Journal of Technology Transfer* 31(1):pp. 101-113.

Hammer, B. and Rosalio, T. D. (1997). A Global channel for improving the environmentperformance of small enterprises. *Background paper for an OECD -workshop; Paris*, November 1997, http://www.cleanerproduction.com/Pubs/pubs/OECDpaper.html

Hanel, P. (2007). *Skills required for Innovation: A review of the literature*. GREDI-0723, pages.usherbrooke.ca/gredi/wpapers/GREDI-0723.pdf

Hategа, G. (2006). Revving up the Engine: Challenges to Private Sector Expansion and Growth. *Presented at the Second National Trade Sector and DTIS Validation Workshop*. Ministry of Tourism, Trade and Industry -MTTI, Kampala

Hippel, E. (1988). *The Sources of Innovation.* Published by Oxford University Press, Inc. ISBN 0-19-504085-6

Jerome, L. W., and Jordan, P. J. (2010). *Building an Institute for Triple-Helix Research Innovation.* http://www.triplehelixinstitute.org/documents/TripleHelix_BuildingAnInstitute.pdf

Jin Cho B. and Eunsuk S. (2009). The role dynamics of the IKED, Government agencies, supporting institutes and incubation centers in Korea. *Asia Pacific Journal of Entrepreneurship*, Vol. 3 No. 2, 2009. Accessed on; www.aabi.org, accessed in May 2010

Juma, C. (2005).*Going for growth: Science, technology and innovation in Africa.* The Smith Institute 2005, London

Kasekende, L. and Opondo, H. (2003). *Financing Small and Medium-scale Enterprises (SMEs): Uganda's Experience*. Bank of Uganda- Research Department Working Paper, November 2003

Ketels, C. (2009). *Clusters, Cluster policy and Swedish Competitiveness in the global economy Report.* ISBN: 978-91-85935-29-1

Keupp, M. M. and Gassmann, O. (2009). Determinants and archetype users of open innovation. *Journal of R&D Management*, 39, 4, 2009

Lalkaka, R. (1997). *Lessons from International experience for the promotion of business incubation systems in emerging economies.* UNIDO, Vienna, available at: www.unido.org, accessed, 16July 2009.

Lating, P. O. (2009). *Hybrid E-Learning for Rural Secondary schools in Uganda: Co-evolution in the triple Helix Process.* Phd Thesis. Division of Technoscience Studies, Blekinge Institute of Technology. ISBN: 978-91-7295-158-7

Laursen, K and Salter, A. (2005). Open for Innovation: The role of openness in explaining innovation performance among UK. Manufacturing firms. *Strategic Management Journal* 27: 131-150 (2006)

Leydesdorff, L. (2001) Knowledge-Based Innovation Systems and the Model of a Triple Helix of University-Industry-Government Relations. *In Proceedings of the Conference New Economic Windows: New Paradigms for the New Millennium*. Salerno, Italy, September 2001

Linsu, K. (2000). *The dynamics of technology learning in Industrialization*, UNU/INTECH Discussion papers, ISSN 1564-8370

Lumpkin, G.T., & Dress, G.G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. Academy of Management Review, 21, (1), 135-172.

Lunegelo, B. and Mbilinyi, A. V. (2009). Convergence of COMESA-SADC-EAC

Regional Frameworks. *In the proceedings of the Annual Forum for Private, Public and Academia Partnership on Trade Policy and Negotiations and organized by the Ministry of Industry, Trade andMarketing (MITM) in 26th October, 2009, Tanzania.*

McCormick, D. (1999). African enterprise clusters and industrialization: Theory and reality. *World development*. Vol. 27, No.9, pp. 1531 – 1551. www.elsevier.com

Mairesse, J. and Mohnen, P. (2007). A survey of innovation surveys: Taking stock of a growing literature, *In Proceedings of CEPR-Banque de France Conference on Innovation*. www.cepr.org/meets/wkcn/6/6658/papers/Mairesse_Mohnen.pdf

Ministry of Finance, Planning and Economic Development. (2004). *An Overview of The National Economy*. Discussion Paper 7, Kampala. www.finance.go.ug

Ministry of Finance, Planning and Economic Development. (2004). *Poverty Eradication Action Plan 2004/5-2007/8*, Kampala. www.finance.go.ug.

Ministry of Finance, Planning and Economic Development. (2010). *Republic of Uganda- Budget Speech: 2010/11 Fiscal Year*. Kampala. www.finance.go.ug

Ministry of Finance, Planning and Economic Development. (2010). *Republic of Uganda- Background to the Budget: 2010/11 Fiscal Year*. Kampala. www.finance.go.ug

Ministry of Tourism, Trade and Industry, (2008). *The Uganda National Industrial Policy; A Frame work for Uganda's Transformation, Competitiveness and Prosperity*. www.mtti.go.ug

Morris, M.M. and Jones F.F. (1999). Entrepreneurship in established organizations: the case of the public sector. *Entrepreneurship Theory and Practice*, 24(1), pp. 71-91.

Mugisha, E.; Onyango, C. and Mugoya, P. (2009). *An Evaluation of the Implementation and Impact of the East African Community Customs Union*. Final Report, EAC. www.eac.int.

National Agency for Enterprise and Construction, (2004). *Benchmarking Incubators: Background Report for the entrepreneurship Index, 2004*. Retrieved in June 2010 from www.ebst.dk/file/3057/Entrepreneurship_2004.pdf

National Council for Higher Education. (2007). The state of higher education and training in Uganda 2006: *A report on higher education delivery and institutions*. www.unche.or.ug

Ngwenya, S. and Munalula, T. (2010). *The Political Economy of the the Common Market for Eastern and Southern Africa (COMESA) Customs Union*. www.comesa.int.

Nowotny, H.; Scott, P. and Gibbons, M. (2011). *Re-Thinking Science: Knowledge and the Public in an Age of Uncertainity.* Polity Press Publishers. ISBN: 978-0-7456-2608-6.

O'Brien, R. (2001). *An Overview of the Methodological Approach of Action Research*. Retrieved in August 2010 from www.web.net/~robrien/papers/arfinal.html

OECD, (2009). *Reviews of Innovation Policy: South Africa*, ISBN: 978-92-64-03823-3

OECD, (2005), *Oslo manual guidelines for collecting and interpreting innovation data Third (Ed.).* Organization for Economic Co-operation and Development: Statistical Office of the European Communities, Paris.

OECD (2006), *OECD Science, Technology and Industry Outlook*, Paris: OECD.

Page, J. (2009). Seizing the Day?. The Global Economic Crisis and African Manufacturing. *Paper prepared for the African Development Bank experts meeting on the impact of the global economic crisis*, Tunis, 10 April 2009. www.afdb.org

Page, J. (2010). Should Africa Industrialize?. *Public lecture in Kampala*. UNU World Institute for Development Economics Research (UNU-WIDER .The Brookings Institution

Philips, R.G. (2002). Technology Business incubators: how effective as technology transfer mechanism? *Technology in society* 24(3), 299-316

Pittaway, L., Robertson,M., Munir,K. and Denyer, D. (2004). Networking and Innovation: A Systematic Review of the Evidence. *International Journal of Management* Reviews, Accessed at http://www.lums.co.uk/publications

Pénin J. (2009). *Open source innovation: Rethinking the concept of openness in innovation Studies.* Submitted to Revue Economique. www.decon.unipd.it.

Porter, M. E. (1998). Clusters and the new economics of competition. *Harvard Business Review*. Accessed at: http://www.econ-pol.unisi.it/didattica/ecreti/Porter1998.pdf

Rice, M.P (2002). Co-production of business assistance in business incubators: An exploratory study. *Journal of Business Venture*, 17(2), 163-187

Romijn, H. (2001). Technology support for small –scale industry in developing industries: A review of concepts and Project practices. *Oxford Development studies*, Vol.29, No.1, 2001. Retrievedfrom
http://unpan1.un.org/intradoc/groups/public/documents/APCITY/UNPAN002135.pdf

Rydhagen, B. (2002). *Feminist Sanitary Engineering as a Participatory Alternative in South Africa and Sweden*. Blekinge Institute of Technology Dissertation Series. Division of Technoscience Studies. ISBN 91-7295-017-X. ISSN: 1650-2159 Publisher: Blekinge Institute of Technology, Sweden

Salazar-Acosta, M. (2006) Innovation systems' based indicators: Emphasis on human capital and ICTs adoption. *In the OECD Proceedings of the Blue sky conference, September 2006, Ottawa Canada.* Available at www.sfu.ca/cprost/docs/06-03.pdf

Sieh Lee Mei Ling (1988)Malaysia's industrial and entrepreneur profile" Production Management. *Institute of Southeast Asian Studies, Singapore*, 1988.

Simba, F. (2010*). Modeling connectivity for e-learning in Tanzania: Case study of rural secondary schools*. Licentiate Dissertation Series No.2010:05, Division of Technoscience Studies, School of Planning and Media Design, Blekinge Institute of Technology

Slovell, O., Lindqvist, G. and Ketels, C. (2003). *The Cluster Initiative Green Book*. ISBN 91-974783-1-8

Sölvell, O. (2009). *Clusters – Balancing Evolutionary and Constructive Forces*. ISBN 978-91-974783-3-5

Sun, H., Ni, W., and Leung, J. (2007). Critical Success Factors for Technological Incubation: Case Study of Hong Kong Science and Technology Parks. *International Journal of Management* Vol. 24, No.2, 2007. Accessed from http://media.web.britannica.com/ebsco/pdf, in May 2010

Szogs, A; Cummings,A. and Chaminade, C. (2009) Building systems of innovation in less developed countries: the role of intermediate organizations. WP 2009/01 CICLE, Lund University, Sweden, ISSN 1654-3149

Tirthankar, M. (2007). Small and Medium enterprises in BIMSTEC: Synergies and Emerging issues for cooperation. Center for studies in international relations and development (CSIRD), Kolkata; Available at: www.csird.org.in, accessed in May 2010

Todorovic, Z. (2006). University-Based Incubators - Towards a Multi-Dimensional Framework. *In proceedings of Administrative Sciences Association of Canada (ASAC) Conference June 3-6, 2006,* http://luxor.acadiau.ca/library/ASAC/v27/content/authors_r_v_eng.htm

UN, (2003) Background Paper of the Millennium Project Task Force on Science, Technology and Innovation. *Commissioned and supported by UN Development Group*.http://www.unmillenniumproject.org/documents/tf10apr18.pdf

UN Millennium Project (2005). Innovation: Applying Knowledge in Development: Task Force on Science, Technology and Innovation.

UN/ECA, (2000). Science and Technology for Africa's Development. http://www.un.org/depts/eca/divis/fssd/

UNIDO, (2005). *Industrial Development Report 2005*. UNIDO Publication, Vienna. ISBN 92-1-106431-7

UNIDO, (2007). *Uganda, Integrated industrial policy for sustainable industrial Development and Competitiveness Part 1 Report*. UNIDO, Vienna

United Nations, Economic and Social Council,(2009*). Science, technology and engineering for innovation and capacity-building in education and research Report*: E/CN.16/2009/3, http://www.unctad.org/en/docs/ecn162009d3_en.pdf

United Republic of Tanzania, (2010). *Economic survey 2009*. Retrieved from www.Tanzania.go.tz

Vanhaverbecke, W.; Vrande, V.; and Chesbrough, H. (2008). Understanding the Advantages of Open Innovation Practices in Corporate Venturing in Terms of Real Options. *The International Journal of Creativity and Innovation Management*. Volume 17, Issue 4, pages 251–258, December 2008

Verheugen, G. and Potocnik, J. (2005). Handbook for Responsible partnering: Joining Forces in a world of open innovation. *The European Industrial Research Management Association*. Available at. www.ec.europa.eu

Wang, Z. and Zang, Z. (2005). Strategic human resources, innovation and entrepreneurship fit: A cross regional comparative model. *International journal of manpower*, Vol. 26, No.6, 2005; pp. 544-559.; www.emeraldinsight.com, accessed in Feb 2010

Wiegratz, J. (2009). *Uganda's Human Resource Challenge: training, Business Culture and Economic Development*. Fountain Publishers, ISBN 978-9970-02-968-1

Wiklund, J. (1999). The Sustainability of the Entrepreneurial Orientation-Performance Relationship. *Entrepreneurship theory and practice* 24.1 (1999): 37-50.

World Bank. (2011). *Doing Business 2011-Uganda: Making a Difference for Entrepreneurs*. World Bank Publishers, ISBN: 978-0-8213-7960-8. E-ISBN: 978-0-8213-8630-9. Internet www.worldbank.org

Yin, R. K. (2009). (4th Ed.). *Case Study Research. Design and Methods Fourth Edition*. SAGE Publications, Inc. ISBN: 9781412960991