

Stimulating Industrial Development in Uganda through Open Innovation Business Incubators

Joshua Mutambi

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Stimulating Industrial Development in Uganda through Open Innovation Business Incubators

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This PhD is dedicated to the memory of my late father Rev. Canon Boaz K. Muntu who passed away immediately after submission of the concept proposal for the research to Makerere University and to my mother Mrs. Idah Muntu for their unconditional love and encouragement throughout my life.

I further dedicate this thesis to my beloved wife Barbra B. Mutambi and our lovely children Samuel Muhimbitse and Esther Atuhairu Mutambi for all their love, support and patience during the period I have been away from them pursuing this PhD.

Abstract

Uganda's economy is agro-based; although the country is land locked it has great potential for industrial development. It is well endowed with natural resources and salubrious climate, but with little success in transforming its agricultural and mineral wealth into processed commodities for local, regional and international markets. The Uganda's National Development Plan 2010-2014 and Uganda Vision 2040 call for a transformed Ugandan society from a peasant to a modern and prosperous country within 30 years. To achieve this goal, Ugandan economy needs to be industrialized. This need is one of the identified strategic bottlenecks. Various strategies and action plans have been developed to steer the country's economy towards sustainable development and increased competitiveness but with little success.

It has been recognized globally that economic development depends heavily on small and medium sized enterprises (SMEs). SMEs are the prime source of new jobs and play a crucial role in income generation as well as in industrialization processes. However, most small businesses fail within their early stages of operation mainly due to under-capitalization and / or lack of proper management and business skills. Globally, through business incubators, start-ups and SMEs have been significantly enhanced to overcome their initial and critical stages of development. Business incubators have been tried in Uganda but not in a successful way. An Open Innovation Business Incubator is a physical or virtual environment that combines the attributes of open innovation and business incubation concepts in creating and supporting new start-ups.

This research aimed at understanding more of the situation in Uganda, how the innovation systems and incubators are managed in other countries and to design a model for how to create better conditions for incubators in Uganda and similar low-income countries and stimulate industrial development. The proposed model has adopted an open innovation approach and a list of suggestions and recommendations has been made.

Different methodological tools and participatory approaches were utilized in the process of undertaking the study to achieve the objectives. Data were collected through literature review, analysis of relevant theories such as industrialization, entrepreneurship, science, technology and innovation, business incubation, triple helix and clusters theory, open innovation, and public- private partnerships. Review of Government reports and policy documents, discussions with industrial and incubation experts, surveys, focus group discussions and case studies were done. Useful ideas were obtained from seminars and conferences.

Research findings indicated that:

- There are hardly any graduate incubatees in Uganda, thus there is a need to foster partnerships and synergies between government, private sector/non-government organizations and academia for open incubation,
- All incubators in Uganda focus on incubatees developing technologies and products but not on business models ,

- Open innovation incubators combined with entrepreneurial oriented strategies can effectively support start-ups and SMEs but requires strong mutual trust amongst actors,
- Through public-private partnerships and open innovation incubators, industrial transformation can be stimulated.

Keywords: Clusters, Entrepreneurship, Innovation Systems, Industrialization, Open Innovation, incubators, Small and Medium Enterprises (SMEs).

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Preface

This thesis is based on a compilation of eight papers, which have been revised to conform to the format of the thesis without changing the original content as follows:

- I. Mutambi, J. (2008). Advancing value addition and competitiveness through standardization to promote manufacturing sector. Proceedings of the Annual International Standards Conference (AISC) 10th – 12th June 2008, Kampala- Uganda
- II. Mutambi, J. (2009). Clustering Small and Medium Enterprises (SMEs) to Enhance Intra and Extra Trade, Productivity and Innovation: Case of Uganda’s Cluster initiatives. Proceedings of the 13th COMESA Summit- Business Forum, 3th - 4th June 2009, Victoria Falls, Zimbabwe.
- III. Mutambi, J. (2009). Institutional and Support Environment to Cluster-based development approach in Uganda. Proceedings of the 12th TCI Annual global conference, 12th -16th October 2009, Jyvaskyla, Finland
- 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.
- V. Mutambi, J., Byaruhanga, J.K, Trojer, L., Buhwezi, B. K. 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
- VI. Mutambi, J. (2012). Adoption of Open Innovation Approach for Sustainable Business Incubation Process. Proceedings of the 10th Global Network for the Economics of Learning, Innovation, and Competence Building Systems (GLOBELICS) International Conference 9th -11th 2012, Hangzhou China.
- VII. Mutambi, J., Byaruhanga, J.B, Trojer, L. (2013). Promoting Innovation and Entrepreneurship in Rural Communities: Case of OVOP Program in Uganda. (Part of the paper that is in the proceedings of the 7th International OVOP Seminar 13th-14th December 2010, Hanoi, Vietnam and submitted to the AJSTID for publication)
- VIII. Mutambi, J., Byaruhanga, J.K, and Trojer, L. (2013). Strengthening Business Incubation System in Uganda: Feasibility Concept Model for Ugandan Context; Accepted in February 2013 for publication by Journal of US-China Public Administration –David Publishing Company, ISSN 1548-6591 (print) ISSN 1935-9691 (online)

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List of Abbreviations and Acronyms

AGOA	African Growth and Opportunity Act
BDS	Business Development Services
BOD	Board of Directors
BTH	Blekinge Institute of Technology
BTTB	Background to the budget
BTVET	Business, Technical and Vocational Education Training
CI	Cluster Initiatives
CICS	Competitiveness and Investment Climate Strategy
COMESA	Common Market for Eastern and Southern Africa
COSTECH	Tanzania Commission for Science and Technology
CP	Cleaner Production
EAC	East African Community
EU	European Union
EUG	Enterprise Uganda
FDI	Foreign Direct Investment
FTBIC	Food Technology and Business Incubation Center
GCs	Governing Councils
GERD	Gross Domestic Expenditure on R&D
GDP	Gross Domestic Product
GoU	Government of Uganda
ICT	Information and Communication Technology
ISCP	Innovation Systems and Clusters Program
JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
LDCs	Least Developed Countries
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MDGs	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
MTIC	Ministry of Trade, Industry and Cooperatives
MTTI	Ministry of Tourism, Trade & Industry
MUBS	Makerere University Business School
NAADS	National Agricultural Advisory Services
NBIA	National Business Incubation Association
NCHE	National Council for Higher Education
NCPC	National Cleaner Production Center
NDP	National Development Plan

NGOs	Non-Governmental Organizations
NPA	National Planning Authority
OECD	Organization for Economic Co-operation and Development
OVOP	One Village One Product
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
TIRDO	Tanzania Industrial Research and Development Organization
TEMDO	Tanzania Engineering and Manufacturing Design Organization
UBOS	Uganda Bureau of Statistics
UDC	Uganda Development Corporation
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 young and fast growing population of estimated 34 million people and high human population growth rate of 3.2% per annum. Worldwide, Uganda is the leading country with the youngest population of 78 % below age 30 years, 52% is 15 years and below (GoU, 2012). It is well endowed with natural resources and salubrious climate, with low industrialization and value addition. Facing the challenges of poverty alleviation, a high human population growth rate, low science, technology, engineering and innovation level, climatic change and environmental impacts among others, Uganda identified infrastructure development, human resource skills development and exploitation of natural resources and value addition (innovation) as some of its main strategies to transform the country and reduce poverty (MTTI, 2008). This situation can be averted by further effectively promoting the involvement of MSMEs as the engine of economic growth in industrial and trade investment.

In the vision of transforming the society from a peasant to a modern and prosperous country within 30 years, (GoU- NDP, 2010; GoU-NPA, 2040), the main focus is the development of private sector driven economy. The government of Uganda ratified and is signatory to the Millennium Development Goals (MDGs) under the UN Millennium Declaration¹⁵. The MDGs are: 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 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 135 million people with access to the sea (EAC, 2012b). 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 has advanced trading partners and international markets that include 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.

To stimulate economic growth, the most promising policies are any means that yield greater rates of technological progress (Simons, 2003, p.38). More broadly, sustained economic growth is associated with the capacity to diversify domestic production structure (innovation): that is, to generate new activities and solutions, to strengthen economic linkages within the country, to create domestic technological capabilities and entrepreneurship development (Lalkaka and Abetti, 1999). 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. However, Mebratu (2002) pointed out that a low level of capacity utilization (30-50% on average) and extreme dependence on foreign inputs, expertise and exchange are the dominant characteristics of most African industry sectors.

According to Mebratu, (2002), industrialization and manufacturing in particular was the lead sector in fast growing developing countries in Asia and Latin America while it is lagging in Africa. African governments and Uganda in particular are putting more efforts into expanding the region's manufacturing sector on a sustainable basis. Industrialization in Uganda will depend on using the resource base and hence on equipping farmers, women and youth to understand the technical and quality requirements of commercial production. Industrialization process efforts include industrial investment recruitment, entrepreneurial and small business development, and business retention and expansion programs. In this respect, there are many existing programs and new initiatives in the country promoting and supporting agricultural production and industrial development, but tend to suffer from a number of weaknesses (MTTI, 2008). In particular, institutions that work with the private sector are not able to provide services that support new sources of growth or enable private sector to compete in global markets. Typically MSMEs find it difficult to do research and development; add value to their products and commercialize their results in markets (innovation) as fast as they should because of high transaction costs. For MSMEs 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 sustainably.

This research proposed that open innovation business incubators concept can promote innovation and accelerate industrialization process in Uganda through encouraging

collaborative entrepreneurship, business start-ups, information and technology transfer, commercialization of research results, manufacturing of inputs, and implementation of science, technology, innovation and industrial development policies. Open Innovation incubator concept is proposed because valuable knowledge, competencies and ideas can be introduced from outside the organization into the incubation process, management and operation practices as well as sharing resources in value creation collaboration projects. Business incubation is referred to as complex business support services and special environment provided temporarily for start-up enterprises with the aim of improving their chances 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; Hackett and Dilts, 2004; Sun et al., 2007).

The Uganda Integrated Industrial Policy for Sustainable Industrial Development and Competitiveness report (UNIDO, 2007) stated that 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). However, in the 1980s, saw the approval of the Lagos Plan of Action and the Final Act of 1980, the Abuja Treaty of 1991, and the recently COMESA-EAC-SADC Tripartite Institutional Framework and Memorandum of Understanding endorsed in June 2011 have all emphasized on common pillars as:

- Market integration;
- Infrastructure Development; and
- Industrial Development.

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 (national and regional regulatory frameworks, financial, privatization and export promotion). It experienced sustained economic growth averaging seven percent per annum generated by different economic sectors (GoU- NDP, 2010). The government in collaboration with other development partners such as EU, UNIDO, JICA, Sida, USAID and Common Wealth Secretariat has been trying to support small and medium enterprises (SMEs) by various means, including technical assistance in policy development, 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 and weak entrepreneurial behaviour which limit entrepreneurship, productivity 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 and resources 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 (Mebratu, 2000; UNIDO, 2007). The creation and subsequent growth of enterprises with a substantial growth potential was 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. MSMEs constitute an important dimension in the innovation and industrialization processes (Hammer et al., 1997; Beal, 2003; Byaruhanga, 2005; Tirthankar, 2007).

The International “Doing Business Survey 2010” report ranked Uganda 112th out of 183 countries on a wide range of business indicators. Adequate infrastructure is among key determinants for economic growth and competitiveness in Uganda. 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). To address the high cost of doing business in such a landlocked country, the government needs to invest heavily in transport, energy and skills development infrastructures (EAC, 2012).

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, it is unlikely therefore that if left alone will be a platform for significantly transforming the economy as the case in the rest of the world. One constant is these small businesses have several disadvantages that hinder their success and their propensity to fail within the initial years of operation (Sherman and Chappell, 1998). 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). 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 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%. Business incubation programs have been considered as a remedy for the

disadvantages that small and new firms encounter by providing useful business support services (Sherman and Chappell, 1998). They are useful in fostering technological innovation, entrepreneurship, commercialization and industrial renewal (Hackett and Dilts, 2004). For this reason many countries have increasingly been engaged in establishing business incubators (Lalkaka, 1997; Lalkaka and Abetti, 1999; Akcomak, 2009). 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). Commercialization driven by market and profit motive is the utilization of research results or new findings (the transfer of knowledge to end users) where firms seek to gain an economic return of investment from research, product development and marketing. Commercialization is predominantly associated with industry development, financing, exploitation and a route to market.

Although the private sector has grown rapidly between 2001 and 2011, growth in the number of firms has been concentrated in small firms with low value addition. According to UBOS Report on the Uganda Business Register 2006/07 and 2010/11, the total number of registered businesses in Uganda in 2007 and 2011 was 26,000 and 460,000 respectively from 160,000 businesses in 2001/02 with majority located in central region of the country. The estimated number of informal sector business is at 800,000 (Kasekende et al., 2003; UBOS, 2007; GoU, 2010; UBOS, 2012). The service sector is the fastest growing in Uganda predominantly in telecommunications, hospitality and trade sub-sectors (MFPED, 2010). The Uganda Government's past Poverty Eradication Action Plans (PEAP I and II) (MFPED, 2004), and in the National Development Plan 2010/11 -2014/15 (GoU-NDP, 2010), the strategy for poverty eradication was 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 requires 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 UNMDGs.

EAC and 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 Ugandan economy is however 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 within the country. What remains to be done therefore is to focus on innovation, 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 (STI) indicators will be another strategy.

With the regional integration and an increasingly competitive environment, there is strong need for industrial restructuring and strengthening of technological capabilities including incubation facilities in Uganda for innovations, diversified production and value addition as well as prosperity to take place. Prosperity depends on a country's economy-wide productivity and innovation is the feedstock of productivity growth (Ketels, 2006; Porter, 2008). However, the Ugandan experience in the incubation process is still at an early stage and this study aimed at better understanding and improving the process of incubation in respect to value creation to successful entrepreneurs, i.e. 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 implementation activities, and skills and technology transfer programs in Uganda and within the EAC region. During that period, it was observed that lack of infrastructural facilities, limited access to finance, poor adaptation of science, technology and innovation; low level of entrepreneurial management skills and poor business development support services were the major constraints hindering industrial transformation and entrepreneurship development (Mutambi, 2006). The idea for this study evolved from such observations and subsequent discussions. Supporting business development and commercialization of innovation for industrial development is the main motivation of this research and it is in line with the vision and objectives of the National Development Plan -2010/2011-2014/15, (GoU-NDP, 2010) and the objectives of the United Nations Millennium Development Goals.

This research was further motivated by the emerging importance of triple helix model and innovative clusters, business incubators, and the realization that Science, Technology and Innovation (STI) are fundamental to understanding the field of business incubation. As Ketels (2006) argued, without microeconomic improvements macroeconomic reforms fail to achieve sustainable improvements in prosperity. One of the strategies that this research proposes government should adopt in enabling innovative entrepreneurship; promoting science, technology and innovation; value-addition, changing peoples' mindset and culture; business services and global industrial network for the industrialization process is through a collaborative process involving industry, academia, private sector organizations and support institutions and services such as business incubation systems.

1.2 Research Problem Description

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 graduates and artisans with potential to start-up enterprises or better improve on their product production processes and prototypes if technically supported. Innovation and the generation of new business ideas have generally been considered quite weak in Uganda.

In contrast, 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 (R&D) and innovation (starting commercial enterprises), yet little has been achieved to this end. Many Ugandan training institutions and agencies have focused on training business management and technical courses, business plan competitions for graduate students and entrepreneurs, but there is little further support and inadequate mentorship to apply the skills and knowledge acquired during training to commercial opportunities.

Attempts were made to introduce the concept of business incubation in Uganda in the 1960s, and from the late 1990s to to-date. Moreover, other institutions and organizations have been established to implement the concept. However, technology and business incubation is not well understood and practiced to a limited extent in Uganda. It should be pointed out that the incubation system is relatively new to Uganda and in the region. There is little information (no academic comprehensive study) on the process of creating an effective incubator, i.e. coordination, design, development and management processes in relation to science, technology and innovation system in Uganda. Thus improving the process of business incubation in Uganda is of high relevance to both research and practice. This situation provided the motivation to carry out research and suggest solutions to the above problems. Furthermore, it became imperative to re-examine the current approaches to promote commercialization of innovative ideas and develop enterprises, and assess the potential roles of business incubation systems strategy and other tools in stimulating techno- entrepreneurship and fostering industrial development in Uganda.

1.3 Objectives of the Study

The main objective of the research was to explore the impact of business incubator initiatives and develop an appropriate open innovation business incubation model that can guide and improve the development of incubation system in Uganda. It is aimed at stimulating industrial development in Uganda.

To achieve the main objective, the specific objectives identified were as follows;

- (i) To review the obstacles of industrial development in Sub-Saharan Africa, in particular the manufacturing sector and draw lessons for Uganda
- (ii) To identify the theoretical bases and principles that can be used for promoting innovation and industrial development in Uganda
- (iii) To study experiences and best practices for business incubation systems in different environments
- (iv) To develop an appropriate business incubation model and suggest areas for the incubators to help the firms enhance their operations

1.4 Research Questions

Research questions are essential in order to have a clear understanding of the issues the study seeks to respond. The following questions guided the study:

- (1) What are the factors that affect the industrialization process, the performance of business incubators and growth of small and medium industrial businesses in Uganda?
- (2) How is the institutional framework for supporting entrepreneurship and SMEs in Uganda?
- (3) What are the major evolving concepts in the field of promoting innovation and industrial development?
- (4) How can these evolving concepts influence industrialization in Uganda?
- (5) How is an incubation process carried out under different conditions globally?
- (6) What is the next practice for the Ugandan business incubators to be managed and improve operations efficiently?

1.5 Significance of the Study

Rising factor costs and intensifying competition in starting and operating businesses have 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 service environment if successfully implemented, together with the clustering program, can play a key role in addressing the mentioned challenges in the process of industrialization. Understanding incubation processes, success factors and challenges of incubators can strengthen the effective partnership between the government, researchers (academia) and the business community (triple helix) in a Ugandan context. There is no known assessment and evaluation framework of incubators in Uganda. This research contributed to fill the research gap of incubation process in Ugandan context and laid the groundwork for further study in the future.

The research objectives are in line with the Uganda Vision 2040 (GoU-NPA, 2013), objectives of the Uganda National Development Plan 2010/11-2014/15 (NDP) 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 findings contribute to deepen our understanding of the incubation climate and are of importance to researchers, policy makers and incubator practitioners for addressing the key issues starting from assessment of the inexperienced or potential entrepreneurs' ideas until their visions are realized. The conceptual model contributes to establishing, operation and evaluation of sustainable business incubators. Application of the proposed model will be helpful for the incubators as through the M&E process, the overall strengths, weaknesses, development needs and

possible solutions are identified. The thesis has contributed to the knowledge of the working methods of different incubators and growing literature about open innovation taking the institutional approach in Uganda.

1.6 Research Scope

The research focused on the Ugandan industrial sector, the small and medium sized industrial manufacturing firms and existing business incubators. To enhance the research results, the author took into consideration 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. The sample of SMEs sectors in Uganda included 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 in the survey of SMEs and cluster initiatives. The study took consideration of the related programs that the author was actively involved in, in Uganda related to development of STI indicators, promoting of innovative clusters and enterprise development through virtual incubation mechanism program known as One Village One Product (OVOP) as well as facilitating cluster initiatives and institutional development.

1.7 Interrelatedness of Research Questions, Included Papers and Objectives

This section describes how the objectives were addressed following the research questions and the included papers. The concepts and theoretical frameworks were reviewed as they are linked to the research and contributed to objective two and three. The objectives have therefore been addressed in papers as follows: Paper I responded to specific objective number 1. Papers II, III and IV discussed the institutional framework for clusters, STI and SMEs development activities in Uganda, challenges and proposals for improving their innovativeness, competitiveness and sustainability, all responding to specific objective number one and two. Papers IV and VI responded to specific objective number three. Question six resulted into Paper VIII which responded to objective number four. It presents an appropriate incubator model and a performance measurement framework detailing indicators that can be useful in monitoring and measuring performance of incubator institutions. It is built from the existing methods, based on the feedback and ideas from experts. Altogether, papers VI, VII and VIII responded to specific objective number four. Figure 1.7-1 shows the interrelatedness of Research questions, included papers and objectives of the study.

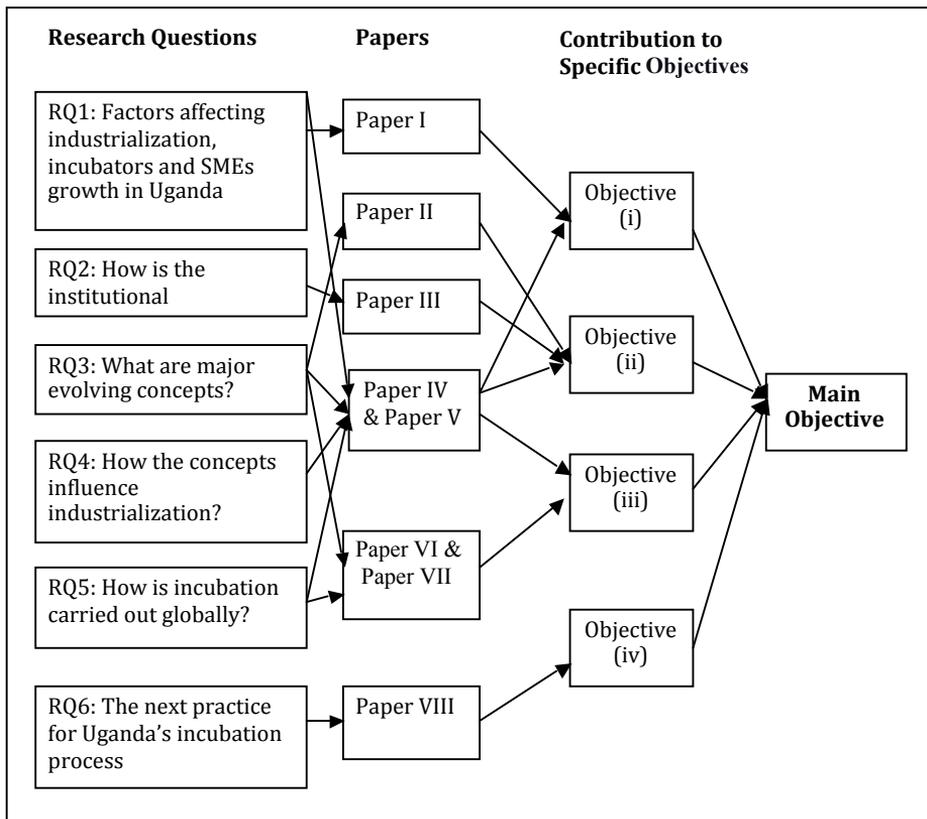


Figure 1.7-1: Interrelatedness of Research Questions, Included Papers ad Objectives

1.8 Thesis Structure

The thesis includes three parts. Part 1 comprises Chapter One, which presents the introduction/background information, problem statement, objectives, significance of the research and research questions. Chapter Two focuses on concepts discussions and theoretical frameworks (i.e. theoretical considerations) linked to this research in the broad category of research in value creating innovations through interactions between university-industry and government sectors. The concepts include industrialization, entrepreneurship, national innovation systems, triple helix model and clusters, business incubation, open innovation, and public private partnerships. It gives the overview of industrialization status of Uganda, the role of MSMEs and their constraints to growth as well as the incubation initiatives in Uganda. Chapter Three dwells on methodological considerations and approaches, a full description of the data collection methods and analysis that were followed.

Part 2 is made of Chapter Four, the papers on which the research is based that have been published and presented in refereed journals and conferences respectively. Part 3 has Chapter Five, which contains the discussions and Chapter Six for conclusions and recommendations for practitioners and policy makers, elaborated suggestions for future work and references.

CHAPTER TWO: CONCEPTS DISCUSSIONS AND THEORETICAL FRAMEWORKS

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 and Potocnik, 2005). The framework underlying the research makes use of concepts and relationships in broad category of research in value creating innovations through interactions between university-industry and government sectors. The research focuses on how open innovation business incubators can stimulate the commercialization of scientific findings and acquired technologies from different sources, and industrialization process in Uganda as shown conceptually in Figure 2.1-1.

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. This research builds on the thoughts of Bell and Pavitt, (1993) who argued that “technological capabilities consist of the resources and innovative capabilities needed to generate and manage technical change including skills, technology base (tangible and intangible assets), knowledge and experience and institutional structures and linkages” and how these different forms can help to create the basis for dynamic changes in competitive advantages as well as industrialization processes.

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 be realized (in other words, taking ideas from inception to impacts). The supply of new knowledge, new ideas and resources (knowledge, skills, capital) and transfer of all these into real innovation within the incubator environment is essential in the process of supporting entrepreneurs and new venture businesses to gain competences. But with the changing nature of innovation, the incubators and the support services they provide must also be open to change (European Commission, 2010). In this research, we are concerned with the ideas or process employed collectively in order to enable open innovation business incubators produce the desired outcomes, in particular, the relationship between knowledge, individuals and organizations. In this context, research on incubation needs to be considered with other bodies of knowledge; in particular cluster theory, innovation systems, entrepreneurship, investment, and firm growth (Dee et al., 2012). Other concepts such as triple helix, open innovation, public-private partnerships, and One Village One Product model have been included in the theoretical framework for promoting innovation and industrial development.

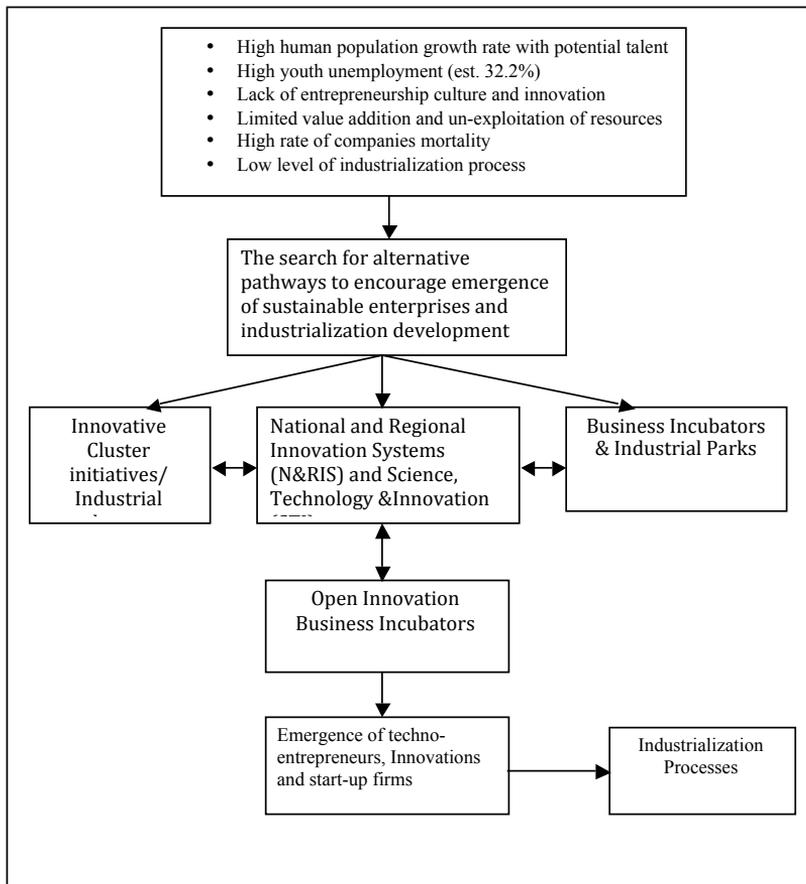


Figure 2.1-1: Conceptual Framework of Research Study

2.2 Various Concepts Discussions

When we talk about industrial development, a number of concepts play a pivotal role in the analysis. This section begins with some general theoretical explanations on some key concepts related to industrial development literature that underpin this study.

2.2.1 Industrialization

Industrialization is frequently considered as the replacement of farming and resource extraction by manufacturing and service activity (Bailey, 2000). Bailey (2000) pointed out that this transition takes different forms in different places at different times. The context within which a country industrializes depends on the innovative capacity to exploit its existing resources. Bell and Pavitt (1993) argued that in an increasingly dynamic and competitive world, it has become complex and specialized requiring knowledge and institutional bases, intra-firm training, incentives and opportunities for technological accumulation. Industrial activities are commonly divided into different components namely; primary sector covers economic activities directly concerned with use of natural environment such as agriculture, fishing, forestry and mining. The secondary sector involves the processing of raw materials and manufacturing. The tertiary sector is where they provide services which include wholesale and retail sales, transportation, and finance, insurance and construction industry. The fourth sector is the application of information and knowledge based activities.

Literature indicates that industrialization began during the industrial revolution in the 1760s with the steam engine and mechanized factory production, while in the early 1970s proto-industrialization and its theoretical implications began to be developed (Walton, 1987). 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 and Kozul-Wright, 1996; UN/ECA, 2000). Most features of modern society are traced to the influence of industrialization in some theory. The factors that explain variations include technological changes in production, markets and communication, or an up-grading of skill levels (Walton, 1987). 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). In Walton (1987), industry is described as the fabrication of raw materials into components or finished products by primarily mechanical means dependent on inanimate sources of power, while proto-industrialization is defined as the increase in manufacturing activity by means of the multiplication of very small producing units and small to medium accumulations of capital. This further resulted into interregional trade in Europe. Industrial development therefore, 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 competi-

tiveness in price and quality (the skills, knowledge and institutions). Technological knowledge is built up using scientific methods described in books, tested by experiments and can make deliberate progress by doing practical things or producing things (Bell and Pavitt, 1993; Arnold and Thuriaux, 1997). 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; Wiegratz, 2009; Page, 2010). Firms have to compete with a larger number of international rivals and this often compels them to up-grade their products and processes (technological progress) (Archibugi and Michie, 1997). Arnold and Thuriaux (1997) suggest that this requires that firms search for opportunities, change their behaviors and have technological capabilities including the absorptive capacity needed to evaluate and exploit ideas from outside. It is the drive for profit in a competitive economy. For developing countries like Uganda where the private sector is dominated by SMEs, faced with weaknesses to interface with such technological changes and opportunities, government support intervention is very critical.

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 /science parks and business incubators, 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 Bell and Pavitt (1993) pointed out, is policy and technological accumulation 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 infrastructural support, obtaining technical information, assimilating it and improving upon it (diffusion). It entails building institutional rather than individual capacity, with new managerial and organizational methods, new ways of storing and disseminating information (communication channels) 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 (*the user – producer linkages*). All the described above were so important in most industrialized economies, that the developing countries will have to accumulate before full dynamic benefits of industrial development (Archibugi and Michie, 1997).

2.2.2 Entrepreneurship

The word “entrepreneur” is derived from a French word “entreprendre” 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 economically viable operation and goods (Amabile, 1996). Entrepreneurs recognize new opportunities and drive innovations (Gries and Naudé, 2010). To be innovative is an important characteristic for entrepreneurs and managers, nearly every new product in the market is sold as an innovation.

Some scholars have defined entrepreneurship 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 (Morris et al., 1999; Brown et al., 2001; Todorovic, 2006) 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. This is however, subject to venture or start-up costs, which include costs such as initial capital endowment information and organization and management costs, administrative costs, costs of learning, acquiring and developing a business idea (the innovation) and a business plan suitable to obtain finance. 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 and 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. Entrepreneurs are vital in the

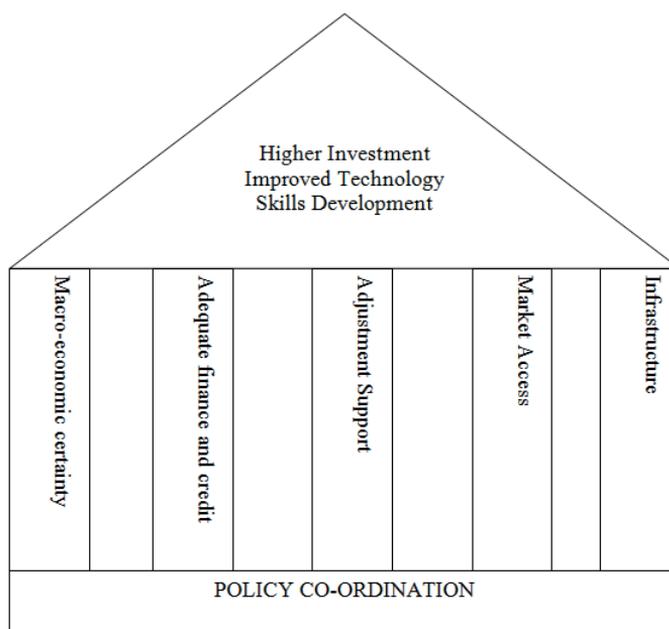
process of industrialization (Ács and Naudé, 2011). Entrepreneurs play an essential role in driving the structural transformation from a low-income, traditional economy to modern economy (Naudé, 2010). Naude (2010) pointed out that for the present purposes entrepreneurship is the resource and process where individuals utilize opportunities in the market through the creation of new business firms. In particular, the key role of manufacturing industry for growth based mainly on technology driven increase of productivity and innovation, in this case structural change and some essential co-factors, like human skills, capital or appropriate institutions and entrepreneurs is globally undisputed (Gries and Naudé, 2010).

Gries and Naudé (2010) explains how the small firms are linked to the large and medium established firms by outsourcing opportunities provided by large firms and for small firms together with new entrepreneurial start-ups supplying intermediate inputs. To sustain these opportunities, the small firms and prospective entrepreneurs need resources including finance. 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 state is an enveloping influence shaping both the organizations and communities and the conditions of industrial development. 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 (Archibugi and Michie, 1997; Bulan, 2004).

Electricity generation for instance is very crucial for industrial development and growth. Low levels of electricity generation and low access coupled with high prices in Uganda and Sub-Saharan Africa in general has created an unfavorable environment for growth and hindered development. Uganda currently generates 450 mega watts out of the targeted 2000 megawatts. Only 11% of the population in Uganda has access to electricity, Kenya is 20%, Tanzania is 14%, Burundi 2% and Rwanda 16%. More efforts need to be applied on how to increase electricity generation and access within the region as well as other major areas of reforms for economic and social development as referred to as “pillars of growth” below. These reforms are major drivers of industrialization process. Figure 2.2-1 shows the pillars of economic and social development as explained above.



*Figure 2.2-1: Pillars of Growth
(Source: Author & Bulan, 2004)*

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 many decades and even 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 (OECD, 2006; Ertl et al., 2007)

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; OECD, 2007; Gault, 2008). 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 (Arnold and Thuriaux, 1997).

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 the basis for increased productivity, competitiveness and national wealth (Carlson and Wilmot, 2006). Carlson and Wilmot, 2006 further stated that innovation is the successful creation and delivery of a new or improved product, process or service in the market place. In other words, it is the process of development and deployment of new products, processes and business models for economic gains irrespective of whether they are new to their competitors, countries, or the world (Bismuth and Tojo, 2008). Innovation is a broadly inclusive term that can encompass almost every activity of the firm, the work of both formal S&T enterprises, and the informal, grassroots ideas and inventions of people not associated with official institutions (Arnold and Thuriaux, 1997; Juma and Yee-Cheong, 2005). To innovate means to create, adopt or adapt knowledge and technology to develop or improve products, processes or services with the goal of improving the productivity and competitiveness of a company or organization or a sector. Innovation could be subdivided into many types, for example process innovation, market innovation, product innovation, factor innovation, and even organizational innovation (Hippel, 1988; Pittaway et al., 2004; OECD, 2005; Hanel 2007; Mairesse and Mohnen, 2007).

Innovation 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, processes or services 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. It gives insights and calls for attention to developments, performance, awareness and trends in STI system and its environment (national system of innovation-NIS). Therefore, STI indicators are also key elements in industrialization process. The develop-

ment 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 got a weak innovation system and 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. The aim of an innovation system is to produce knowledge, spread information and diffusion in order to use it for economic development. The system is to support firms in their innovation and business development needs for competitiveness and rapid technological change (Kuhlmann and Arnold, 2001). The National innovation system is made up of different actors and their interactions (Fig2.2-2). The system is built on different regional partners or players, such as research institutes, universities, technology transfer agencies, chambers of commerce, financing institutions, investors, government departments, individual firms as well as company networks and industry clusters. The Figure 2.2-2 below shows a simple model of an innovation system:

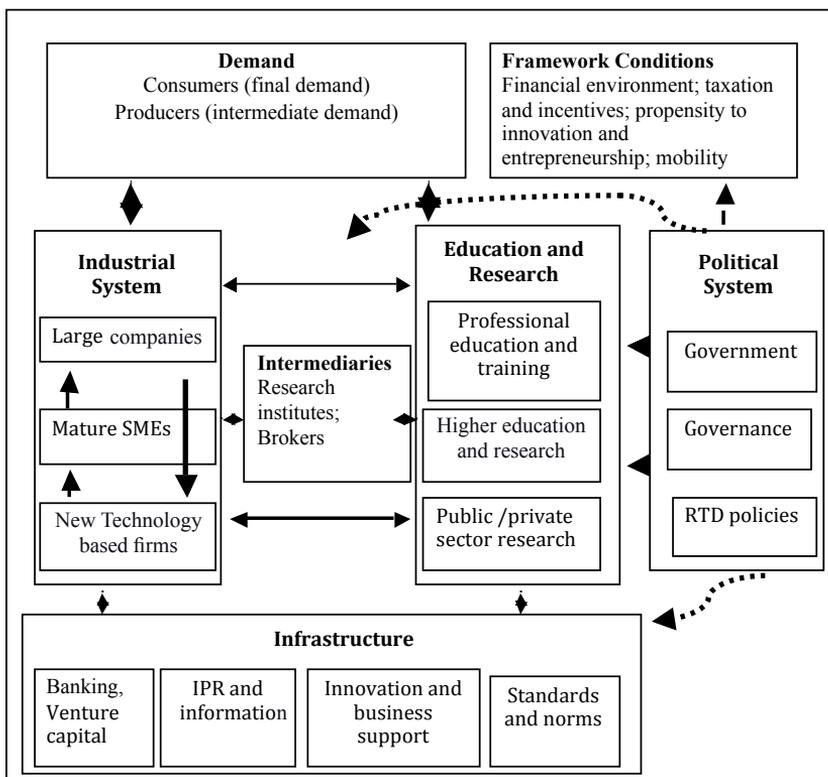


Figure 2.2-2: A simple Innovation System Model
(Source: Kuhlmann and Arnold. (2011))

A strong innovation system can therefore be seen as one with systematic linkages between different sources of knowledge production (universities, research institutions, and other intermediary organizations) and both large and SMEs.

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. However, in developing countries Uganda inclusive, innovation is understood broadly as all efforts to search and improve a firm's capabilities, and as a continuous process of absorbing and creating knowledge which is determined by external inputs and the accumulation of skills and knowledge in the past (Kroll and Schiller, 2009). The processes of innovation and learning have been described as open innovation.

2.2.5 Open Innovation

Chesbrough defines Open Innovation as follows: '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., 2003; 2006). Knowledge is not necessary technological knowledge but also business, organization, market and services knowledge. Open innovation is a paradigm that assumes that firms can and should use external ideas, as well as internal ideas, and internal and external paths to market as they look to advance technology. 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 as opposed to closed innovation system. 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 (Laursen and Salter, 2005; Vanhaverbecke et al., 2008; Keupp and Gassmann, 2009). These include;

- Innovating firms benefit from early involvement in new technologies or business opportunities. Innovating firms also benefit from delayed entry or delayed financial commitment a company can start exploring the commercial possibilities of a technology outside initially, via relationships with universities, SMEs and other innovation sources.

- Firms take the advantage of an early exit, and the ability to realize some value from projects that do not go forward internally. 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 institutions or organizations/firms to clarify thinking, chart relationships of technology to markets, and other related factors and expose areas where the organization lacks expertise.

Increasingly, entrepreneurs, firms, institutions and organizations can neither own nor exclusively control all of the capabilities and knowledge needed to create and capture value. They must find novel ways to access these capabilities through collaborating with and involving diverse players, adopting open innovation platforms, nurturing communities of innovation and participating in business ecosystems (Mcphee and Segers, 2013).

The logic of Open Innovation is that not all the smart people work for you. Organizations need to leverage their internal capabilities. They must look outside as well as inside locally, regionally and internationally integrating the internal capabilities with external together. This means that organizations really have to be connected to and collaborating with the outside. These organizations not only include large companies but a whole range of organizations including organizations that fund innovation (incubators, venture capitalists, etc.), organizations that generate innovation (innovation explorers, merchants, architects, and missionaries), organizations that bring innovation to the market and those that try to control all parts (PERA, 2009).

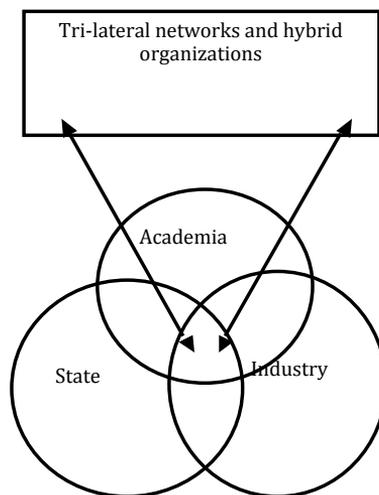
The approach will shape the organizations to rethink their business models (Hedman and Kalling, 2003; Osterwalder et al., 2005) and strategic objectives for innovations and selecting potential collaborators because they have an influence on success. Most of the academic research has dealt with case studies of multinational companies and not with how open innovation can benefit SMEs (Brunswick and Vanhaverbeke, 2011). However, the relevance and adaptability has grown from larger companies, to institutions and now in SMEs (Vanhaverbeke et al., 2012; Mcphee and Segers, 2013). The research seeks to place the concept of open innovation from individual firms to the context of business incubators and other organizations or networks of incubators.

Since successful business development, as well as entrepreneurship are based on the integration of several business activities, innovation processes and stakeholders, it is essential for developing or low-income countries such as Uganda that are disadvantaged in terms of science, technology and innovation resources to adopt open innovation or collaborative innovation practices in institutions that can transform the incubation industry targeting sustainable long-term growth and can enhance diffusion of ideas, innovations and knowledge in the course of industrialization.

2.2.6 Triple Helix Model 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 or

government in the process of knowledge capitalization and social development (Etzkowitz, 2002; Almeida, 2005; Gunasekara, 2006; Jerome et al., 2010; Simba, 2010). The triple helix denotes the university-industry-government relationship as one of the relatively equal, yet interdependent, institutional spheres which overlap and in relevant situations 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 (Etzkowitz and Leydesdorff, 2000; Leydesdorff, 2001; Campbell, 2005).



*Figure 2.2-3: The triple Helix Model of University-Industry-Government Relations
Source: Etzkowitz and Leydesdorff (2000)*

In the triple helix model, the incubators are looked upon as exemplar hybrid organizations that internalize the university - industry - government relationship, creating and fostering an environment that is conducive to interaction (Etzkowitz, 2002, Almeida, 2005). Incubators like other institutions play more significant role in improving survival and contributing to competitive success of innovative clusters and to promote economic development. Innovative 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 but cooperating companies, suppliers, service providers, and associated institutions (Porter, 1998; Solvell, 2009; Ketels, 2009). The cluster concept was accelerated with the adoption of cluster theory within public policy beginning in the early 1990s when the notion was embraced by practitioners in the public, private and academic sectors (Solvell, 2009). Governments worldwide at all levels adopted the concept as a tool for promoting national and regional competitiveness, innovation and growth (Davis et al., 2006; Arthurs et al., 2009). But the progress is relatively slow in developing countries

especially in African countries compared with developed countries and newly industrialized countries in Asia. It is therefore beneficial to understand and take lessons as benchmarks in order to improve the synergies and partnerships of existing triple helix actors.

Clusters constitute important knowledge spillovers for businesses. Clustering is generally defined as a process in which geographically proximate producers, suppliers, buyers or firms and other actors co-locating within the same geographical area, intensify collaboration with mutual benefits around a certain functional niche, and establish close linkages and working alliances to improve their collective competitiveness. On the other hand, cluster initiatives (CI) are organized efforts to enhance competitiveness of a cluster, involving private industry, public authorities and/or academic institutions (Slovell et al., 2003). Through clusters and networks (the result of agreements among participant firms), SMEs can access skilled and highly educated labor and pooled business services (Aranha, 2003). 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. Aranha (2003) stated, “these opportunities permit specialization and build technology capability, adaptability, innovativeness and competitiveness”. 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. Clustering, business incubators and entrepreneurship are very closely linked (Slovell et al., 2003). Innovative Clustering concept is in its earliest stages of development in Uganda. Uganda like other most countries have been, is also trying to attain some form of triple helix of academia-industry and government in policy formulation and under the concept of university outreach service delivery as explained in Turyangyenda, (2004).

2.2.7 Business Incubation

Business Incubation is described as 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 (Sherman and Chappell, 1998; 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 (NBIA) 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. Incubators are primarily designated as either non-profit or for-profit. Incubators are often funded by public resources as non-for profit incubators (Cheng and Schaeffer, 2011). 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 incubators (for-profit) such as those in privately run organizations and corporate enterprises (Aranha, 2003) as indicated in Table 2.2-1. Cheng and Schaeffer, (2011) added that the rationale for publicly funded business incubators lies ultimately in addressing market failures, i.e., gaps and deficiencies in the support structure available to new and small firms. Recent studies introduced the mixed-models of business incubators such as public-private partnerships incubators (Lalkaka, 2000). Table 2.2-1 shows the simplified typical incubation typologies with sector specialization, source of funding and objectives (goals)

Table 2.2-1: Business Incubator Typology by sector, financing and goals

Sector Specialization	Source of funding	Main objectives/Goals
Technology incubation	Universities, Government and private sector initiative	Innovation, spin-offs from universities, high-tech or high growth, stimulation of entrepreneurship
Research and Development	Research Institutes, Government and other sources	Research commercialization,
Mixed Portfolio incubation	Government, public-private partnership, and other sources	Job creation, economic development, stimulation of entrepreneurship, support to particular industries
Agri-business incubation	Government, public-private partnership, NGOs, and other sources	commercialize innovative practices , raise agricultural productivity, create jobs and incomes to communities
Special purpose or social business incubation	Government, public-private partnership, NGOs, and other sources	Innovative programs for special groups such as women entrepreneurs, individuals and communities for job creation and social economic impact

*Sources: Author, Lalkaka and Abetti, (1999) and infoDev, "Types of business incubators".
[http:// www.idisc.net/en/DocumentArticle.38689.html](http://www.idisc.net/en/DocumentArticle.38689.html)*

Taking the decision to start a business or commercialize a research finding is a big step while the practicalities of setting up one can be challenging sometimes. Business Incubators often provide and nurture start-up firms or early stage ventures particularly for technology businesses with high and rapid growth potential with a shared space, business and professional support services, networks and access to sources of funding that are difficult for start-up firms to acquire on their own to increase their survival rate and growth (Bergek and Norrman, 2008; Cheng and Schaeffer, 2011). The premise of the incubator is that firm-formation can be improved by organizing it as an educational process, with formal and informal aspects. 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). Governments around the world support entrepreneurship and view business incubators as important tools to drive innovation, mentor SMEs to get into the supply chains of large companies and create more sustainable economies (Wang 2009; Chandra and Silva, 2012).

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 1959 when opened in a Batavia, New York, warehouse) 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). Massachusetts Institute of Technology exemplified incubation as a strategy to revive a declining industrial region in USA in the early 20th Century (Etzkowitz, 2002). Incubation expanded in the U.S. in the 1980s and spread to the UK and Europe through various related forms (e.g. innovation centres, technopoles/ science parks) later in Latin America, Asia and Africa. Incubation activity gained popularity, estimated over 9000 business incubators in the world in 2013. Incubators are being implemented in developing countries raising interest for financial support from organizations such as UNIDO and the World Bank (Scaramuzzi, 2002).

2.2.7.1 Business Incubation Evolution

In general, there are three main global trends and periods of business incubation evolution (EC-CSES, 2002). The global trends and incubation evolution led to strategic changes.

- First Generation. Initiation and development of the concept (late 1950s- mid 1980s). This is called the “infrastructure: economies of scale” period. Business incubation programs became a popular tool for creating new companies which lacked managerial, marketing and other business skills. Thus, space provision for tenants was not enough. There was obvious need in additional business support services (training, coaching, mentoring and other knowledge based services). This led to the second generation business incubators.

- Second Generation. Active growth and development (mid 1980s – mid 1990s). Called “Business support: accelerating the learning curve”. Due to technological achievements in information, communication and new technologies, it allowed businesses to solve issues rapidly as compared to few decades ago. Resource scarcity such as access to capital, expertise and knowledge became very important which were bottlenecks of start-ups. These could be partly solved through networking models of business incubators, thus a third generation was introduced.
- Third Generation. Industry maturity and new leaps of development (mid 1990s – present). Called “Networks and Value Chains” are the most common characteristics of this period. Entrepreneurs have constant pressure from market and their competitors. They are forced significantly to reduce time-to markets, establish partnerships and embed their products and services in existing value chains. That is why networks became so important.
- The rapid development in ICT trends and new technologies led to the new concept of virtual incubators or networked incubators. Business incubators spread all over the world (from USA to Europe, Europe to Africa, Latin America to Asia). The vast majority of incubators are non-profit entities. In accordance with current trends, as well as the need to offer support to companies in Uganda during their first years of development, the first and second generation incubator initiatives are in operation.

The development trend is shown in Figure 2.2-4 below.

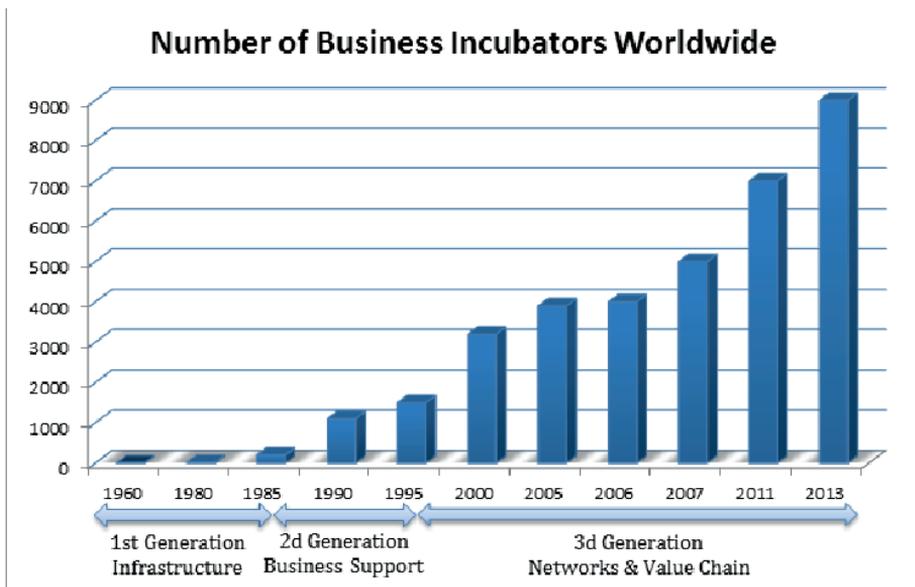
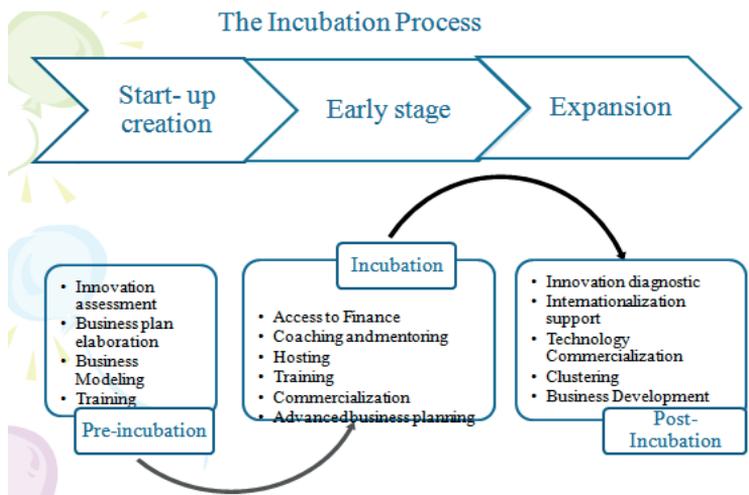


Figure 2.2-4: Number of Business Incubators Worldwide
 Source: (Mutambi et al., 2010, Lewis et al., 2011, Ryzhonkov, 2012)

Incubators are of basic importance in the process of establishing links between research and business (i.e. transfer of technology from universities to industry). 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 as illustrated in Fig. 2.2-5. The interactions between the academic, industrial and government actors at all levels redirected the production of knowledge to new ends (the new production of knowledge, Mode 2), transdisciplinary rather than mono or multi disciplinary (Gibbons et al., 1994, Etzkowitz, 2002). 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. With the advancement and cost effective communication technologies, the processes of opening up, utilization of external resources and by networking organization structures can be observed. The idea of open innovation incubation has not been dealt with in literature nor implemented in practice (Thom, 2011). This study aims at adapting open innovation approach in business incubation practices utilizing the specific area of collaboration and co-development. Thus merging the two literature streams and contributing to this area by bringing the Ugandan incubation context, we can gain key knowledge, skills and other advantages. Across the incubator movement, the management problems of incubator clients are met with the delivery of a variety of value-added management services and capabilities. 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). Business incubators and clusters in Uganda are still in developing stages so that their influence on company performance and competitiveness has so far been negligible. It is therefore necessary to stimulate a more significant partnership of the public and private sectors as well as network linkages between economic actors to ensure a more effective performance.



*Figure 2.2-5: The Incubation Process
(Source: European Commission, 2010)*

2.2.8 Open Innovation Business Incubator

In a world of increasing complexity with scarce resources, but abundant and widely dispersed knowledge, organizations cannot afford to rely on their own experts and research (Van de Vrande et al., 2009). In open innovation context, organizations need to associate, involve, collaborate and share facilities in order to advance the development of new models, technologies and services (Clausen and Rasmussen, 2011). Open Innovation business incubator is described as a physical or virtual environment that combines the attributes of open innovation and business incubation concepts in creating and supporting new start-ups (Lee et al., 2010; Chesbrough, 2011; DeCleyne, 2013). Open Innovation incubator concept is proposed for adoption because valuable knowledge, competencies and ideas can be introduced from outside the organization into the innovation process, management and operation practices as well as sharing resources and facilities in value creation collaboration projects. The combination of these assets aims to establish an environment to foster start-up companies (DSV, 2013) and support social economical relevant innovation (Clausen and Rasmussen, 2011). For Uganda to enhance the incubation and entrepreneurship programs, adopting open innovation incubator concept through collaboration with various stakeholders as described by the triple helix model of university-industry –government relations and combining them with entrepreneurial oriented strategies (concepts) will accelerate production of short and medium-to long term valuable effects.

2.2.9 Public-Private Partnerships (PPP)

Business incubators take various forms; public owned, privately owned and public-private partnership owned (Lalkaka, 2000; Chandra, 2007). On the other hand, issues concerning funding and daily operation efficiency and productivity as well as increased service level expectations are part of the growing worldwide political support from privatization of government services and subsequent movement towards Public-Private Partnerships (PPPs). The private sector has to be involved because incubators are there to serve private companies and or entrepreneurs. The concept of public-private partnerships (PPP), was first adopted in the United Kingdom in 1980s (Hodge and Greve, 2005, p.2). In their book, Hodge and Greve (2005, p.2) pointed out that many scholars, articles and books are devoted to the study of PPPs because the concept promises a new way of managing and governing organizations that delivers service to citizens (Hussain et al., 2012). Lonsdale, (2007) re-affirmed that all over the world, governments are expanding the role of the private sector in the planning and delivery of public services and infrastructure. Literature shows that the concept has existed historically where governments have contracted with the private sector for centuries. There are many working definitions. Public Private Partnerships (PPP) are characterized by the sharing (between public and private partners) of common objectives, as well as risks and rewards as might be defined in a contract or manifested through different arrangement, so as to effectively deliver a service or facility to the general public (Akintoye et al., 2003). Hodge and Greve (2005) loosely define PPPs as cooperative institutional arrangements between public and private sector actors. PPPs are long-term contractual

arrangements that harness the skills and resources of both private and public sectors in the delivery of public services or the development of public infrastructure.

According to the National Council for Public-Private Partnerships (NCPPP), (2013), the Canadian Council for Public-Private Partnerships defines a public-private partnership as “a cooperative venture between the public and private sectors, built on the expertise of each partner, that best meets clearly defined public needs through the appropriate allocation of resources, risks and rewards.” While according to Lawther’s (2002) report, *Contracting for the 21st Century: A Partnership Model*, public-private partnerships are further defined as: “Relationships among government agencies and private or nonprofit contractors that should be formed when dealing with services or products of highest complexity. In comparison to traditional contractor- customer relationships, they require radical changes in the roles played by all partners.”

In this research, a working definition of PPP adopted is *“a cooperative venture between the public and private sectors, built on the expertise of each partner that best meets clearly defined public needs through the appropriate allocation of resources, risks and rewards. Main elements are shared ownership or management of infrastructure projects and development of enduring private sector-led activities, institutions, or organizations that deliver technical, financial, and other forms of assistance to public sector entities”*

Public-private partnerships can take various forms and include both collaborative (non-legal binding) or contractual (legally binding) agreements. The current government NDP promotes and supports private sector engagement and direct involvement in education and training sector, infrastructure development, health and other business development services as part of a Public Private Partnership arrangement. The government is yet to pass the legal guidelines. The PPP Policy for Uganda was approved by Cabinet in March 2010, a Bill was also approved by Cabinet and is yet to be approved by Parliament. This research argues that in order to have proactive business incubators in Uganda where there are scarce resources, a true partnership is needed between the parties where risk is shared rather than allocated to individual parties and on long term basis. Public-Private Partnerships forged by the business incubator can create a web of relationships with the capacity for influencing the broader business environment (Chandra and Silva, 2012).

Combining the concern of industrialization and entrepreneurship in Uganda with the characteristics and constraints of small and medium enterprises, the possible ways to propel the economy into the industrial chain are through strengthening the role of government, provision of business development services and adoption of new initiatives as discussed above.

2.3 Industrialization in Uganda

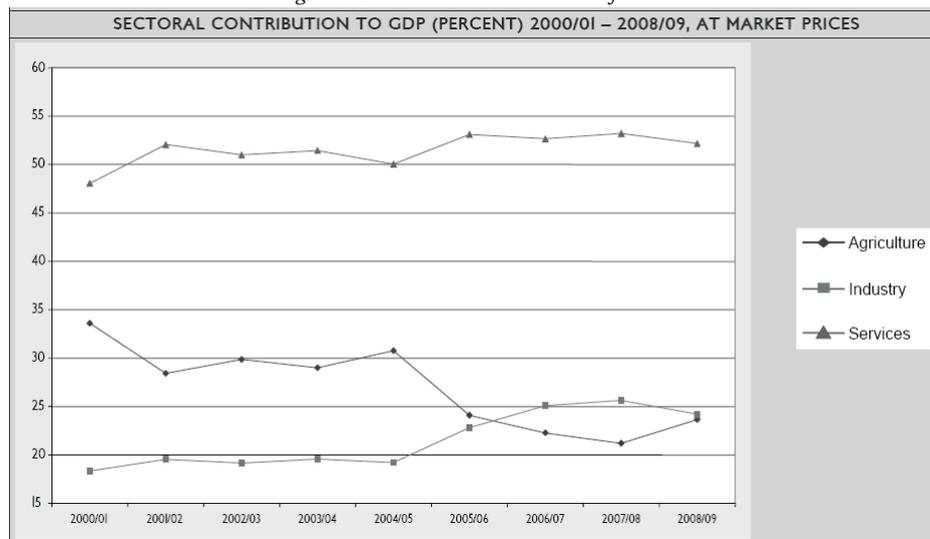
The country is well endowed with natural resources and a healthy climate. Although, there is abundance of raw materials, they are not exploited and effectively utilized. The industrial sector occupies a central position in the Government’s vision and the

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 2.3-1: Sectoral Contribution of GDP



(Source: Uganda Bureau of Statistics Database, 2010)

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, 25 parks have been identified across the country and development 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 as shown in Table 2.3-1 (UBOS, 2010; 2012). 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%. Statistics show that the secondary school enrollment is over One million from Senior One to Senior Six.

The government policy to liberalize the education system (public-private partnership) has led to an increase in the number of private higher learning institutions. Uganda has a total of 32 universities, out which 5 are publically owned and 27 are privately owned while the total number of institutions is 164 including universities, colleges and other tertiary (Non-University) institutions (UBOS, 2012) as indicated in Table 2.3-2 and Table 2.3-3.

Table 2.3-1: Primary and Secondary School Enrollment in Uganda

Category of School Enrollment	2005	2006	2007	2008	2009	2010
Primary 1-7: Grand totals	7,223,879	7,362,938	7,537,971	7,963,979	8,297,780	8,374,000
Secondary S1-S6	728,393	814,087	954, 328	1,088, 744	1,194,454	1,225,692

Source: UBOS Abstract 2012

Table 2.3-2: Higher Education Institutions Enrollment 2006-2007 in Uganda

Institutions	No.	2006			2007		
		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: UBOS Statistical Abstract (2010)

Table 2.3-3: Higher Institutions Enrollment in Uganda, 2011

Institutions	Number of Institutions	Male	Female	Total
Universities	32	78,817	61,270	140,096
Business Institutions	58	12,260	12,724	25,084
National Teachers Colleges	7	4,989	2,853	7,842
Health Institutions	21	3,924	3,564	7,459
Management Institutions	12	2,293	3,179	5,472
Technical Colleges	5	2,914	336	3,250
Agriculture, Fisheries & Forestry	3	1,169	456	1,625
Media Institutes	4	967	653	1,620
Theology	11	1,326	271	1,597
Law Institute	1	500	300	800
Cooperative Colleges	2	204	144	448
Tourism Institutions	3	137	89	226
Art Institutions	1	134	61	195
Aviation Institution	1	127	20	147
Meteorological Institution	1	15	24	39
Survey Institution	1	27	3	30
Others	1	452	188	640
Grand Total	164	110,255	86,135	196,570

Source: UBOS Statistical Abstract, (2012)

Due to the increase in the number of higher education and tertiary institutions, more graduates are increasingly 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. In 2009/10, statistical further indicated that number of self employed work force was 76.4% while paid employees was 23.6%. This is translated into 66% employed in agriculture, mining and quarrying, 27.9% in service and only 6.0% in manufacturing sectors. 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 so that entrepreneurship and absorptive capacity can be created within the country. Therefore, as a support structure for entrepreneurship, incubation is the logical next step after entrepreneurial education.

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 ac-

counts 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 functional 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. The manufacturing sector includes the formal and informal manufacturing sector. The food processing group has the biggest weight, followed by beverages and tobacco, then the chemicals, paint, soap and foam products. There are also businesses in production of construction materials, metal products, textiles, clothing and foot wear, saw milling, paper and printing (UBOS, 2012). With the need to change the mindset of Ugandans in particular with respect to doing business and work attitudes, business and technology incubators which have been proven as enterprises development tool 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 as presented in Table 2.3-4:

Table 2.3-4: Definition and Classification of MSMEs in Uganda

CRITERIA	MICRO ENTERPRISE	SMALL ENTERPRISE	MEDIUM ENTERPRISE
Number of employees (persons)	< = 4 employees	< = 50 employees	50< employees<400
Sales Turnover p/y (UGX)	< = 12 million UGX	< = 360 million UGX	360 mln <Turnover<10 bln
Total Assets/Capital (UGX)	< = 12 million UGX	< = 360 million UGX	360 mln<T/Assets<10bln

Source: GoU, (2007)

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 and more than fifty percent fail within the first five years (Hatega, 2006; Tushabomwe-Kakoza, 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 and market opportunities; poor managerial practices; lack of technical training and advice in small business development; high taxes; high rent charges; power failure (load shedding); 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 (Tushabomwe-Kazooba, 2006; MFPED, 2007; MTTI, 2008). This situation is a real problem in rural areas and away from Kampala including border areas. Strengthening of regional commercial centers, SMEs cluster initiatives and establishing business incubation facilities among other infrastructures would improve this situation (McCormick, 1999; Ketels et al., 2006; Davies, 2009).

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 Trade, Industry and Cooperatives (MTIC) with the support of the Ministry of Finance, Planning and Economic Development (MFPED), but the role clarity is somewhat lacking. The Ministry of Trade, Industry and Cooperatives is in the process of creating a Directorate of MSMEs an umbrella for overseeing development of Micro, Small and Medium scale Enterprises (MSMEs) in the country. A Cabinet Memorandum (CT (2011) 246) for this development was submitted to Cabinet Secretariat and Ministry

of Public Service (MoPS) for onward submission to and discussion by Uganda Cabinet (MTIC, 2013).

2.3.2 Building Entrepreneurial Communities in Uganda

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.

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, supporting Makerere University to commercialize research, application of information and communication technologies including rural communities, as well as cluster development for 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 more 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 stimulate industrial development.

Uganda Government has progressively established and supported a number of business support organizations offering services intended to help SMEs/firms grow and survival. These organizations are either private sector driven or government. The key among government are ministries and agencies which include: Ministry of Trade, Industry and Industry (MTIC), Ministry of Agriculture, Animal Husbandry and Fisheries (MAAIF), Ministry of Finance, Planning and Economic Development (MFPED), Ministry of Local Government (MoLG), Ministry of Education and Sports (MoES) and Ministry of Information and Communication Technologies (MICT). The agencies include; Uganda Investment Authority (UIA), Uganda Revenue Authority (URA), Uganda National Bureau of Standards (UNBS), Uganda Export Promotion Board (UEPB), Uganda Industrial Research Institute (UIRI), Management Training and Advisory Center (MTAC), etc. while the private sector organizations include but not limited to the following: Private Sector Foundation of Uganda (PSFU), Enterprise Uganda, Uganda Manufacturers Association (UMA), Uganda National Chamber of Commerce and Industries (UNCCI), Microfinance institutions (MFIs), Uganda Small Scale Industries Association (USSIA), and Non-Government Organizations (NGOs).

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 institutions and programs, but there are also a large number of challenges. Thus, even with all the above interventions, the statistics on SMEs failing to survive are appalling. In order to propel businesses forward and support their operations to higher and acceptable standards which will lead to productivity improvement, sustainable growth and industrialization, it is important that the knowledge transfer and technological innovation process is supportive. For instance, 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 open innovation business incubation centers and industrial parks.

2.3.3 Business Incubator initiatives in Uganda

In Uganda, attempts were made to set up incubation centers since the post independence days, (1960's) to provide support to SMEs, however due to political instability, the concept did not progress. The incubation concept was revived in mid 2000s with UIRI to facilitate research and development, innovation and learning activities, and nurturing start-up businesses. Makerere University and other institutions also followed and started to establish business incubator services as a way to help spin-offs and business start-ups while providing laboratories for students and entrepreneurs in which to experience the real world of business. According to their objectives, they all aim at value creation, skills development and economic growth.

The following are operating incubation facilities in the country funded by the government:

- (a) Uganda Industrial Research Institute (UIRI);
- (b) Makerere University National Software Incubation Centre (NSIC);
- (c) Makerere University Food Technology and Business Incubator;
- (d) Makerere University, Africa Institute for Strategic Animal Resource Services and Development (AFRISA)
- (e) The Presidential Initiative on Banana Industrial Development (PIBID);
- (f) The Textile Development Agency (TEXDA)-Quasi-government institution

The Ministry of Trade, Industry and Cooperatives has been implementing a program “One village One Product” based on virtual incubation practices since 2010 across the country. Micro and small enterprises or groups/cooperatives are trained in basic business management skills, value addition and marketing techniques. Some groups are also provided with production and technical equipment as seed funding.

Uganda Investment Authority (UIA), a semi-autonomous government agency responsible for promoting and facilitating private sector investment in Uganda and offering support to SMEs intends to develop an SMEs business incubation Center at Kampala Business Industrial Park. The main objective is to foster and encourage a spirit of entrepreneurship and enterprise development generally, particularly among the youth and women. There are also other government institutions such as MTAC, Makerere University Business School and privately operated companies that have started offering some form of business incubation services such as FinAfrica Uganda Ltd. There is no association of business incubators in Uganda.

In all the above existing young incubation institutions, there are faced with many weaknesses and challenges which include;

- Lack of financial resources available to incubators and inadequate operational infrastructure;
- Lack of functional and effective governing boards and bureaucratic procedures in some incubators
- Poor coordination among the institutions and other stakeholders which hinders partnering opportunities;
- Some businesses become too reliant on the incubator support and fail to mature;
- Inability to recruit top talents from outside their boundaries, hence inadequate capabilities to offer quality business development services and to exploit the opportunities in the emerging sectors such as ICT, biotechnology and new materials;
- Lack of access to venture capital and networks of new venture funding institutions.

The continued trend towards globalization and regional economic integration requires government and private sector support for incubators in order to enhance their growth and subsequent facilitation of establishment and expansion of business enterprises in Uganda. Information given from existing incubators is still general. Research has not been done investigating how many jobs are generated and how many businesses have graduated from incubators.

There is need for incubators to change their operational models and involve partners to strengthen the absorptive capacity (develop more skills and attract talented individuals) for working with external innovation or resources, information management system and capability in marketing knowledge assets for collaboration. Although, there are some weaknesses, it has been proven that organizations or institutions operating on a networked or open innovation basis have the advantages of being able to draw on a much greater pool of resources, expertise able to add significant value and to minimize costs. The approach further enables them to build up their networks of expertise, development and management of information.

CHAPTER THREE: METHODOLOGICAL CONSIDERATIONS AND APPROACH

3.1 Research Design

This chapter introduces the research design and the methodological techniques applied. The limitations have been also defined. The research design adopted was inspired by Participatory Action research and interactive model of mixed methods based on undertaking both theoretical and empirical (qualitative and quantitative) analyses. From the research objectives, the first part focuses on analyzing secondary data on published materials and studies in industrialization, entrepreneurship and innovation systems, cluster theory and clusters development, public-private partnerships, business incubators and open innovation concepts. Secondly, it involved use of interviews and surveys from different stakeholders and experts in the field within Uganda, Tanzania and Sweden. Such a focus led to involve many stakeholders including representatives of several government ministries and agencies, community based and business development institutions, organizations or associations, academia, private businesses, cluster initiatives and cooperative societies in case of Uganda. It is both practice and theory driven research for potential benefits. Case study method was also applied in assessing the interactions between the triple helix actors in cluster initiatives and application of different approaches in business incubation process.

To address and achieve objectives of the study, in addition to the literature review of the previous research studies and published articles, the author was involved in the following studies, programs and surveys:

- (i) Formulation of the National Industrial Policy, 2009;
- (ii) Facilitating the innovative systems and clusters program in Uganda, particularly Katwe Metal Fabricators Cluster in Kampala, 2006-2013;
- (iii) Needs Assessment survey for the artisans, handicraft and small agro-processors under the innovation systems and clusters program, 2010;
- (iv) The Science, Technology and Innovation Indicators status in Uganda, 2009-2012;
- (v) Introduction and implementation of the value addition and utilization of locally available resources program named 'One Village One Product Program' in Uganda, 2009-to-date.
- (vi) Establishment of Africa Institute for Strategic Animal Resource Services and Development (AFRISA), Makerere University (an academic-community public private partnership engagement platform), 2010

3.2 Participatory Action Research

Action research is known by many other names, including participatory research, collaborative research (on the part of scientists, practitioners, service users etc), action learning, and contextual action research, but all are variations on a theme. Participatory research approaches are mostly utilized at the level of applied and adaptive research or even technology transfer. The common aim of these approaches is to change social reality on the basis of insights into everyday practices that are obtained by means of participatory research (Bergold and Thomas, 2012). "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" (Dan, 1996; O'Brien, 2001).

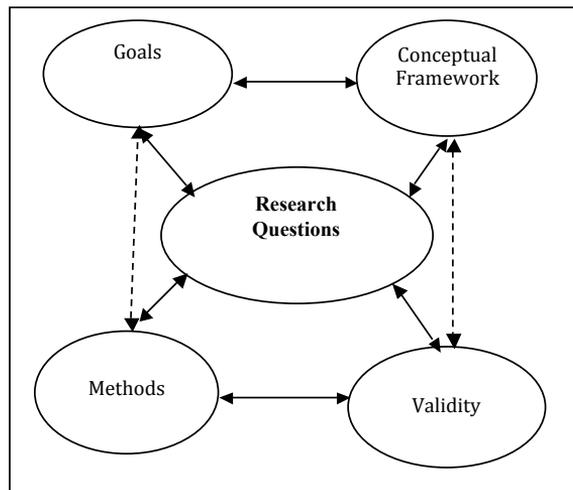
Participatory Action Research provides means to measure results against initial goals and identify critical elements within a project to advance the desired outcome (Ryd-hagen, 2002; Lating 2009; Simba, 2010; Otine, 2011). Against this background, the methodological approach was inspired by the Participatory Action Research (PAR), as a collaborative approach, which involves all partners in the process, with the aim to produce knowledge and recognizes partners' strengths, weaknesses, threats and opportunities (SWOTs). The aim of the study is broad but was guided by various concepts and methods. It is motivated by the triple helix model and clusters development, business incubation, innovation systems, open innovation, public-private partnership concepts and trans-disciplinary knowledge production (Mode 2) (Gibbons et al., 1994). The research adopted both quantitative and qualitative methods. They include observation, participation, interviews and document analysis in this category (Driscoll et al., 2007; Creswell, 2008; Yin, 2009). Creswell (2008) confirms that observations, field notes, journals, interviews (structured, semi-structured and unstructured) and analysis

of documents are used for gathering qualitative information. Exploration is also made empirically which takes a variety of forms such as case studies, personal experience and participation, interviews, texts, etc.

3.3 Interactive Model

To obtain data from mixed methods and multiple techniques in addition to the participatory methods, an interactive model of research design developed by Maxwell (2005) was applied. It consists of five research components that are strongly connected and influence each other: (1) goals, (2) conceptual framework, (3) research questions, (4) methods, (5) validity.

The graphical representation of those components integrated into one system is shown in Figure 3.3.1.



*Figure 3.3-1: An Interactive Model of Research Design
(Source: Maxwell, 2005)*

The interactive nature of the model made it suitable for this study as all components are inter-dependent and interacting with each other and closely tied to several others rather than being linked in a linear sequence. Maxwell (2005) explains that attention should be paid to ethical considerations in every part of the research. Research ethics involves application of fundamental ethical principles such as honesty, confidentiality, responsibility, non-discrimination, legality, intellectual property rights, animal care and human subject rights. Ethical rules were followed during this research. Where the identity of respondents from enterprises might be problematic, strict anonymity was preserved.

The design of the research is reflected in Table 3.3-1 based on Maxwell, (2005).

Table 3.3-1: Components of the Interactive Model Research

#	Questions to consider	In present study
1	Goals	
	<p>(i) What issues does your study want to clarify and what practices and policies do you want it to influence?</p> <p>(ii) How will the results be relevant?</p>	<p>Industrialization is stated as a national priority.</p> <p>The necessity to create a competitive business environment is a long term goal for Uganda. Specifically, value addition, skills development, job creation and poverty reduction</p> <p>Results of the study will be relevant to public authorities, policy makers, incubator managers, business incubation associations, researchers and stakeholders involved in the process of setting up or running business incubators.</p> <p>Researchers develop understanding of the interactions and benefits of the innovation system. It will contribute to the body of knowledge and industrialization strategies in Uganda</p>
2	Conceptual framework	
	<p>What theories, literature, preliminary studies, personal experiences, prior research findings and ideas will guide the research</p>	<p>Industrialization; triple Helix model; Cluster theory; Innovation Systems theories; Open Innovation; business incubation and Public-private partnerships; National Industrial Policy, STI Policy, Trade Policy</p> <p>Formulation of the National Industrial Policy, 2009</p> <p>Facilitating the innovative systems and clusters program in Uganda</p> <p>Science, Technology and Innovation Indicators status in Uganda, 2009-2012</p> <p>Introduction and implementation of the Value addition and utilization of locally available resources program named 'One Village One Product Program' in Uganda, 2009-todate.</p>
3	Research Questions	
	<p>(i) What does the research investigate?</p> <p>(ii) What is intended to be understood</p> <p>(iii) What questions(s) the research attempts to answer</p>	<p>What are the factors that affect the industrialization process, the performance of business incubators and growth of small and medium industrial businesses in Uganda?</p> <p>How is the institutional framework for supporting entrepreneurship and SMEs in Uganda?</p> <p>What are the major evolving concepts in the field of promoting innovation and industrial development?</p> <p>How can these evolving concepts influence industrialization in Uganda?</p> <p>How is incubation process carried out under different conditions globally?</p> <p>What is the next practice for the Ugandan business incubators to be managed and improve operations efficiently?</p>

4	Methods	
	What approaches and techniques will data collection and analysis will the research apply	Literature review, document analysis, several in-depth interviews and surveys, participatory action methods and case studies
5	Validity	
	(i) How might the results and conclusions be wrong and how to deal with these? (ii) How the data collected supports or contradicts the initial ideas? (iii) Why should the results be reliable	Wrong interpretations, ambiguity or contradictions due to inaccurate data collected. Resource limitations and other environmental factors may influence validity. Data collected support the initial idea, however several other cross-observations have been made. Multiple sources and methods, reliable sources, official documents, cross-checking with other research, stakeholders involvement and researcher's experience.

Source: Constructed by author based on Maxwell, (2005)

3.4 Data Sources

Multiple data collection methods were employed for data collection from the primary data and secondary data sources. For primary data, the methods chosen included; administered questionnaires (surveys) and conducted interviews and conversations with stakeholders, held focus 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 about 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 (different actors) for effective business support services.

Ultimately, the research investigated the mechanisms of incubator support and how the incubator model works, business development elements, strengths, and weaknesses of the existing BIs locally, regionally and internationally. It also focused on the actors, the linkages and the factors that affect the successes or failures. The study had some limitations particularly in obtaining data during direct interviews and surveys from the incubatees.

3.4.1 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.

3.4.2 Primary Data Collection

Primary data collection covered surveys and interviews methods as were used by Mian, 1996; CSES, 2002; Grimaldi and Grandi, 2005; Bergek and Norman, 2008). Expert opinions and 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 and participatory case studies were also applied.

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, Tanzania and Sweden to enable the collection of in-depth quantitative and qualitative information i.e. views and experiences from business owners and stakeholder organizations/ support service providers (Uganda) and experts and incubator managers (Uganda, Tanzania and Sweden). 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, as identified by Yin (2009). Site visits were made to the universities, institutions and business incubation facilities in all the three counties, and some SMEs industrial parks in Uganda as well as science parks in case of Sweden for visual and performance data.

Study visit of selected business incubators in Uganda included Uganda Industrial Research Institute (UIRI), Food Science and Technology Business incubator, Makerere University, ICT incubation center, Makerere University, Presidential Initiative on Banana Industrial Development (PIBID), Bushenyi, Textile Development Agency (TEX-DA), Management Training and Advisory Center (MTAC), FinAfrica Uganda and Apiary training center (Nakasongola). SMEs industrial parks included Njeru Gatsby Industrial Park in Jinja and Mbarara UIA SME industrial park. In Sweden, the agencies and business incubators visited included; VINNOVA (the Swedish Government Agency for Innovation Systems), Blekinge Business Incubator (BBI) located in the NETPORT Science Park in Blekinge, Ideon business incubator located in Ideon Science Park in Lund which is the oldest science park in Sweden, Stockholm Innovation Center (STING) an incubator of Karolinska Institute of Technology (KTH) located in Kista Science City among many innovative firms especially within the IT sectors , Malmo business incubator (MINC) which is fully owned by Malmo city and Chalmers University of Technology Innovation Office also one of the oldest incubators in Sweden and Chalmers School of Entrepreneurship, and other Incubators in Gothenburg. In Tanzania, the incubators visited included TEMDO, and University of Dar-es Salaam ICT business incubation Center. Discussions and findings were analyzed and presented in paper VI.

The case study method was used in facilitating the cluster initiatives in Uganda and assessing the advantages and disadvantages of targeting industrial clusters in Uganda for promoting entrepreneurship and industrial competitiveness. This was very significant for understanding the advantages and disadvantages of clusters and the institutional support for SMEs. Results were discussed in paper II.

During this research, a study for conducting the Research and Development, and innovation surveys under the African science, technology and innovation (ASTI) indicators was coordinated and involved by the author, which was very relevant to the research. So these surveys were conducted to give background and empirical information regarding the innovation system and environment in Uganda. The STI indicators institutional framework for Uganda was developed in the process. The innovation survey produced 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. The findings were presented in paper IV.

In the course of the study also, the author initiated another program within the Ministry of Trade, Industry and Cooperatives termed “One Village One Product program” also for promoting innovation, value addition and business development focusing on utilizing available resources within the country. It has been considered a global model for cluster development, business incubation and economic impact (Cooperhouse, 2010). Adopting the virtual business incubator methods and public-private partnership arrangement, ideas were selected from the participants and nurtured into real businesses in rural communities. Detail procedures were followed in transferring knowledge and technological development within the unit of analysis. Business managers were identified, advisors allocated and the incubation process conducted. Thus through a participatory process, communities learn how to plan their development path and develop solutions amidst changing economic environment.

Interviews were conducted to evaluate the impact of the program focused on the activities generated, the interactions of members and actors within the units, the types of knowledge and information offered and gained, and how this led to the development of their ideas that helped to improve their businesses and increase their incomes. The findings were discussed in a feedback workshop with all the participants for clarification and verification purposes. They are presented in Paper VII.

The information derived from all the surveys and sets of case studies described above was analyzed and developed a proposed suitable model based on open innovation business incubator for Ugandan context. This is presented in the last paper VIII.

Table 3.4-1: Relation between Research Questions and Methods

Question 1: What are the factors that affect the industrialization process, the performance of business incubators and growth of small and medium industrial businesses in Uganda?
Methods: A combination of review of existing literature, analysis of government policy documents, discussions with experts and practitioners. Conducting studies and surveys. Results discussed in workshops and conferences
Question 2: How is the institutional framework for supporting entrepreneurship and SMEs in Uganda?
Methods: Literature review, assessment studies, surveys were conducted in innovation systems sectors. Reports discussed in seminars, workshops and conferences. At national level, seminars and workshops were organized while at international level, with the technical assistance of NE-PAD, Sida and government results were discussed. Presentations and Publications were made
Question 3: What are the major evolving concepts in the field of promoting innovation and industrial development?
Methods: Literature review, case studies through participatory action facilitating innovative clusters development program in Uganda. Interviews and case studies for detailed information were conducted. Data analyzed and presented in seminars, workshops and conferences.
Question 4: How can these evolving concepts influence industrialization in Uganda?
Methods: Literature review, participatory processes, interviews, surveys, focus groups
Question 5: How is incubation process carried out under different conditions globally?
Methods: Literature review, interviews and surveys with a focus on Uganda, Tanzania and Sweden. Carried out field work in Ugandan Incubators and a selected sample of incubators in Tanzania and Sweden were interviewed to investigate incubation processes and structures. Analysis of collected data was done. Seminars organized both at BTH and Makerere universities to discuss results. Presentations in international conferences were made.
Question 6: What is the next practice for the Ugandan business incubators to be managed and improve operations efficiently?
Methods: Analysis of best practices, processes and structures was done. A proposed model has been designed with concepts and principles to guide the operations and management of incubators in Uganda and in low-income countries based on literature review, data collected from field work and ideas from experts. Suggestions for areas of improvement to the incubators recommended.

Source: Constructed by author

3.5 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. Analysis of the data collected helped the author 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.

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. Next section provides the papers that were presented in international conferences and others published in international journals.

All the ethical rules and regulations were followed bearing in mind the confidentiality issues.

The references for this Part I are all found at the end of Part III (page 197).

PART II

CHAPTER FOUR: PRESENTATION OF PAPERS

4.1 Introduction and Summary of the Papers

This research produced ten papers that have been presented in conferences and others published in journals. The thesis is a compilation of eight papers which have been revised to conform to the format of the thesis without changing the original content as indicated in the summary:

Paper I: Mutambi, J. (2008). Advancing value addition and competitiveness through standardization to promote manufacturing sector. Proceedings of the Annual International Standards Conference (AISC) 10th – 12th June 2008, Kampala- Uganda

This paper 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. 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, the economy 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 and other initiatives for industrial development as they have accelerated developments in Asia and European countries.

Paper II: Mutambi, J. (2009). Clustering Small and Medium Enterprises (SMEs) to Enhance Intra and Extra Trade, Productivity and Innovation: Case of Uganda's Cluster initiatives. Proceedings of the 13th COMESA Summit- Business Forum, 3th - 4th June 2009, Victoria Falls, Zimbabwe.

This paper focuses on the need to enhance intra and extra regional trade, productivity and competitiveness within the framework of cluster development. Although Africa is endowed with resources it has lagged behind in productivity, innovation and competitiveness. The value addition of the region's raw materials greatly benefits the producers and contributes to wealth and employment creation. The paper further analyzes the linkages between entrepreneurship and clusters, the importance of clusters. It highlights key challenges and the need for incubation services. The findings are demonstrated from the experiences in facilitating cluster initiatives in Uganda. It concludes by emphasizing intra and extra regional trade, business to business linkages, and implementation of the policies and actions planned.

Paper III: Mutambi, J. (2009). Institutional and Support Environment to Cluster-based development approach in Uganda. Proceedings of the 12th TCI Annual global conference, 12th -16th October 2009, Jyvaskyla, Finland

This paper presents the related support initiatives and institutions and the kinds of support to cluster based development approach in Uganda. 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.

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.

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

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.

The objective of the paper was to explore and compare different points of view from a number of articles, reports and policies. The paper provided the state of business incubation in different countries, how they have grown and the lessons for Uganda. 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 especially for technology and high potential for growth. Improving and promoting entrepreneurship, new enterprises and indeed the operating potential for SMEs in general is essential for all national economies. It introduced 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.

Paper V: Mutambi, J., Byaruhanga, J.K, Trojer, L., Buhwezi, B. K. 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

The focus of this paper was on developing and establishing relevant science, technology and innovation indicators for Uganda. It indicates how Uganda has not been producing primary STI indicators like many of other African countries. 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 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 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 open innovation business incubators will yield more potential benefits.

Paper VI: Mutambi, J. (2012). Adoption of Open Innovation Approach for Sustainable Business Incubation Process. Proceedings of the 10th Global Network for the Economics of Learning, Innovation, and Competence Building Systems (GLOBELICS) International Conference 9th -11th 2012, Hangzhou China.

The paper aims to explore relationship between the performance of incubators and their openness. The paper looked at frameworks for making the population prosper through trade and industrialization/innovation process in the Ugandan context. It discussed dynamic relationship of incubation, support environment and entrepreneurship with respect to industrialization process. The paper emphasizes openness and outsourcing; stakeholders involvement and strong interactions between the government institutions, academia and industry/ businesses; enhancement and utilization of capabilities and opportunities at all levels of society in the formal as well as informal sectors.

Paper VII: Mutambi, J., Byaruhanga, J.B, Trojer, L. (2013). Promoting Innovation and Entrepreneurship in Rural Communities: Case of OVOP Program in Uganda. (Part of the paper that is in the proceedings of the 7th International OVOP Seminar 13th-14th December 2010, Hanoi, Vietnam and submitted to the AJSTID for publication)

This paper discusses the importance of business incubation, particularly virtual incubation practices for the support to innovations in SMEs and the promotion of entrepreneurship. It further presents the case of OVOP Program in Uganda, the involvement of the author, its implementation process and evaluation findings for the pilot phase. This is important in the process of technology adoption, innovation and entrepreneurship development as well as an imperative leverage for industrialization of the country. The findings underscore the importance of human and material resources, business development support services and role public-private partnerships. The impact so far achieved reflects that incubation services have potential to generate entrepreneurs, innovations and industrial growth.

Paper VIII: Mutambi, J., Byaruhanga, J.K, and Trojer, L. (2013). Strengthening Business Incubation System in Uganda: Feasibility Concept Model for Ugandan Context; Accepted in February 2013 for publication by Journal of US-China Public Administration –David Publishing Company, ISSN 1548-6591 (print) ISSN 1935-9691 (online)

This paper highlights the challenges faced by private sector mainly the micro, small and medium enterprises that constitute a large percentage (over 80%) of private-sector in Uganda. It further discusses the concept of business incubation services and how it can be popularized in Uganda based on public-private partnership and open innovation approach.

It draws a feasibility concept for consideration in establishing a multipurpose/mixed-use business incubation facility given that the demand is very high and highlights the

best practices. It recommends among others an urgent need for the public-private partnership policy framework and improved government commitment in fostering innovation, skills and entrepreneurship development.

The papers have been arranged within the following themes:

Theme 1: Background and Industrial Status of Uganda

Theme 2: Supporting Rural Industrialization

Theme 3: Status of Incubation Services Globally and New Approaches.

THEME 1: BACKGROUND AND INDUSTRIAL STATUS OF UGANDA

4.2 Paper I

ADVANCING VALUE ADDITION AND COMPETITIVENESS THROUGH STANDARDIZATION TO PROMOTE MANUFACTURING SECTOR

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 Sub-Saharan 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 Ugandan, African and the global markets. To achieve manufacturing sector products that meet 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). 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 (industrial) sector development, a key lesson is the ability to take a coordinated and sustained approach to provide necessary conditions (especially a stable macro economy) which will greatly increase the chances of success in expanding the sector in order to stay competitive or improve competitiveness in the global markets (Lall, 2004; 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. Process and functions can be distributed. Designs can be done say 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. This has practically been possible based on a bewildering array of new technologies, advanced skills and sophisticated supply-chain and distribution techniques (Lall, 2004; Shoji, 2007; JBIC, 2008). Such a globalization characteristic leads to a cross cultural dialogue between regional blocks, governments, corporations, societies and most importantly individuals. This trend has been possible due to promotion of technological innovations, foreign direct investments (FDIs), joint ventures, strategic alliances, and export-led strategies. Manufacturing researchers in Uganda and Africa generally have concentrated on low level manufacturing processes, resource-based materials and methods. Though these are still extremely important, it is becoming increasingly apparent that there is also need to focus on the additional dynamics which is a result of globalization and information technology 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 increasingly getting 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 policy decisions made and 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, promoting high performance and good governance practices, Science, Technology and Innovation, infrastructural development as well as building the skills of the manufacturing workforce (the pillars of economic and social development). Based on the above factors and experiences, a strong partnership project was established in Mozambique not based on raw materials. Table 4.2-1 shows an example of the Mozal Project Scheme in Maputo –Mozambique (Miyaji, 2008)

Figure 4.2-1: General Overview of Mozal Project Scheme in Maputo Mozambique

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	

The key drivers for this project according to Miyaji (2008) were; competitiveness of production cost (Hydro electric power generation, access to Maputo port for importation of inputs-alumina), governments’ strong commitment and support (Mozambique

and South African Governments), and participation of reliable financial institutions and partners.

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 for 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 Sub-Saharan African (SSA) countries to develop competitive manufacturing sectors will therefore depend on the quality of SSA 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, strict adherence to international standards, focused training and general business support with governance as a cross-cutting theme (MFPED, 2004).

2. Status of Manufacturing Sector in Africa (Sub-Saharan 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 (the Sub-Saharan 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 processing such as the textile industry. The manufacturing development in Asia (East and South East Asia), for instance, started from agricultural processing including the textile industry and shifted to the capital intensive and other technologically sophisticated industries (i.e. Automobile and electric appliances industries) (Bell and Pavitt, 1993). The Asian LDCs income levels were quite similar to the Sub-Saharan African countries, yet Sub-Saharan 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 (Eifert, Gelb and Ramachandran, 2005). In a liberalizing world, export success is a good indicator of industrial competitiveness. Strict international standards have often prevented Ugandan businesses from exporting their goods to foreign markets. Quality requirements are often higher, particularly in the EU and AGOA markets, than in regional markets. The cost of attaining these quality standards and the minimum quantities required for export can be prohibitive for SMEs. Table 4.2-2 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 compared to other international regions, the East Asia, Latin American and Caribbean, and the Middle east and North African countries.

Table 4.2-2: Economic Indicators of Developing Countries on Trade, Investment and Exports

	GNI per capita, \$	Trade % GDP	Ag. % GDP	Investment (FDI*), %GDP*	Mfg, %GDP (growth*)	Mfg exports %GDP*	Mfg, % mch 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. According to the indicators, in EAC countries, it is clearly illustrated that Uganda, although in terms of attracting FDIs, it is relatively higher than other regional countries, its performance in other indicators are poor. This really needs serious policy and strong government intervention.

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;

- Sub-Saharan 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.
- Sub-Saharan 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 as illustrated in the next section.

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

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 for economic and social development (termed as pillars of growth); including finance and macro-economic stability; market structure, infrastructure; human capital; and good governance and policies as shown in Figure 4.2-1 (Bulan, 2004; MFPED, 2004; Lall, 2004).

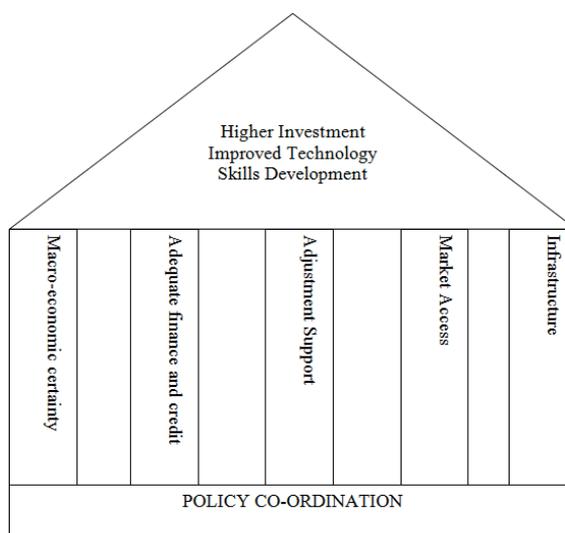


Figure 4.2-1: Pillars of Economic Growth
(Source: Author & Bulan, 2004)

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 earnings 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 serious 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 macroeconomic stabilization, there are many more that have a long way to go in building macroeconomic 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. It is observable that increasing efficiency is a key to firms being able to enter export markets, such efficiency will be linked to observable skills firms possess, 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 build capabilities, advance value addition, quality and standardization and productivity. Abundance of raw natural resources and or cheap unskilled workforce are no longer sufficient to sustain industrial competitiveness and growth. The manufacturing sector growth trend can be improved by;

- Absorbing technology from the developed countries, either by attracting FDIs or improvement of the business environment
- Upgrading production systems, technological improvements 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 (Khan, 2006).
- Encourage sub-contracting terms from large companies to small and medium firms (backward and forward linkages). 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 central 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 (1998) 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. Governments should also act to improve awareness among entrepreneurs of the range of financing options available to them from financing programs, private organizations and banks.

In conclusion, to advance manufacturing and competitiveness, numerous major bottlenecks need to be addressed such as; manufacturing modernization, policy uncertainty, poor access to finance, inadequate infrastructure, focused training and general support to quality infrastructural institutions (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).

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THEME 2: SUPPORTING RURAL INDUSTRIALIZATION

4.3 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 (Porter, 1998). Clusters contribute to the enhancement of innovations and competitiveness of firms and regions where support environment is provided. Firms do not innovate or learn on their own but in interaction with other firms (suppliers, buyers, consultants and competitors) and institutions within a country and abroad. Interaction often however requires inputs and favorable conditions: physical inputs, new skills, technical information, institutions (such as research institutes, universities,

standards agencies, marketing bodies, industry associations and training institutions), finance and infrastructure.

The Government of Uganda (GOU) emphasizes on enhancing the performance of private sector, the local business community, infrastructure development while also promoting the transfer of skills and knowhow to the entire value-chain actors through the Public-Private Partnership (MFPED, 2004). 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 as stipulated in PEAP (2004/5-2007/8).

In recognition of the importance of small and medium scale enterprises (SMEs) 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. That is a sign of adopting characteristics similar to the cluster based development concept, which should be promoted and taken advantage of.

There is a political will to promote clusters (MTTI, 2008); the government 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.

The aim of this paper is to present basic program instruments and discuss an effective institutional framework for supporting cluster-based development approach for innovative SMEs. Specifically, it discusses the basic aims and desired outputs of the institutional framework and strategies namely; as to enhance SMEs survival, growth and competitiveness within the competitive environment; and also to point out duplication and un-coordination issues within the institutions.

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, support entrepreneurship and SMEs, develop technical

and managerial skills, promote research and development, promote local networks of suppliers and supporting industries. The areas of support include support to; access to finance, access to knowledge and skills, and others like marketing access.

The identified existing programs and institutions supporting the operations related to cluster - based development in group 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 is in the Ministry of Finance, Planning and Economic Development (MFPED, 2006). 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 (PFA) Programme

In order to improve finances and capacity building for a number of people in rural areas, H.E 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 pillars such as production, value addition and agro-processing, improved marketing, and microfinance (savings and accessibility to affordable credit). The end result was poverty alleviation. At least each household was expected to have a daily income, food security, organized into marketing groups for large volumes of produce. This programme is being implemented through National Agricultural Advisory Services (NAADS) in the Ministry of Agriculture, Animal Husbandry and Fisheries (MAAIF).

This programme has enabled the creation and development of farmer groups and a number of SMEs in both the urban and rural areas as it has enhanced resource accessibility both financially and socially mainly women and youth as key focus groups. The government started rural Savings and Credit Cooperative Organizations (SACCOS) in every sub-county in Uganda. The program has promoted growing of food crops, fruits and vegetables, rice (upland rice), fish farming and rearing of animals (cows, goats, pigs, sheep) and poultry. Although, there are issues regarding sustainability as proper structures and institutions to nurture them are still weak, poorly resourced and uncoordinated. In terms of value addition, lack of electricity has hindered value addition in rural areas. It requires technology and machinery to process the raw goods and pack the finished products. These are still challenges as well.

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 exper-

tise 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)

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

The paper has discussed the institutional framework although they have some limitations in their structures and implementation achievements. The government and the entire cluster based development actors need to strengthen the importance of the enabling framework conditions as outlined in the PEAP.

(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 insti-

tutions 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) There is 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 among others.

4. Conclusions and Recommendations

- 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 selectively.
- Emphasis should shift from strategic planning to strategic doing through partnerships between the government, industries and academia
- 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.

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Paper III

CLUSTERING SMALL AND MEDIUM ENTERPRISES (SMES) TO ENHANCE INTRA AND EXTRA TRADE, PRODUCTIVITY AND INNOVATION: CASE OF UGANDA'S CLUSTER INITIATIVES

Joshua Mutambi

Abstract

In most Sub-Saharan African countries, small firms are geographically dispersed in rural areas while some are concentrated within urban and peri-urban centers. Faced with binding constraints and challenges, globalization, rapidly changing technology and stiff competition their growth and sustainability have been hampered. Africa is witnessing renewed momentum in formation of regional economic communities with the aim of facilitating trade and investments, industrialization and economic growth. Although Africa is endowed with resources it has lagged behind in productivity, innovation and competitiveness. This paper focuses on the need to enhance intra and extra regional trade, productivity and competitiveness. The value addition of the region's raw materials greatly benefits the producers and contributes to wealth and employment creation. The paper further analyzes the linkages between entrepreneurship and clusters, importance of clusters. It highlights key challenges and the need for incubation services. The findings are demonstrated from the cluster initiatives in Uganda.

Keywords: Clusters, Entrepreneurship, Incubation, Industrialization, Productivity, Uganda

1. Introduction

Africa is witnessing indicators from survival to prosperity. 80% of the population has been trying to meet basic needs (i.e. food, water, shelter, etc) while in an environment of poor infrastructure and being exposed to higher aspirations due to global technological developments and communication explosion. So the first cash that the people get goes to aspirations (airtime, drinks, etc) rather than the basics or savings. Yet the agrarian sector is still by far the biggest employer in Africa today. With globalization, most governments have downsized and reduced on employment patterns. The job opportunities are mainly available in the private sector which is largely characterized by small and informal business activities, while the informal manufacturing sector is relatively small. It is therefore important to adopt clear leanings for transformation from the developed and industrialized countries of the world; Europe, Asia and the western world.

The African regional trade continues to grow showing that stakeholders including private sector very much see and appreciate the trade and investment opportunities arising from the Common Market for Eastern and Southern Africa (COMESA), East African Community (EAC) and the Southern African Development Community

(SADC) regional markets (Lunogero & Mbilinyi, 2009). Following the establishment of Free Trade Area (FTA) on 31st October 2000, the launch of the COMESA Customs Union on 7th June 2009, and the EAC launched customs Union in 2004 (Shayanowako, 2011), exploitation of the availability of market opportunities locally, regionally and internationally should be promoted by African Governments. This can be realized through many ways by applying new policy approaches and innovative tools to improve economic performance and prosperity for their citizens. Porter (1998) reasoned that productivity not exports or natural resources, determines the prosperity of any state or nation. Support to clusters development and small and medium scale enterprises which form the bulk of intra/extra-regional trade can provide a foundation for increasing productivity, sustainable economic growth and the way forward to greater prosperity.

Integrated programs such infrastructure development, formation of institutions, trade facilitation and ICT have assisted to consolidate the regional market into a linked up-market where goods, services, people and investment can move more freely. However, in spite of the regional efforts being made, small and medium sized enterprises are stuck with a number of constraints such as low productivity levels, lack of modern technologies, poor quality products, lack of institutional support, and inadequate skills among others. SMEs in most Sub-Saharan Africa are in two categories. (i) Geographically dispersed mainly rural based largely depending on agricultural activities, (ii) Clustered in urban and sub-urban areas. In this context, cooperation and continued improvements (innovation) in product, process, technology, marketing, key operations and utilization of resources are vital for survival and sustained competitiveness.

The objective of this paper is to discuss how clusters can enhance the competitiveness and sustainability of micro, small and medium scale enterprises, and to discuss the experiences of innovative cluster initiatives in Uganda.

Recent studies have revealed that small enterprises serve as the engine of innovative activity in certain industries, yet the bulk of industrial R&D is undertaken by large corporations, universities, research institutes and other government agencies. This view has been made possible and is supported by the fact that knowledge spills over from the firm or research institute producing it to a different firm commercializing that knowledge (Audretsch & Thurik, 2003). Small and medium size enterprises (SMEs) are defined differently globally, but for this paper will define SMEs not employing more than 50 employees.

Geographic proximity or localization is one of the mechanisms to have enabled knowledge spillovers across firms. Small firms tend to cluster where doing business conditions are favorable, i.e. infrastructure, ICT, markets, workforce and support institutions. They are very flexible and fast in utilizing the knowledge spillovers or ideas from different sources. Although in some circumstance, they have found it difficult to survive and grow. (Schmitz & Nadvi, 1999) argue that clustering is particularly relevant for the early stage by helping small enterprises to grow in riskable steps. Entrepreneurship and innovation are frequently seen as pivotal forces in new clusters (Wennberg

& Lindqvist, 2008). Thus promoting entrepreneurial activities and clustering of small firms may facilitate innovation and therefore subsequent growth.

This paper is organized as follows: Section 2 discusses what a cluster is, cluster origins and actors, some of the concerns why Africa needs the cluster-based economic development strategy; section 3 describes how clusters can enhance intra and extra exports, cluster initiatives in Uganda, identifies specific examples of cluster initiatives, their actions, impact and challenges; and, lastly lessons learnt and concluding remarks.

2. Clusters as an economic development tool

Clusters are today recognized as an important instrument for promoting industrial development through fostering innovation, competitiveness and economic growth. A cluster has been defined by Prof. Michael Porter as a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities (Porter, 1998). Schmitz defines a cluster as a geographic and sectoral agglomeration of enterprises (Schmitz, 1999). Schmitz stresses that the agglomeration of producers, customers and competitors, whether based in geographical proximity or linked by complementary expertise, brings out advantages, promotes efficiency and increases specialization. Agglomeration promotes positive externalities through increasing innovation, and especially through technological spillovers. Further, he noted that emergence of suppliers, marketing agents, specialized services, and formation of consortia and associations among these small enterprises are derivatives of collective efficiency. It has been argued that firms that operate close to related firms and supporting institutions are often more innovative and therefore more successful in raising productivity than firms that operate in isolation (Solvell et al., 2003). Porter (1998) stresses that innovation and competitive successes in so many fields are geographically concentrated. The basic principle is that the predominantly small firms can gain economies of scale and scope through joint actions and increased flexibility through specialization and inter-firm cooperation. Based on the above, clustering can enhance individual enterprise's productivity, innovativeness and facilitate growth.

2.1 Cluster Origins

In general clustering is something that has been happening spontaneously throughout time, but due to globalization and technological innovation, innovative clusters have been realized to produce more potential benefits for economic development. The origins of clusters differ. Some clusters have been formed as spontaneous agglomeration based on resource endowments for comparative and/or competitive advantages (locational advantages), e.g. Fishing cluster around L. Victoria, and cut-flower clusters in Kenya.

Some clusters are formed due proximity to major markets and R&D and academic institutions, e.g. Metal fabricators in Kampala and Nairobi. According to Porter (1998), geographic, cultural and institutional proximity, leads to special access, closer relation-

ships, better information, powerful incentives and other advantages in productivity and innovation that are difficult to access from a distance.

Lastly, some clusters are induced by public policies, or government efforts. These range from “techno-polis” and industrial parks to incubators (e.g. Finland and Sweden) and export processing zones strategies, e.g. Leather, flower and tourism clusters in Ethiopia; Textile manufacturers in Nairobi, and Mauritius, textile and clothing cluster and ICT in South Africa.

A new approach, Innovative Systems and Cluster Initiatives Program in East Africa (IS-CP-EA) was introduced after the “The Competitiveness Institute (TCI) Conference” on Innovative clusters was held in Gothenburg, Sweden, September 2003. Innovative Systems and Clusters, which facilitate the interaction and exchange of knowledge and opportunities between Academia, Business and Government, have been proven to be important in the development of new products, services and processes. The ISCP program was started in Uganda in 2005 with the Swedish International Development Agency (Sida) support to ISCP-EA including Uganda, Tanzania and Mozambique. It aims at industrialization of countries by fostering innovation, competitiveness and economic growth. During the implementation process, artisans/ members were trained and encouraged to form networks/value chains as a means of strengthening the collective action for improving their competitiveness and business performance. Some were already in associations.

2.2 Types of Clusters and Key Actors involved in Clusters

There are various types of clusters internationally and some are more sophisticated than others. Clusters are classified by structure (i) A large group of micro & small to medium scale enterprises, e.g. Lake Victoria fishing cluster; Dairy cluster in South Western Uganda and Katwe Metal Fabricators cluster (in Uganda). (ii) Pyramid type structure, e.g. one major assembler, many sub-assemblers, and more sub-sub assemblers

The key actors in cluster development are “the Triple Helix” which distinguishes clusters from other kinds of associations, i.e.

- Government for policies, regulations and establishing a supportive and progressive regulatory environment. Porter (1998) argues that the government role should also include facilitating and upgrading cluster development and creating opportunities for productive dialogue to bring cluster participants together.
- Private sector –business enterprises (large and SMEs), Non-Government Organizations (NGOs) and Trade Associations
- Academia – Universities, Colleges and R& D institutions

All have a stake and play important roles.

3. Why Clusters Development Strategy?

(Schmitz 1989) argued that promoting clusters appeared as a promising new approach to stimulate latecomer industrialization. Clusters promised to reduce all sorts of barri-

ers – barriers to intra-firm competence building, as firms could specialize more; barriers to exports, as local firms could work jointly in export consortia; barriers to upgrading, since an agglomeration of many firms of the same branch created strong demand for business development services. Awareness and embracing of clusters development among policy makers as a tool for economic growth and innovation is very important.

Cluster development strategies have been implemented in many parts of the world and since the early 1990's, a large number of cluster initiatives have been launched, in advanced economies as well as developing and transition economies (Ketels et al., 2006; Wennberg & Lindqvist, 2008). The main objectives have been focused on firm formation, strengthening the growth and competitiveness of regions, innovation and entrepreneurship stimulation. In clusters, firms can form partnerships with suppliers and even competitors to gain mutual benefits through collaborative value added activities. Such gains are termed as “collective efficiency” and defined as competitive advantage derived from local external economies and joint action (Schmitz, 1999) . Cluster firms establish strong links with domestic R& D institutions including universities to strengthen product development design as well as marketing and distribution capabilities. However, due to low level of economic development in African countries, clusters deserve to be promoted and supported during their developmental stages. The following reasons demonstrate why Africa needs Clusters development strategy; Africa is associated with (i) Great raw material producer and exporter with most business categorized as SMEs; (ii) Low levels of value addition in the value chain; (iii) Low capacity of wealth and jobs generation in the region; (iv) Management and technology capability constraint (v) Limited capability in R & D and Technology; (vi) Difficult in obtaining financing; (vii) Limited marketing & promotion strategies

3.1 Enhancing intra and extra trade performances through clusters

Africa's trade is characterized by its high external orientation and relatively low level of intra-regional trade. Intra-African trade stands at around 10 per cent compared to 60 per cent, 40 per cent, 30 per cent intra-regional trade that has been achieved by Europe, North America and ASEAN respectively (African Union, 2011). Due to the fact that Africa does the bulk of its trade with the outside world and exports are heavily concentrated on primary commodities, the continent has lagged behind in building the skills to compete globally. African countries will trade more with each other if they upgrade their productive capacities in dynamic sectors of the economy and support the development of regional enterprises and value chains. As clusters are defined by interdependences, clustering has helped small firms to overcome well known growth constraints in developed countries (Schmitz, 1999). African countries should therefore promote cluster formation and clustering initiatives for their advantages. Due to globalization and competition, individual enterprises cannot compete in supplying quality and high speed delivery products, unless they are acting jointly in clusters. It has been confirmed that clustering can;

Enhance information sharing among the firms domestically, regionally and internationally;

- Improve employment opportunities, and strengthen business and education linkages;
- Boost innovation through increased competition and cooperation, as well as availability of various talents, inter-firm linkages and knowledge networks (knowledge and technological diffusion);
- Increase productivity and efficiency through business value chains, internal competition and reduced transaction costs (e.g. in joint purchasing or shared costs of marketing) , so as to reduce market failures;
- Stimulate regional entrepreneurship. Opportunities are more transparent, role models more visible, and opportunities to supply (inputs, production & distribution), compete or complement are more available;
- Attract buyers and thus facilitates access to distant markets;
- Aid product specialization by leveraging local comparative advantages (endowments), and improve regional economical sustainability.

As illustrated above, all most all can be achieved if the joint action and/or collective efficiency are promoted and pursued as a critical element to explain growth and competitiveness (McCormick, 1999; Solvell et al., 2003). Table 4.4-1 shows the Forms of joint action in Clusters.

Table 4.4-1: Forms of joint action in Clusters

	Bilateral	Multilateral
Horizontal Cooperation (between Competitors)	e.g. Sharing equipment	e.g. Sectoral Association
Vertical Cooperation (between producer, user of inputs /seller of outputs	e.g. Producer and user improving components	e.g. Alliance across value added chain

Source: Schmitz (1999)

3.2 Cluster initiatives in Uganda

There are a total of 22 operational cluster initiatives and 8 approved clusters located all over the country with membership levels ranging from 30 to 300 members representing various sectors of the economy including agriculture, food processing, manufacturing, service sector, ICT. Table 4.4-2 shows the 22 operational cluster initiatives in Uganda as of 2009.

Table 4.4-2: Operational Cluster Initiatives in Uganda (2009)

Management Consultancy- Kampala	Coffee - Kapchorwa
Katwe Metal Fabrication - Kampala	Building Materials - Kampala
Katwe Salt Processing - Kasese	Furniture - Lubaga
Pineapple Processing - Kayunga	ICT -Kampala
Basketry - Luwero	Leather Processing-Jinja
Fashion and Garments - Kampala	Maize Millers -Jinja
Bio-Fuel Ethanol -Kakira	Tree Planting - Masaka
Fruit and Vegetable Processing – Luwero	Fish Farming - Kaliro
Bee Keeping – Lira	Education -Kampala
Dairy – South Western Uganda	Super Goat Rearing -Wakiso
Mushroom - Kampala	Seeds - Kampala

Source: ISCP (U), (2009)

3.3 Major activities

The Innovation Systems Clusters Program-Uganda facilitates knowledge transfer through academia, private sector and government linkages fostered by training programs to introduce relevance and awareness, Leadership/ change agents formation, Trust building/ Networking, Market research, Product diversification, Quality assurance and branding, Linking the clusters within the region and, Monitoring and evaluation

The clustering process has yielded positive results for the SME community within and without the cluster initiatives. Improvements in incomes, employment, investment growth, production, value addition and increase in membership among others. However, some innovative projects have been identified that necessitates the cluster initiatives to be linked to business incubators for members to develop and test their products and services. Incubators are key factors for linking and developing competences hence help increase chances for innovative business ideas.

4 Case Studies

4.1 Katwe Metal Fabricators Cluster

Katwe Metal Fabricators Cluster was among the first 7 pilot clusters that were under the Innovation Systems and Cluster Program-East Africa (ISCP-EA) supported by Sida/SAREC and coordinated by Makerere University Faculty of Technology in 2005 in collaboration with government ministries mainly Ministry of Trade, Industry and Cooperatives and Ministry of Finance, Planning and Economic Development. This cluster brings together different firms involved in foundry and black smiths, automotive services and spare parts manufacturing and general metal products fabrications within Katwe- Makindye division, Kampala city. There is specialization amongst producers within the cluster. With close to 3000 member firms, the cluster has been

growing. Linkages with other cluster initiatives (e.g. basketry, textile and garments) and institutions such as Standards agency, Research institutions, Business and management training institutions, local councils have been created.

Applying collective capacity to compete, adapt and innovate, the cluster has diversified networks. The market has expanded domestically and regionally (e.g. Southern Sudan, Rwanda and D.R. Congo). They have created and extended trust amongst themselves. To promote collective action, self-sufficiency and sustainability, the cluster in 2011 opened up a Savings and Credit Cooperative Organization (SACCO) as a cluster financial support arm with 200 million Shs, and collectively were provided with 5 acres of land as Jua-Kali Industrial Park (18th February 2012), the first of its kind in Uganda as support from Government. The cluster however has got some challenges such as; unreliable power supply, inadequate capital, competition from the imported products, limited work space, inadequate skills, high taxes, inadequate machinery/technologies and weak bargaining power as most firms are informal.

4.2 Basketry/Handicraft Cluster in Luwero:

The art of making handicraft has been traditional all over the world. In Uganda, Basketry cluster has been producing handicrafts basically for household items such as bags and baskets from the fiber harvested out of existing natural vegetation in and around Luwero district, 60 km from the city. Over the years, very high potential market for handicrafts has been growing from the local communities to domestic markets, visiting tourists and spread across borders beyond Uganda which has attracted many artisans in the handicraft business. From the city centre the craft business spreads all over the Country employing many people to include raw material suppliers, producers, bulk buyers, small scale buyers, exporters. A larger percentage of artisans are women with a small percentage of men engaged either in making handicrafts and/or bringing fibers from swamps and other sources for use by their women colleagues.

The artisans in the cluster with the support from UNIDO in addition to previous support from ISCP-U underwent an intensive training to improve their existing product range and introduce new products within the cluster. New product innovations like wallets, key holders, hand bags, phone bags, photo frames, and pen pots have been produced. Product range has been greatly diversified. With the improvement in their product quality in terms of product designs and color patterns artisans collectively have been able to expand on their marketing outlets. They have also opened up a highway shop targeting tourists and other passengers. Luweero Basketry/Handicraft cluster was successfully registered as a Cooperative Society with a total of 139 members, and continuously increasing. There are enhancing intra and extra regional trade.

The improved marketing strategy has definitely caused an improvement in their standards of living. Sales have increased by 50%. Average income per month for the 139 members is 13,344,000 (UGX). Women are able to contribute to the economic welfare of their homes in addition to their husbands' contribution. Single mothers are able to pay school fees for their children, pay medical bills and afford at least two meals a day. Despite the above achievements, the cluster has some challenges, such as supply

of raw materials, financial support, access to market opportunities, and continuous skills up gradation.

5. General Challenges facing Clusters Development and Growth in Uganda and within the Region

Based on evaluation studies, reports and experience from existing cluster initiatives, a number of factors that affect the development and growth of clusters include; Inadequate support policy makers; building trust amongst members; access to sufficient financing; globalization that affects trade and marketing; infrastructure/logistics; rapid technological change and developments; weak linkages (collaboration) between business and knowledge institutions; and natural resources depletion, e.g. low levels of fish in Lakes, lack of quality processing and packaging facilities.

5.1 Summary of lessons learnt from local implementation and international experiences

- (i) There are efficiency gains through cluster –based business value chains
- (ii) Knowledge and technology acquisition, adaptation and dissemination
- (iii) Creating awareness on industry/business, government and academia partnerships
- (iv) Continuous governmental and institutional support: The role of governments and institutions differ from cluster to cluster. In general governments' interventions are manifested in the following; policies, regulations and standards; public support institutions (such as councils, incubators, techno-centers, science parks and R&D institutes) to provide business development and technological assistance, training and capacity development, etc; promote clusters formation and upgrading initiatives; infrastructure; incentives and market avenues; promoting and deepening intra-regional trade

6. Conclusions and Recommendations

Cluster initiatives are complementary to industry associations, and not competitors. For transformation to occur, political will and support policy frameworks to promote entrepreneurship, innovation and industrialization process are critical. It is observed that not all firms can have all the necessary skills and competences to produce innovative products and services by themselves, therefore through cluster-based approach, full integration of operations along the value chain, capacity building, productivity, job creation and export growth can be achieved.

Cluster initiatives call on government to put in place prerequisite infrastructure, financial support, promote well coordinated and targeted public-private partnerships in order to address some of the salient challenges and to facilitate the realization of existing and potential markets.

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4.5 Paper IV

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. It contributed to African Innovation Outlook, 2010.

The major conclusions and recommendations 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 paradigm” 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 “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 and interactions between innovation actors, performance and position of the state within local and global markets will be missing.

1.4 Objective

The purpose of this research was to develop and establish a set of relevant science, technology and innovation indicators for Uganda. It contributed to the African Innovation Outlook, 2010. It will further make important contributions to both intel-

lectual understanding and broader practical developments for STI policy in Uganda and Africa as whole.

2.0 METHODOLOGY

2.1 Study Approach

The survey followed the Frascati Manual Guidelines, 2002 and Oslo Manual developed by the Organization for Economic Co-operation and Development (OECD, 2005). 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 for more information and validation of the data collected.

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 4.5-1: 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 4.5-2: Percentage share of firms that introduced innovations and performed R&D

	Product In- novation	Process innova- tion	Service Innova- tion	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) and turnover by year

Table 4.5-3: Percentage share of firms that introduced totally new innovations 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 4.5-4: Gross Domestic Expenditure on R&D as an Indicator of R&D Activities, (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 (2007):- 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 mastery. 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 4.5-1 and 4.5-3, as a general observation most innovative firms had fewer than 50 employees according to the survey. This confirms the global perception that most businesses in low-income countries like Uganda are generally dominated by Small and Medium enterprises which have the potential of adapting existing technologies to changing situations and introducing new products, processes and services within the localized markets.

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 (research on Banana development, agro-processing, malaria and a five year US\$30 million millennium Science Initiative) as indicated in Table 4.5-4.

With respect to R& D indicators in Table 4.5-4, 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 and proven concepts, they have undertaken curriculum development for courses on entrepreneurship, co-ordinated business plan competitions as well as providing entrepreneurial outreach programs. This analysis provides evidence that there is potential for developing the triple helix system and improving open innovation application between institutions and other organizations in problem identification, solving and strategic brokering that characterize technology transfer, innovation and collaborations..

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 based on 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 AND RECOMMENDATIONS

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.

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THEME 3: STATUS OF INCUBATION SERVICES GLOBALLY AND NEW APPROACHES

4.6 Paper V

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 objec-

tives; 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 busi-

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

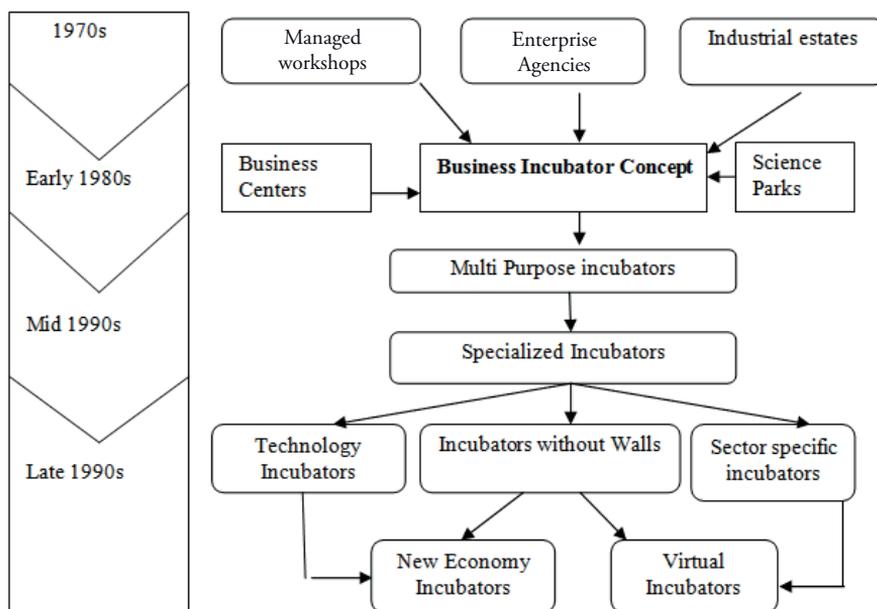


Figure 4.6-1: The Evolution of Business Incubator Model
Source: EC-CSES (2002)

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 4.6-1 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 is¹:

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) 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

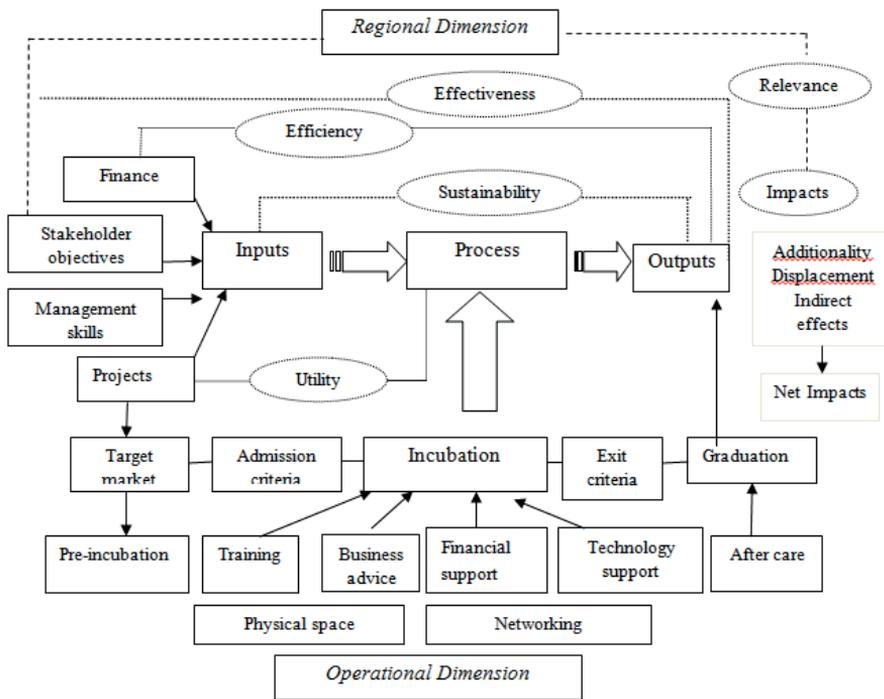


Figure 4.6-2: The Business Incubator Model
 Source: EU-CSES (2002)

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 HRD² 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 mid-1980s 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. Figure 4.6-3 shows the growth of business incubators in Brazil.



Figure 4.6-3: 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 plays 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 4.6-1: 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: Zedwitz and Li. (2004) and Min (2007).

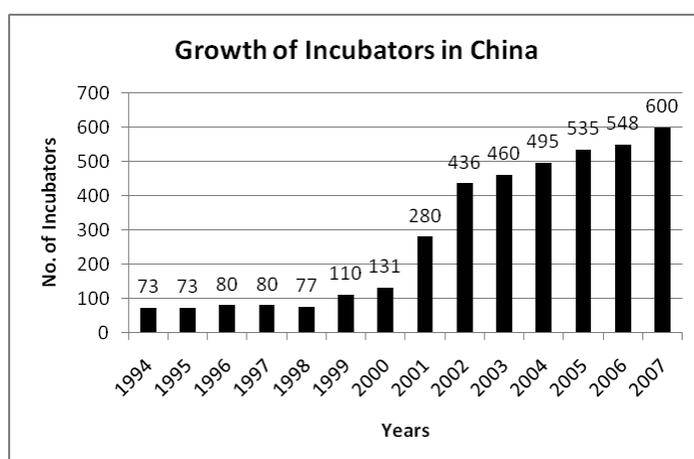


Figure 4.6-4: Growth of Incubators in China

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.

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Paper VI

4.7 ADOPTION OF OPEN INNOVATION APPROACH FOR SUSTAINABLE BUSINESS INCUBATION PROCESS

Joshua Mutambi

Abstract

In the modern society, no economy entity is able to be self-developing within a complete closed environment. This paper traces the role of government policy support and entrepreneurship in economic development and innovations. Incubation programs in Sweden, Tanzania and Uganda with respect to partnerships, policies and strategies have been investigated. It further examines whether, and to what extent, open innovation is a relevant perspective in fostering innovation and entrepreneurship through incubators. It highlights open innovation theory and explores the integral aspects into business incubation for purposes of sustainability.

Based on empirical examples, surveys and interviews with some incubator managers and staff, policy makers, and consultations from various agencies and experts in the subject area across the three cases, it confirms that openness and networks can enhance incubation processes. Adoption of open innovation approach into business incubation a conceptual base, from which external resources are faster utilized to enhance innovative activities, capabilities and entrepreneurship culture, can enhance growth and sustainability. The findings and key learning points include; need to develop more technological capability; focus on improving support service infrastructure; strengthening coordination between government and among the academic institutions and private sector.

Keywords: Incubation, Industrialization, Entrepreneurship, Open Innovation, Sustainability

Background

Over the past two decades, the Uganda economy has established a strong record of prudent macroeconomic management and continues to undertake private-sector oriented structural reforms (MFPED-BTB, 2010). The industrial sector is contributing approximately 23% of the country's GDP. This sector is dominated by micro (informal sector), small and medium sized enterprises (MSMEs) which account for 95% of the entire industrial sector, employ more than 2.5 million people and are responsible for over 70% of the industrial sectors contribution towards Uganda's GDP. In recent years, Uganda has sought to create sustainable conditions for enterprise creation and growth that responds to local and export markets, generate jobs, and promote science, technology and innovation by putting policies in place, trying to set up business industrial parks and incubators. In addition, it is focusing on building capacity in science and technology by supporting tertiary institutions/university students mainly specializing in sciences and developing related institutions; advancing collaboration and network-

ing regionally and internationally. However, stimulating, supporting and ensuring effective coordination, implementation as well as monitoring performance of key integrated development policies and strategies (i.e. infrastructural industrial development, Research and Development and Innovation, skills development and IPR issues, etc) is still limited and yet is very critical.

Despite of the above efforts, sustaining small and medium scale enterprises especially start-up businesses, absence of early-stage finance and well trained human resources continue to hinder innovation, enterprise development and long-term strategies towards industrialization.

Business incubation has gained ground in promoting, nurturing and supporting growth of innovative small firms, create jobs and commercialization of university research and entrepreneurship in nations and regions (OECD, 1997), since the concept started in USA in 1959 (Hackett & Dilts, 2004). Business Incubators can be viewed as a mechanism (i) to support regional development through job creation, (ii) for new high tech venture creation, technological entrepreneurship, commercialization, and transfer of technology, (iii) an initiative to deal with market failures relating to knowledge and other inputs of innovative process. For these reasons many countries have increasingly been engaged in establishing incubators (Mian, 1996; Lalkaka & Abetti, 1999; Akcomak, 2009).

Since business incubators are intended to nurture the start-up firms, the fundamental issue is on the effective delivery of services in assisting incubates so that they could obtain better chances of survival and growth. They provide shared facilities and equipment; Business development, market access, and technology assessment services; Financial services; and Mentoring and networking (Lalkaka, 2003)

Purpose and scope of the study

The paper aims to study innovation support systems, policy and organizational relationships and examine the business incubation process as a mechanism to nurture new enterprises as well as innovation, effective collaboration between the academia, industry and public in the three countries, Sweden, Tanzania and Uganda. Sweden is selected because of her strong industrial history characterized by her high level of research and development, and strong national innovation system. Tanzania and Uganda are both participating in the Sida programs of Innovation systems and both participating in the New Partnership for Africa's Development (NEPAD) African Science, Technology and Innovation Indicators initiatives. Both countries aim at alternative pathways to industrialization.

Objectives

This paper has the following objectives.

- (i) Describes policy representation and financing mechanism following the innovation system (IS) approach (institutions, policies, and science and technology)

- (ii) It explores relationship between performance of business incubators and openness as well as networks within the three countries of our interest, Sweden, Uganda and Tanzania.
- (iii) It explored the demand situation of the incubation process in the Ugandan medium, small and medium scale enterprises

The paper is structured as follows: Section 2 briefly reviews the literature and theoretical framework on, innovation systems, business incubation and open innovation. It discusses the notion of business incubation and the importance of open innovation in business incubation process, enhancing of innovative activities and capabilities. Section 3, describes the methodology approach used to build the analytical framework and gather data; analysis of implementation processes of business incubation, industrial and national innovation systems between the three countries. The study further looked at the relationship between open innovation and the performances of enterprises in Uganda involved in areas of metal products, agri-business, wood works, textiles and garments, and ICT mainly. Section 4 presents analysis, identified specific constraints and several notable issues proposed for future prospects of business incubation development. Finally conclusions and some recommendations are made.

The original contribution of this incubation research is to provide insights into the operational reality of incubators using direct evidence as provided by the managers, tenants and other stakeholders from a national as well as international perspective with respect to future collaborative studies and policy development in three countries. The second contribution is the real potential of adopting open innovation practices into the incubation process to achieve Millennium Development Goals in Ugandan context.

Conceptual Framework and Theoretical Considerations

It has been widely recognized that entrepreneurs play an important part in economic growth and development. At the same time, entrepreneurs are vital in the process of structural change or industrialization (Ács & Naudé, 2011). Entrepreneurial innovation leads to reallocation of resources from the traditional agricultural sector to the modern manufacturing sector. They create new firms outside the household, offering new products and introducing new processes that provide information as a 'lead' activity. Second, they grow firms (and wage employment) by making use of scale economies. Such larger firms tend to specialize, and the clustering of specialized firms can give rise to localization economies, further encouraging innovation and specialization. Third, entrepreneurs can raise the returns to human and physical capital and so provide incentives for further investment and education. The role of entrepreneurial ability in the industrial success of the newly industrialized economies (NIEs) has been emphasized (Syahida, 2009; Acs and Naude, 2011). Research suggests that industrialization is slow in developing countries among other reasons given, lack of skills and entrepreneurship development have featured (Page, 2011). The constraints of small and medium enterprises in developing countries have been over researched. The only way ahead proposed is to support entrepreneurial development programs that will

foster growth of SMEs. Business incubation has proved a useful strategy intended to assist start up businesses to be successful. Today there is an increased interest in the relationships between enterprises, the individual entrepreneurs, universities and other service providers like incubators.

Brief National Innovation System Overview

The concept of National Systems of Innovation can be regarded as a tool for analysing economic development and economic growth (Lundvall, 1997). Innovation systems encompass private firms, public authorities, research organisations and socio-economic structures (such as social, industrial and professional networks) that can promote interaction and innovative thinking (Etzkowitz, 2002, Feinson, 2003)). The main components of innovation systems are institutions (policies, regulations, rules and norms, etc) and organizations (firms, universities, research centers, etc) and the linkages among them (Lundvall, 2007). Innovation system is crucial in this study, because innovation and learning are fundamental for growth and industrial competitiveness and thus for catching up (Lundvall et al., 2009). The variety of institutional arrangement covering even policies in a given system of a country shapes the way innovations come about (Diyamett, et al., 2010; Ecuru, 2011). For this study, the definition of innovation adapted is a process encompassing diffusion and adaptability as well as the first market introduction of product, process and/or organizational method.

Business Incubation

As a notion of support to and growth of small and medium sized enterprises and mainly start ups, (stimulate entrepreneurship and innovation), the concept of business incubation was promoted. Incubators started in the United States in the 1950s, and gained prominence since then, (Hackett and Dilts, 2004). There is a large amount of professional literature on the subject, how incubators have evolved over time has been reviewed through a variety of studies outlining the history, benefits as well as current state of incubation in the world (Duff,1987; Smilor, 1987; Markley et al. 1994; Mian, 1997; OECD, 1997; OECD, 1999; Wang, 2009).

Business incubators facilitate in the growth and commercialization of companies that will eventually become financially successful and evolve into high-growth companies (Tang et al. 2011). It is one of the many tools aimed at fostering innovative enterprise creation and growth (Khalil and Olafsen, 2009). The primary drivers of business incubation are entrepreneurs- people who make things happen and technologies or ideas that have potential to be commercialized within a reasonable period of time (Bulsara et al., 2009). Business Incubation is a tool that clearly supports and/or enables the five key areas of action identified in the World Bank Group Agriculture Action Plan FY2010-2012 (InfoDev, 2010). They provide five fundamental services: incubation space, management services, financial services, supporting start-up enterprises and networking (Bajmoczy et al., 2008).

For technology transfer, entrepreneurship and start-up promotion, it means access to academic resources and basic production factors. Infrastructure facilities and key personnel are major issues, such as laboratories facilities, clean water, reliable electricity, communication systems, and an environment conducive to technology development (Hisrich and Smilor, 1988). This will require partnerships and collaboration between industry, academia and public agencies to establish best practices and research and the development of new, innovative solutions to challenging problems. This argument is also supported by David Monkman (InfoDev, 2010) in his presentation of incubators and lessons for developing countries.

To introduce the basic incubator concept in this study, incubators are portrayed in Figure 4.7-1 as a special environment and milieu provided for start-up enterprises that increases their chances of survival and improves their capacity to develop.

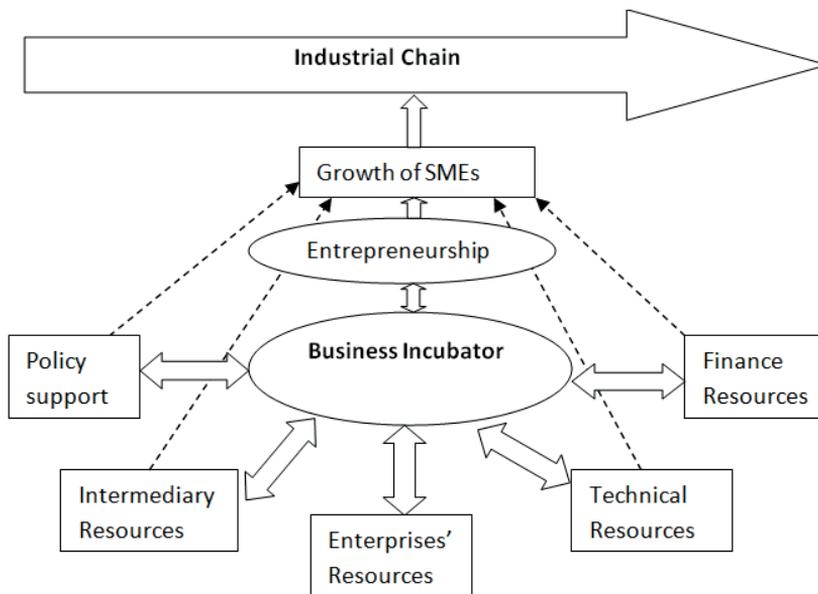


Figure 4.7-1: Dynamic Relationship of Incubation, Support Environment and Entrepreneurship
 Source: Author and Wang (2009)

In this context, incubation centers perform not only the function of professional knowledge sharing and communication, but also the function of knowledge coordination, by actively becoming involved in triple-helix collaboration. Consequently, this leads to entrepreneurial organizations or capabilities being firmly rooted in the knowledge networks (Tsai et al., 2009) as well as industrial growth.

Institutions, Networks and Expectations

Given the fact that incubators serve a cross section of sectors such as agri-business, hi-tech and services from different institutions, implementation of the incubation process has necessitated some adjustments with regards to the approaches. There are vertical and horizontal resource linkages. It is further observed that cooperation and network-

ing within the knowledge, innovation and technology (KIT) networks are of essential importance. The fundamental reason of partnership is always to gain or create some new knowledge, skill or capability. It is further an accepted view that one of the most important tasks of networks is to facilitate access to various resources and expertise, therefore, it is recommended to establish the widest possible network co-operations starting from (potential) financing institutes through various enterprise development organizations to the different scientific institutions (InfoDev, 2010).

Depending on their absorptive capacity, SMEs in Uganda due to the limitations have relied mainly on the external sources for their innovations especially those in the low-tech manufacturing and services. With the help of government incentives by establishing institutions and networks to improve information flow, training, and diffusion of technologies, firms can take full advantage of acquiring technologies and innovations. Taking advantage and considering the external knowledge sources to capture new opportunities and keep competitive in the market is what describes the open business model (Lema, 2010). Compared to the closed business models, where all innovation tasks are carried out internally within the firms, (Chesbrough 2003), open business model attacks the cost side of the problem by leveraging external research and development resources to save time and money in the innovation process, (Wang, et al., 2010). Yun et al., (2010) specified 4 types of Knowledge Sources for Open Innovation as Market area, institution area, other area and specialized area. The theoretical considerations discussed above compelled the research into what extent is Open innovation approach practiced in the incubators in Uganda.

International Perspective

Sweden

From the international perspective, a developing country like Uganda wishes to learn from the experiences of Sweden. This section briefly introduces Swedish experiences in respect to science, technology and innovation framework. Sweden has a strong industrial and innovation systems policy. It directs technological development and attracts multinational corporation investments. The concept of innovation systems in general, and national innovation systems in particular, rapidly entered and spread in the industrial, research and economic policy debate and policy thinking towards the end of the 1990s. A central part of Swedish innovation policy is to develop effective, globally competitive, innovation systems in regions in order to strengthen the regional growth potential (OECD, 2002; VINNOVA, 2006).

In respect to government support for private-sector development, R&D and innovation, public funding of R&D in enterprises was very rare in Sweden in the early 1990s. However, some new measures to foster R&D and innovation in SMEs and collaboration between public R&D technology providers like institutes, universities and university colleges were later on introduced. From 1998, a number of support institutions were also created which culminated into the government funding organization VINNOVA, that was established in 2001(OECD, 2002). Furthermore, the government

set up science parks and business incubators to foster innovations and entrepreneurs. Several financial institutions have made commitments to Swedish science parks, some of which house business incubators (Lofsten et al 2001).

Sweden has a National Incubator Program (NIP). This was launched in 2003, and in 2005 the management of the NIP was transferred to Innovationsbron, and Vinova allocated 10 years worth of funding to the program. The National Incubator Program was launched in order to increase the number of new R&D-intensive growth companies in the Swedish national innovation system. The National Incubator Program ended on 30th September 2011 and has been replaced by a new program called "Business Incubation and Growth Sweden" (B.I.G Sweden) that was launched on 1st October 2011. Around the country there are 55 business incubators.

The research shows that Government of Sweden urges universities to collaborate with business and other organizations. This has been seen from the programs that involve universities and are government funded. In the area of international co-operation and globalization, Swedish policy makers at all levels are extensively involved in international networks, for example, the Sida supported programs as part of the work with the EU framework program, which provides ample opportunity for exchange of information, capacity building and experience sharing.

Linking open innovation practices in business incubation process

This concept was first introduced by Henry Chesbrough in 2003. Open innovation has been defined as; "a paradigm that assumes that firms can and should use external ideas, and internal and external paths to market, as the firms look to advance their technology (Chesbrough, 2003). Other scholars have defined it as;

"...systematically encouraging and exploring a wide range of internal and external sources for innovation opportunities, consciously integrating that exploration with firm capabilities and resources, and broadly exploiting those opportunities through multiple channels" (West and Gallaher (2006).

The open innovation approach focuses attention on two particular factors. First of all, it regards knowledge residing outside the boundaries of an innovating company potentially as valuable as expertise that the company has acquired for itself. Second, the innovating firm is not considered as the sole platform for commercializing results of research, development and innovation (RDI) activities. It is because of competition, demand and collaboration that open innovation practices can play a critical role in today's industrializing, industrialized and knowledge-based countries. The OI approach stresses abundance of sources of useful information. Information and communication technologies have facilitated the exchange of technologies, market information and other information among partners throughout the world through web-based databases, (Chesbrough, 2003)

In an open innovation environment users, customers, suppliers, public knowledge institutions, individual inventors and even competitors are regarded as potential providers of crucial pieces of information. Through collaboration, R&D and innovation costs

can be reduced. Chesbrough et al., (2007) stresses it that “co-development partnerships are an increasingly effective means of innovating the business model to improve innovation effectiveness”. This can enhance their performance, competitiveness and sustainability in case of business incubators. Openness and outsourcing helps incubators to tap a wide range of ideas.

Methodology

Based on direct visits to the sampled incubators and interviews of the stakeholders as well as reviews of literature and secondary statistical analysis in the three countries, Sweden, Tanzania and Uganda between May 2010 and January 2012, conclusions have been drawn. The combination of surveys and case studies provided a broad coverage of sectors, institutions, and beneficiaries. The need for further investigation in the relationship between Open Innovation approach and the performance of the incubators emerged as one of the not fully resolved question, bearing in mind that there is no standard way of evaluating success. An exploratory research phase interviewing incubator managers in three randomly selected incubators, two science parks and two agencies was carried out in Sweden. An attempt to use the Evaluation framework methodology for business incubators on performance measures was done. Analysis provides the number of enterprises incubated, partnerships involved for sustainability, and assets.

Sampling and Sample Size

The study sampled institutions in the agri-business and industrial sectors. These included: business incubators, industrial firms, small and medium enterprises associations, tertiary institutions offering R & D services in Uganda. More than 70 sampled interviews cutting across Uganda’s small and medium sized enterprises, universities, some government entities, and private sector associations were conducted. In Tanzania, few heads of institutions and ministry officials were interviewed and some reports were collected from institutions of R&D, and industrial/ manufacturing support institutions. In Sweden, a sample of four organizations offering business incubation services was used and few interviews conducted including reviewing the government and agencies policies and reports.

Data collection

To study the organizational and institutional challenges in the wake of the paradigm shifts we have relied more on sources of qualitative information like: documents, visits to the relevant organizations and interviews with key persons. Altogether, more than 70 interviews with representatives of firms involved, trade and business associations, research organizations, universities, public support institutes, and bridging organizations in the three countries. The data sought included: the nature and relevance of R&D activities; mobilization of both public and private resources; linkages between the institutions, the business communities and government; dissemination of results and support to start-up businesses; types of innovations introduced, demand for busi-

ness incubators and awareness of Open Innovation concept. While for the incubator institutions, mainly was type of innovative business models, forms of partnership, strategic affiliation, target clients and organizational coordination.

Data Collection in Sweden

Four Swedish incubators out of 55 were examined in this study: The Table 4.7-1 below summarizes findings from the three incubators.

Table 4.7-1: Information from three Business Incubators in Sweden. Source: Constructed by the author

Name of the Incubator	Year, Location and Sector	Actors involved and Affiliated companies
Stockholm Innovation and Growth (STING)	2002, Royal Institute of Technology (KTH) and in Stockholm City. ICT, Clean-Technologies, and Med-Technologies	Owned by a Electrum Foundation- comprised of Business angels, industry and research Institutes in Kista/Stockholm, City of Stockholm, Innovationsbron, Royal Institute of Technology – KTH, Ericsson, ABB. (Public private partnership). 12-15 companies graduate every year Companies admitted: 69 since 2002-2009
Ideon Innovation Business incubator (2005), Bio-incubator (2007) in Ideon Science Park	2005, Located at Ideon Science Park in Lund (ICT), Clean-tech, Biomedicine, Biotechnology	Lund Local government/ Municipality, - Universities- Lund and Lund Institute of Technology (LTH) Ideon Science Park - Innovationsbron -Private industries, organizations and banks From 2006-2010, over 50 companies have exited/ graduated
Blekinge Business Incubator AB, BBI, Blekinge.	2005, Blekinge-Karlshamn, Karlskrona and Olofstrom; ICT Game/ Media & Creative industry, Clean-tech and production industry	Five municipalities in Blekinge, Blekinge Institute of Technology, TelecomCity-Business park, Almi (State company), and NyföretagarCentrum (Centre for entrepreneurs)- public private partnership; 22 companies
Malmo Business Incubator (Minc)	2003, City of Malmo; Mixed areas, special focus on ICT, new digital media, design, clean-tech, and services industry	City of Malmo, Malmo University, Can support 25-30 incubatees, with work space tenants 30. Since 2003, 78 companies have graduated, 94% of them successful

The study on Swedish business incubation programs in an international comparison showed particular lessons especially the characteristics and locations of the incubators, the importance of regional policy and institutional frameworks. Recognizing the importance of entrepreneurship, entrepreneurship education has been developing. Because of these nationwide changes, there has been a strong emphasis on business incubators in the Swedish innovation system and professionalisation of technology transfer; global links and networks; strong scientific and technological investments to foster new entrepreneurs. In addition, from the interviews, mostly observed was the strong coordination and integration of the systems; more to that was the dedication and commitment that is established among the triple helix actors.

The study shows that most business incubators have strong links with their respective universities, government and other support institutions (triple helix model). Majority are hi-tech and Bio-sciences incubators. Special consideration is given to customer needs and efforts to develop solutions.

The Swedish innovation system can be characterized by the following points. The economy is strongly linked internationally. Universities dominate the public R&D-system (42%). Relatively small government R&D investments are made in companies outside the military sector. Big multi-national companies dominate the R&D-investments. SMEs investments in R&D are relatively small. Small sector of Research institutes because the Swedish government has chosen to focus research resources mainly to the Universities (Lidgard, 2009)

Tanzania

Industrial R&D and Innovation System

Majority of Tanzania's population like Uganda is estimated to be making their living on subsistence agriculture and Small and Medium Enterprise activities. All national research and development institutes and institutions of higher learning are affiliated to the Tanzania Commission for Science and Technology (COSTECH). COSTECH is responsible for coordination of all research activities in the country. Unfortunately, Tanzania spends less than 1% of its Annual budget on R&D and STI development, (0.3%) hence ranking low in STI Indicators (Kabambwa, 2009).

Having recognized the significance of technological innovation and entrepreneurship in shaping the future economy of Tanzania, the University of Dar es Salaam (UDSM) decided to establish the business and technology incubation project as a means of commercializing technologies developed at the UDSM so as to enable SMEs to develop high value-added products, processes and services. Three incubators were established in Kibaha, Morogoro and Lushoto, (Mwamila and Temu, 2006). This included the establishment of fully fledged incubator offices (equipped, staffed and with facilities for meetings and training) in the three locations. Incubator services to tenants/clients were started in January 2006.

The UDSM College of Engineering and Technology championed the project of Business and technology incubation. The financiers of the project were the Tanzania Gatsby

Trust (TGT), the Carnegie Corporation and the Tanzanian Government. All the three virtual incubators in Morogoro, Kibaha and Lushoto have been supporting agribusiness entrepreneurs mainly on incubator without walls basis i.e. not accommodating the enterprises.

Following the results of the project, other stakeholders and institutions offered to start the business incubation services. At the same time, Tanzania has increasingly been implementing industrialization process through free zones schemes under the Tanzania Export Processing Zones Authority (EPZA). With regard to institutions, after the EAC broke up in 1977, Tanzania Industrial Research and Development Organization (TIRDO) was established in 1979 to promote technology development for manufacturing industries. TIRDO has not fully embraced the incubation concept which was introduced in Tanzania in 2004, because they believe it really needs serious funding. Among the constraints mentioned included;

- Unreliable funding from government
- Low morale of workers compared to private sectors,
- Lack of expertise in research activities, working equipment and instruments
- Weak linkage between R&D institutions and industries

In 1980, Tanzania Engineering and Manufacturing Design Organization (TEMDO) was established to promote engineering services and provide technical training to enterprises. Over the past 30 years TEMDO has designed and developed over 30 plants and equipment. Tanzania, being an agricultural sector driven economy, the majority of TEMDO's technologies have been those which process and add value to agricultural produce. According to the Director, some of their developed technologies have not been absorbed by the market while others were abandoned in the process due to limited funding.

TEMDO is operating a Business/ Technology incubator which facilitates the start and growth of production ventures. Currently there are 20 incubator clients dealing with: biomass briquetting (charcoal making); leather products; school equipment; food processing; fruit processing; machine and equipment fabrication and animal feed production. Among the challenges listed by TEMDO include;

- Cheap low quality, products/machinery and equipment because of trade liberalization
- Inadequate Design and Prototype Development Facilities
- Inadequate facilities for Technical Support Services
- Lack of enough qualified staff especially technical
- Overdependence on Government Funding

There are other industrial R& D centers, but could not visit them. Center for Agricultural Mechanization and rural technology (CARMATEC) and Institute of Production innovation (IPI).

The following issues emerge from this study of Tanzania's industrial R&D and Innovation activities:

- There is strong existence of policy frameworks in Tanzania, such as Tanzania Development Vision 2025; National Strategy for Growth and Reduction of Poverty (MKUKUTA); KILIMO KWANZA
- Industrial R&D is resource-starved. Although the potential exists for R&D institutes to contribute to the national goal of competitive and sustainable industrial development, the decline in the flow of public resources makes it difficult to achieve this objective.
- Industrial R&D institutions in Tanzania continue to depend on support from foreign donors. This is not consistent with sustainability because this important source of research funds is unpredictable and prone to changing political dynamics.
- There are weak links between research institutes and the productive sector. This can be explained by highly centralized research activities and the absence of systematic involvement of industries and other target groups in the design and implementation of the R&D activities undertaken by these institutions.

Uganda:

Brief review of Science, Technology and Innovation Framework

At the government level, Science Technology and Innovation (STI) forms part of a number of different sector-based policies in Uganda (Kamunyoli, et al, 2010). The National Industrialization Policy, 2008 articulates the use of applied science to develop Uganda's infant industry. There is also National Agricultural Research Policy of 2004, the National Science, Technology and Innovation Policy and National Development Plan, 2010/11 -2014/15 (MFPED, 2010). A number of institutions related to STI have been put in place. Uganda has also been participating in the Millennium Science Initiative, which funds innovative research and science and technology training in the country. There is insufficient capacity for intellectual property rights (IPRs), with little or no regulatory capacity, a lack of information about the existence or relevance of international rules and regulations, and a dearth of trained lawyers equipped to facilitate IPR agreements (Sukhdeep et al., 2011). By studying the current S&T situation in country, the funding of R&D activities indicates that most of the activities are funded by donors. The funding of R&D activities is less than 0.3% of the GDP. The challenge is therefore lack of adequate resources and coordination among all the actors in the innovation system for the application of science and technology to solve the domestic problems. As Szogs (2008) argued, Least Developed Countries do not have the same strong resources as developed countries, therefore their systems need to be more open.

Most of the businesses especially in manufacturing do it manually which affects production and quality of products. Most of the innovations happening are non-technological, hence the need to stress the importance of incremental innovations. Such issues can be reduced if governments can promote openness, establish business incubators (Bøllingtoft & Ulhøi, 2005), universities or research institutions open up on their research findings and freely exchange ideas.

In Uganda, five institutions offer some form of incubations services, however comparable data was from three. In Uganda Industrial Research Institute (UIRI), over ten projects have been incubated in house and several projects virtually incubated since 2006, most of them in agri-business. In Food Technology and Business Incubation Center (FTBIC) Makerere University has 12 resident and 5 virtual incubates with 15 R&D projects but recently opened. Makerere University Software Incubator started in 2008 with a focus on ICT applications. They have two staff and incubated 124 people since 2008. Funded by university, Government and some NGOs, it has no linkages yet with business community. Among some successful projects that have been incubated and are in the successful path to the market are indicated in table 4.7-2 below;

Table 4.7-2: Information from two Business incubators in Uganda

Uganda Industrial Research Institute (UIRI)	FTBIC - Makerere University
E-TECH Ltd - production of electronic teaching equipment for schools using printed circuit board technology (PCB)	Dawn Industries Ltd & Samarlina Beverages Ltd - Fruit juice processing
FREVASEMA Ltd- producing Fresh Vacuum sealed Matooke	Choice Cuts Ltd- beef processing
Natural Heritage (U) Ltd- producing avocado seed beverage (Avocine), and honey products	Nutreal Ltd - Grain/cereal/legume processing
Brentec Vaccines Ltd- launched Newcastle vaccine in 2011	House of Russa Ltd - Natural flavored Liqueurs
5 Virtual incubators -Peanut processing, mushroom growing, fruit juice processing, meat processing, Milk processing.	Jordanah Foods Ltd, Lisha Foods ltd, & Jossy Foods - all in Fruit juices processing
Derekorp Ltd-Fruits and Vegetables	Hamco Ltd-pickled canned foods
Kilangwa Investments Ltd – wood products for learning and teaching children	Smart foods ltd-soya products
	Fonus Ltd for consultancies in branding, packaging

Analysis, Discussion and Lessons Learned

This analysis is based on data obtained through questionnaires, interviews, and discussions with stakeholders within the agencies and individuals in Sweden, Tanzania and Uganda's establishments. A random selection survey of MSMEs was conducted for the purposes of this study from randomly selected towns in Uganda. A total of 70 entrepreneurs out of 144 sampled SMEs and 5 institutions were surveyed. Most of these were in the metal fabrication sector, food processing, wood work and handicraft, and textile and garments. A few were in the ICT and radio/TV repairing, construction materials sectors. Using SPSS to analyze the SMEs data, Metal fabrication sector was 36% while food processing was 27%, wood works were 19%, textile designers and garments 9%, while the rest were 9%.

The dominance of metal fabrication is attributed to the growth rate in the construction sector, towns have expanded, urban migration has increased and the trend explains the higher percentages in Food processing and wood works such as furniture, door/window frames and shutters. Majority of those interviewed started with 2-4 employees (68%) and 89% started privately and not spin offs. Most of the entrepreneurs that started the businesses fell in the age bracket of 35-45 years old and mainly males. Also the higher percentages of education status was for those with Ordinary level and Advanced level education certificates, 40% and 15% respectively, degree holders and primary level were the same at 13%, while those with diploma were at 17%. Very few reported interactions with the academic institutions.

- Most of the enterprise owners interviewed operate informally and are not very keen to disclose information on their operations, faced with a multitude of challenges and constraints.
- MSMEs are not keeping proper records of their business transactions and general operations. This was exacerbated by the underlying fear that information obtained from interviews could end up being used for tax assessment purposes
- Very few MSMEs are linked to large enterprises, thus a need to support them to link with large enterprises. These linkages can promote technology transfer and innovation for improved productivity.

No graduates of a business incubator were interviewed. Some of the entrepreneurs interviewed have been supported under different programs like Gatsby Trust and UNIDO integrated programs. The survey generally has shown that most of the enterprises are not very old in field and not happy with the business sector operations yet they have no other alternative option. They all recommended incubation services and common facilities centers to be established. A number of reasons that were ranked high have been attributed to this conclusion as follows;

- Lack of capital to expand their businesses
- Lack of reliable basic infrastructural facilities, technologies and skills development
- Lack of information on technology and markets
- Difficulties in finding cooperation partners for innovation and business support services
- Lack of markets for their products
- Higher interest rates on finances borrowed from the banks
- Stiff competition from the cheap imported products
- Lack of cooperation among SMEs and in the entire value chain in the respective sectors.

Analysis of the institutions/business incubators in Uganda indicated that they recently introduced incubation services within their premises, less than ten years old.

- They all acknowledged that there were no national guidelines or framework for supporting incubation institutions, much as all are funded by the government.
- Two of the institutions are specialized in ICT and Agro-processing while the other two are mixed (manufacturing, services, agro-processing, ICT, and others).

- They all have business plans for their BIs.
- No national BI supervisory Board and no formal institutional linkages were identified during the survey.
- They all indicated that the demand for their services was high but due to limited funding and facilities, a limited number of entrepreneurs is supported.
- All the institutions visited indicated that their source of knowledge in their innovation process comes mainly from outside the organizations (outside in open innovation) from customers, from universities, trade fairs, collaborative research and some few developed internally (inside out).
- Challenges mentioned include; Sustainability issues, lack of entrepreneurship, inadequate funding, limited awareness by the population, limited facilities and expertise

Incubation institutions as Yun et al., (2010) pointed out, introduce and utilize technical skills and technologies by using various approaches of Outside-In Open Innovation. For instance, UIRI has signed Memorandum of Understandings with Center for Scientific Industrial Research (CSIR) in South Africa, The African Institute for Capacity Development (AICAD), and SIRIM Berhad-Malaysia.

The Tanzania situation is no better than in Uganda. Tanzania has got a national policy frame work in place, but coordination is still very poor, said one Director at TIRDO. The business incubation centers are also newly created, the old ones like TEMDO and SIDO were not doing well either. Hence evaluation of graduate firms was not conducted.

The Swedish national innovation system shows clear strengths in several areas. A stable macroeconomic environment, a well educated workforce, R&D-intensive multinational corporations, strong public investment in activities related to innovation, state of the art scientific performance and integration into global markets, all together form the basis for innovation activities in Sweden.

In terms of motivation, there are many government initiatives to widely promote entrepreneurship within society. The Government is trying to reduce administrative burdens on SMEs. There are no taxes imposed on SMEs. There are various government programs that provide financing to SMEs and certain loan programs are targeted at women and young entrepreneurs.

These factors or preconditions were observed as necessary for a successful incubation program in Sweden and generally in other countries

1. Delivery of quality services through working networks and collaborative partnerships;
2. The existence of active and skilled human resource base;
3. Policy and legislative support at regional, national and districts/provincial levels;
4. Adequate physical infrastructure, access to financial resources and team work;
5. Potential of firms that would anchor the new businesses either through joint ventures, sub-contracting in production, etc;

6. Develop linkages to a sound knowledge base, affiliations to universities, R&D institutions and professional networks (access to expertise);
7. Linkages with entrepreneurship and start-up programmes within the stakeholders and communities;
8. Dynamic, entrepreneurial management team and the wider business support infrastructure;
9. Careful selection of the entrepreneurial groups/start-ups with innovative, growth potential and market oriented plans;
10. Monitor performance and evaluate outcomes

Most incubators in Sweden are located within Universities, Science and Technology Parks. Entrepreneurs and researchers have access to well developed basic infrastructures, very high institutional support and good political governance systems. For instance, the incubator's extensive mentorship network is available to each business, and start-ups are assigned a series of mentors who evaluate and guide each start-up through all stages.

Conclusions and Recommendations

The study shows that there are many entrepreneurs that wish to join business incubators. The virtually incubated projects and businesses are progressing relatively well. Awareness is however still lacking. It is recommended that the Government of Uganda although it developed a public private sector partnership framework, the importance of the business incubation process for enterprise creation and development of SME sector countrywide still needs more attention. The goodwill of H.E the President funding Presidential Initiative projects should be strengthened and more funding be made available to the early start-up projects and R&D. The study concludes that adopting OI practices can enhance the performance and sustainability of incubators. Some recommendations for policy have been discussed as follows.

Development of National Strategy for support of Business incubators

Funding remains the key input as well as the political situation and the market. With the little funding extended to these institutions, there is need to optimize capital available. Linkages within the entire innovation system need to be strengthened to facilitate the institutional networks. Lack of the National incubation strategy causes limited coordination among the institutions. It is good to share the service resources that could improve the service quality and reduce the costs. Team work is very crucial and the contributions of people at all levels must be recognized and rewarded. Inter-organization collaboration and networks can enhance the process of innovation and industrialization. Institutions are recommended to adopt Open innovation practices as the study also confirmed that lack of open innovation approach in the new emerging business incubators can be a considerable danger to the incubation process as well as the growth of the start-ups. Government in partnership with donor partners should strive to recommit itself to establishing a special fund for research and innovation

systems which will facilitate collaborative research in areas such as bio-sciences, engineering and technology disciplines with a focus to commercialization of the findings.

Support practical education to create a culture of innovation

Provision of physical facilities and access to information is meaningless unless the information can be applied. The approach to a well supported competence-based business, technical and vocational training system in Uganda and East Africa in general will produce literate, technically capable workforce that will not only spur start up businesses but can also sustain the attracted foreign direct investments which will transfer technologies and promote innovations. Many ICT applications require high skilled labor force, the researchers and technicians. World Bank report (2011) indicates that industrialization can begin rapidly by targeting promising sectors with modest skill requirements.

Promote Industrial Clusters development

By establishing innovation hubs/ business incubators will accelerate the formation and growth of innovative /industrial cluster firms based upon various existing resources and regional development policies. For example, if government supports construction of business incubators within the identified areas proposed for developing industrial parks or business parks, this will advance significantly indigenous innovation ability as well as industrial development as discussed by McKomick (1999), sustain development capacity and growth of rural sectors. Supporting industrial clusters can also improve sharing of information, advice and training.

Monitor the performance, Evaluate outcomes and disseminate lessons from the innovative initiatives and approaches.

The rapid development of incubators must be accompanied by continuous monitoring and evaluations of their performance. The feed-back of results is intended to enhance operating performance towards sustainability and to demonstrate to sponsors the returns they get from their support. Effective mechanisms for monitoring and evaluation should be regularized. To benefit under the open innovation practices and to accelerate the exchange of experiences and opportunities among incubators and their clients within the region, incubators should join regional and international incubator networks.

Since, all the incubation institutions in the two developing countries are funded by the government and indicated serious challenges including partial assessment results, the paper confirms that adopting Open innovation approach will enable them utilize partnering opportunities for their sustainability. The new ones should follow the public private partnerships model. The successful pursuit of such approaches will enable incubators as well as SMEs to increase in number, commercialize and adopt technologies that add more value to products and processes.

The study has concluded by revealing how institutions and systems can produce good

results within a well developed regional and national science, technology and innovation systems in Sweden, while on the other hand in the Ugandan and Tanzania situation, institutions and systems are poorly resourced and funded, capacity and capability are also minimal, hence need for systems transformation and reforms. This assertion is based on the realization that innovations in any form of new or improved products, services and processes are the basis for sustainable growth and prosperity in today's knowledge-based society.

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4.8 Paper VII

PROMOTING INNOVATION AND ENTREPRENEURSHIP IN RURAL COMMUNITIES: CASE OF OVOP PROGRAM IN UGANDA.

Joshua Mutambi.

Abstract

In the context of globalization, developing countries especially the Sub-Saharan Africa are concerned with science, technology, innovation, linkages and unemployment. The One Village One Product (OVOP) movement continues to fascinate many countries in the World mostly developing countries. It encourages the mobilization and exploitation of local human, material, and cultural resources to create value-added products/services for domestic and external markets. This paper discusses the importance of business incubation, particularly virtual incubation practices for the support to innovations in SMEs and the promotion of entrepreneurship. It further presents the case of OVOP Program in Uganda, its implementation process and evaluation findings for the pilot phase. This is important in the process of technology adoption, innovation and entrepreneurship development. The findings underscore the importance of human and material resources, business development support services and role public-private partnerships. The impact so far achieved reflects that incubation services have potential to generate entrepreneurs, innovations and industrial growth.

Keywords: Entrepreneurship, innovation, rural communities, technology adoption and diffusion OVOP, Uganda

Introduction

In the context of globalization, developing countries especially the Sub-Saharan Africa are concerned with science, technology & innovation (STI), linkages and unemployment. The World Bank's strategy for Africa's Future recognizes the central importance of industrialization in Sub-Saharan Africa, and the consequent creation of productive jobs for Africans (World Bank, 2012). Industrialization in this case is the process of introducing new technologies and cultures in order to transform the nation's economy and productive capacity. 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). In UNIDO, (2009), states that for Africa, key priority is adaptation which reflects innovation. This industrialization process does not happen accidentally. It is planned and implemented, and most of the time, struggled for by a core of industrializing groups, the industrialists, entrepreneurs and other knowledge workers in the private, public and civil society sectors.

In this respect, it is widely recognised that entrepreneurs play a vital role in promoting the private sector and economic growth (Wiklund, 1999) (Henderson, 2002). Entrepreneurs analyse and identify opportunities in the environment, and through effective

utilization of national resources, they act as catalysts for economic development and agents of social transformation and change.

In the case of Uganda like other developing countries, most entrepreneurs are in Micro, small and medium enterprises (MSMEs) which are considered to be one of the principle driving forces in economic development as they are the embodiment of private ownership and entrepreneurial skills, generating employment and helping diversify economic activity. These entrepreneurs however, are unable to play a more effective role in overall economic development due to various constraints. Uganda with the current population of 33 million people and 70% of the population engaged in agriculture and agri-business related activities across the value chain, the country highly desires agri-business innovation, technology transfer and entrepreneurs for industrial growth and competitiveness. Therefore, promoting and stimulating entrepreneurship and innovation within rural communities in Uganda can have a vital role to play in reaching developmental objectives.

The government has undertaken some initiatives to increase productivity and boost the rural households' incomes including business incubators with the objective of developing viable technologies, commercialisation of research results, promoting entrepreneurship amongst researchers and graduates (in case of university incubators), facilitating start up firms and job creation. One initiative that the government introduced in 2009 based on the experiences from the Japanese is One Village One Product (OVOP) program. The following sections present theoretical background, highlights on business incubation, OVOP implementation process and findings of evaluation in three districts (Bushenyi, Masaka and Soroti) that were selected for piloting the program in Uganda. Finally, discussion and concluding remarks with recommendations are drawn.

Theoretical Background

One Village One Product (OVOP) movement was initiated in Oita Prefecture, Japan by its Governor Morihiko Hiramatsu, as a means to promote regional revitalization in 1970's targeting at exploiting local resources (natural, historical, and cultural and human resources,) for the development of products and services unique to a certain village or geographical area (Sakai, 2006). Its goal is to encourage people to produce value added products using local materials, develop expertise and skills to bring self-reliance, increase employment opportunities and sustainable income to their communities. According to Hiramatsu (2006)¹, this program is guided by three main principles namely:

- Local yet global
- Self-Reliance with Creativity
- Human Resources Centered Development.

¹ Hiramatsu, Morihiko, (2006). "One Village, One Product" spreading throughout the World. Oita OVOP International Exchange Promotion Committee, Japan.

The theoretical underpinning employed in this paper is business incubation theory. Business incubators provide entrepreneurs with a supportive environment to help establish and develop their projects (Duff, 1994). (Sean M Hackett & Dilts, 2004) describes an incubator as the operationalization of a community strategy to promote the survival of new firms. They further suggest that an incubator is an enabling technology of which without inputs such as capable entrepreneurs and strategic technologies for commercialization, the outcome will be poor. Based on the incubation theory, this research considers OVOP program to be a kind of virtual business incubation model. Business incubation is a support system designed to help new businesses. Business incubators cover a wide range of organizations that help entrepreneurs to develop their ideas from inception to commercialization and launching of new enterprises within the institution or outside the institution (virtual). According to Stam & Buschmann, (2012), Virtual business incubation is defined as the full range of business incubation tools and services that are not (necessarily) provided to clients residing inside the facilities of a business incubator. A virtual incubation service is not bound by a physical building or any other geographical constraint; the services are made available to a dispersed group of users (Stam & Buschmann, 2012).

The UK's professional body for the business incubation industry (UKBI) definition states that: "Incubation is a unique and highly flexible combination of business development processes, infrastructure and people, designed to nurture and grow new and small businesses by supporting them through early stages of development and change" (Centre for Strategy and Evaluation Services & European Commission, 2002). Business incubators provide direct access to hands on intensive business support, access to finance and experts and to other entrepreneurs and suppliers to really make businesses and entrepreneurs grow.

Business incubators (BIs) can be stand alone business incubators or part of a science or business park, whether based in a university campus, laboratory, research institute or private sector company. (S M Hackett & Dilts, 2004) argues that incubator-incubation phenomenon represents a systematic method of providing business assistance to firms in early –stages of their development with the aim of increasing firm survival rates. In this regard, incubators can have a positive impact on the local economy by increasing the success rate of new business ventures. These businesses, in turn, provide jobs and income and contribute to local economic diversity (Markley & Mcnamara, 1994).

As Lalkaka, (2001) stated "Technological progress and entrepreneurship are dramatically changing the global economic landscape" and that " These forces operate in the framework of open markets, supportive public policy and privatization, together with fresh concerns for the human condition, good governance, environment preservation, gender balance, and growth with equity" introduction of OVOP in Uganda with the support from Japan International Cooperation Agency (JICA) aimed at stimulating industrialization by promoting innovation and entrepreneurship involving a range of public private partnerships and participatory development approach. This argument is also supported by JICA report in (Java & Kuswidiati, 2008) which stated that "The

OVOP movement is a real manifestation or implementation of participatory development ideals, and has encouraged grass roots initiatives and nurtured local industry which can offer valuable hints for economic development and industrial growth in the wider Asian region, across various stages of economic development and transcending differences in social conditions”.

The Figure 4.8-1 below indicates the dynamic relationship of support infrastructure environment, business incubation and entrepreneurship for SMEs path to industrial chain.

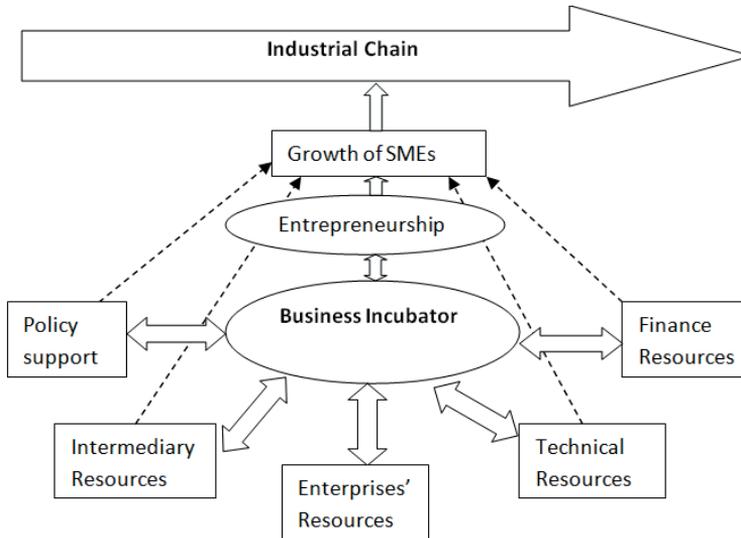


Figure 4.8-1: Dynamic Relationship of Incubation, Support Environment and Entrepreneurship
Source: Author and (Wang, 2009)

OVOP Implementation Process and Achievements in Uganda

The Government of Uganda is currently implementing the One Village One Product program since 2009 with the following specific objectives:

1. To promote market linkages between local firms and domestic and export markets (through production networks/clusters/cooperatives/others)
2. To stimulate innovation by promoting value addition to local materials and products of comparative advantage such as agro –processing, quality control and packaging at community level for social economic transformation
3. To develop human capital and facilitate small-scale business skills development at the village level (entrepreneurial capacities).

Baseline studies of local resources which have potential for village revitalization is conducted first. Secondly, it requires a strong leadership team at all levels that integrates community, and focuses on product differentiation, market and commercial success. In the process, the community accumulates technical skills, know-how, and practical

knowledge learned by inference through experience (tacit knowledge). As it is known that innovation occurs at three levels:

- Local improvements are made by adopting available technologies to satisfy basic needs or to upgrade or improve products, processes or services.
- Competitive industries develop through adaptation of technologies initially produced in or by developed countries.
- Ultimately, new innovations of global significance are developed (World Bank, 2007-P99)

In this paper, the type of innovations described are as a result of the application of knowledge of all types to achieve desired social and economic outcomes by combining technical, organizational, and other sorts of changes (World Bank, 2007).

The implementation of One Village One Product pilot phase started from 2009 guided by the strategic plan that was developed by the former Ministry of Tourism, Trade and Industry through a consultative process (MTTI, 2009). There is a governance structure which is composed of the National Steering Committee with members from different key ministries and agencies, National OVOP Secretariat, District Focal Points, Sub-county committees and Beneficiaries committees. From the selected districts, a survey and analysis of potential local resources such as raw materials (natural, agricultural, historical), logistical and other infrastructure, human resource, service providers and industrial facilities was conducted to guide the selection of communities to participate in the pilot phase. The ministry officials and other members from other institutions attached to the program facilitate the implementation process.

The Governing Structure

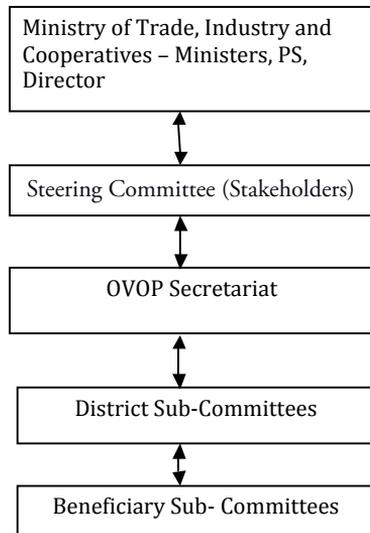


Figure 4.8-2: The Governing Structure of OVOP Program

The initiation and coordination of the OVOP implementation process followed the Ugandan participation in the international seminar on OVOP in January 2008 in Malawi and the findings from a number of studies and reports including baseline survey reports from the pilot districts that SMEs and the informal sector groups in rural areas though well endowed with local resources, are faced with numerous constraints such as;

- Limited access to capital;
- Limited entrepreneur skills and managerial capability;
- Absence of mentoring and entrepreneurial networks;
- Lack of business and market information;
- Poor access to markets and competition with cheap imported products;
- Poor or inadequate infrastructure especially electricity, road networks, water, sanitation,
- High cost of machinery/equipment;
- Uncoordinated institutional supports;
- Lack of industrial sites and common facilities.

It is a general trend that communities with more infrastructural facilities tend to receive even more programs or initiatives all the time. Based on the criteria that were developed, more attention was given to communities that although they are productive, they are always marginalized because of being so remote from the urban centers. Promoting such businesses/projects would create more opportunities for businesses and household linkages and incomes.

Borrowing the experiences of other countries in supporting the innovation-related efforts of micro, small and medium enterprises (SMEs), the program provided support in form of small processing machinery as grant, mentoring, training in business skills, product development, marketing, and tried to link the beneficiaries to financial service providers. Another key instrument has been integration of OVOP program within districts plans and establishment of local committees at village levels for the specific purpose of supporting OVOP firms/groups. To ensure local ownership, some infrastructure facilities are partly funded by local authorities or the groups themselves. The program does not charge any fee for the services provided. The program recognizes the importance of human capital and basic services to support the branding strategy—including electricity, water, sanitation, transportation, telecommunications administration, management, financing, marketing, technical, and R&D institutions.

Awareness creation, advice, technical and business skills development training and networking workshops have been organized. These have been conducted to enable the local communities identify their potential resources for value addition and the possible markets for their products. Workspace has been provided and developed jointly with the beneficiaries. Institutions such as R&D institutions, Bureau of Standards and Quality assurance agency, Enterprise management training and advisory center,

Export Promotion Board and private consultants have all been involved in the implementation process.

The potential groups then developed and submitted proposals to the district focal points for first screening and forwarded the selected ones to the OVOP secretariat for final screening. The final selection was done after field physical assessment of the selected projects was done basing on the following: community ownership, availability of local resources, business experience, market potential, project leadership, self reliance and sustainability issues, logistical support within the communities, etc.

To promote technology adoption, four potential business groups were provided with processing machinery/ equipment like rice hurlers and milling machine, maize hurlers and milling machine and honey processing equipment and harvesting gears, training in business management and technical skills to help them manage, operate and conduct maintenance of the processing facilities. The evaluation exercise was conducted to assess the implementation process, identifying the challenges and to what extent the program objectives were being achieved based on the “Best Practice Issues” methodology (Centre for Strategy and Evaluation Services & European Commission, 2002). The exercise was conducted in December 2011/January 2012. The following section presents the evaluation methodology, findings, discussion and concluding remarks.

Evaluation Methodology

Indicators, outputs and parameters relevant to regional economic prosperity were used to assess how well the program performed and how the stakeholder system was functioning. By sampling, random selection of four (4) groups from each pilot district and five (5) beneficiaries out of each group were selected for interviews, in total more than 80 including district leaders. Interviews were conducted to gather qualitative and quantitative information about the whole program. Representatives of group members were requested to provide brief background of their groups before and after joining OVOP and thereafter structured interviews were administered individually to group members. The evaluation questionnaire was based on activity implementation assessment framework: the efficiency, effectiveness, relevance, impact and sustainability, and the lessons learnt.

The particular methods of inquiry included:

- Document reviews (OVOP strategic plan, farmers group project documents and project related reports and documents)
- Key informant interviews (OVOP secretariat staff, District Chief Administrative Officers and Commercial Officers);
- Focus group discussions;
- Structured individual interviews and
- Observations.

An overall rating for the implementation process shown in Table 4-13 in respect to relevance, effectiveness, efficiency, impact and sustainability based on the evaluation

grid was carried out. Each of the above six indicators was rated against a four-point categorical scale based on a synthesis of commonalities and differences between the various stakeholders' perspectives (Table 4.8-1).

Table 4.8-1: The Four-Point Categorical Scale

The four-point categorical scale used included:	
Highly Satisfactory (HS):	Under this rating, the program fully satisfies all planned and expected requirements/achievements and has significant strengths. There may be only a few minor weaknesses in the program as a whole.
Satisfactory (S):	This is the lowest rating that satisfies program requirements. However, this rating means that there are weaknesses as well as strengths but that the weaknesses are not severe enough to threaten the program.
Unsatisfactory (U):	This rating indicates that the program has some significant weaknesses although other aspects may be satisfactory. The weaknesses require immediate action if the program is to continue to progress. The weaknesses have the potential to undermine the capacity of the intervention to achieve its objectives
Highly unsatisfactory (HU):	This is a rating that indicates serious deficiencies in the activity. A program would only be given an overall HU rating if there were widespread problems which have/will have the effect of preventing achievement of its objectives.

The evaluation criteria followed the best practice issues grouped under 6 indicators.

Table 4.8-2: Definition of Six Indicators of Best Practice Issues

Implementation Process	The methods and approaches used to achieve the project/programme objectives/ goal. It among others consists of processes and means used to deliver on project activities to beneficiaries.
Relevance	The extent to which program objectives and outcomes promote broader Government policy objectives and including an assessment of the quality of project preparation and design – i.e. the logic and completeness of the project planning process, and the internal logic and coherence of the project design.
Efficiency	The relationship between financial inputs and outcomes, and value for money. This generally requires comparing alternative approaches to achieving the same outputs, to see whether the most efficient process has been adopted.
Effectiveness	The extent to which the outcomes demonstrate that program objectives are being achieved and how assumptions have affected project achievements.
Impact	The effect of the project on its wider environment, and its contribution to the wider sectoral objectives summarized in the project's overall objectives, and on the achievement of the overarching policy objectives of the agency.

Sustainability	An assessment of the likelihood of benefits produced by the project to continue to flow after external funding has ended, and with particular reference to factors of ownership by beneficiaries, policy support, economic and financial factors, socio-cultural aspects, gender equality, appropriate technology, environmental aspects, and institutional and management capacity.
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Source: Adapted from CSES- EC, (2002)

Findings:

Table 4.8-3: Activities and Outputs

Objective	Input /program Description	Output/Indicators
Capacity Building- Training	OVOP and Community development	17 officials including ministry and local governments trained abroad, in Japan, Kenya and Thailand
	Sensitization and awareness creation	Total 434 people (including district official leaders) and 57 farmer groups sensitized
	Business skills and enterprise development training	112 participants
	Projects selection feedback workshops	114 participants
	Technical (production-Rice and Honey), operation & maintenance- Rice and Maize processing machinery) processing & packaging-Honey, Rice, Maize)	100 participants
	Manuals developed	-OVOP Strategic Plan and Implementation Guidelines for Uganda, -Workshop Learning Material, -Enterprise Development Training Manual, -Basic Business Management Training Manual, -Community Sensitization Workshop-Presentation Guide, -Skills Training on Operation and maintenance of processing machines (Maize& Rice)

Technology adoption- Machinery provided	Name of the Group	Value addition Machinery & equipment acquired
	Bushenyi Farmers and Bee Keepers Cooperative Society Limited (Honey)	1 Honey Extractor (Centrifuge) 15 Harvesting tools 15 Harvesting Gears 1 Refracto-meter 15 Smokers
	Kiyanga Rice Growers Cooperative society limited (Rice miller)	1 Rice Hulling Machine 1 Double piston Diesel engine 1 Weighing scale Materials to construct a machine house and store(Cost share basis),
	Gunjuka Okulakulane Cooperative Society Limited (Maize flower)	1 Maize Huller 1 Maize mill 2 Diesel engine 1 Weighing scale Materials to construct a machine house and store(Cost share basis),
	Labor Progressive Cooperative Society Limited (Maize flower)	1 Maize Huller 1 Maize mill 2 Diesel engine 1 Weighing scale Materials to construct a machine house and store(Cost share basis),
Linkages and Collaborations created	Local linkages between groups and other organizations	Groups were registered under the cooperatives development, some groups have entered into market linkages with secondary schools within their areas to supply Maize flour
	The Secretariat/ Host institution	AICAD, JICA, JETRO, Support institutions (Industrial Research Institute, Standards Agency, Management Training and Enterprise Development centers, Private sector associations,

Following the interviews, the information provided has been drawn together and analyzed along with the results of the documentation review and other stakeholder consultations as described above.

Discussion

The Governments of Uganda recognizes the role played by incubators like in other global economies. The challenges remain in the absorptive capacity and sustainability. Generally, in a developing country's setting like Uganda, communities/groups or individual entrepreneurs face quite numerous challenges hence require different, specific and focused support. Innovative approaches such incubation practices including open collaboration models complemented with different interventions can propel entrepreneurial development and job creation.

During the OVOP implementation process, the government (ministry and local governments) in collaboration with its donor partner JICA provided preliminary training for human resource capacity building and skills development, simple technological facilities and tried to create some linkages with the service providers and other associations within the country and the respective regions. Production and marketing support is still needed in all the cases. The farmers/ entrepreneurs gained basic skills in business management and planning, marketing, machine operations and maintenance, and product development/ value addition techniques after attending the workshops, seminars, study tours and during the mentoring and counseling sessions.

On the implementation process, the evaluation study found out that 51% of the beneficiaries believed that the program implementation just achieved the purpose; 36% believed that the program partly achieved the purpose; 7% believed that the program did not achieve the purpose at all while 6% believe that the program just exceeded its expectations.

On the impact of the program to the beneficiaries, the evaluation found out that 57 farmers confessed that the sales volume of group products and services increased by 82%. Here the challenge of record keeping hindered finding out the categories of how much was value added and how much was from sale of raw materials. The study recommended for members to separate their records for clear information during the next study.

OVOP products from groups that were supported with value addition equipment that are on the local markets include:

- Maize flour and maize bran – not branded
- Processed and packed honey – Branded
- Bees wax
- Hurdled rice– not branded

Other products on the market by OVOP groups that were trained but have not received value addition equipment are shown in Table 4-17:

Table 4.8-4: Other Products Produced

Product	Group
Herbal soap	Twezimbe Women group (Masaka)
Banana and pineapple wine	Kyamuhanga (Bushenyi)
Sweet Potato crackers and crisps	Odapaeta Farmer Field School (Soroti)
Dried mushrooms	Kyamuhunga (Bushenyi) & Ajokis Edeke (Soroti)
Sunflower oil and cake	Konya Audi Sunflower Growers (Soroti)

Farmers no longer sell maize grains; they sell maize products which are value added in form of maize flour and maize bran. Farmer group members have started poultry and piggery enterprises which feed on maize husk and bran. For those that improved on their incomes, they have put up some semi-permanent houses, installed Solar lighting facilities, bought motorcycles and started some shops. However, as mentioned above, no details were obtained from the groups whether all they improved comes from the sale of profits generated through processing of raw materials or directly selling off raw materials. What is clear though is that there are other products that no processing equipment were provided, hence selling raw materials directly is still going on.

The maize and rice value addition facilities have influenced surrounding community to increase production of maize and rice. The farmers said that the value addition facilities helped them reduce wastage and made their products to attract higher prices compared to when they would be sold unprocessed. For example, Labor Farmers Group in Serere District now produces sixty (60) tonnes of maize per annum compared to one and half (1.5) tones before acquiring the milling equipment.

Financing: In terms of financing, there is still insufficient funding from government. As a consequence, the performance and sustainability is negatively impacted. This challenge confirms that the incubators funded fully by the government cannot be sustainable although the government continues to play a key role supporting innovation activities and industrial sector. The private – public partnership incubator models can work best under the prevailing circumstances. Furthermore, the government should improve the general investment environment to facilitate the SMEs’ accessibility to financial resources in order to encourage investments in modern technologies and innovation.

Linkages: In terms of creating linkages and marketing channels, during the pilot phase, this gap was observed as still weak. During the next phase, the district authorities, group leaders and the ministries will need to strengthen collaboration to ensure that linkages are created between service providers, academic institutions, export markets and financial organizations. Collaboration and coordination with local research institutions including universities can contribute to the training of OVOP participants and transfer of technologies. Universities and other tertiary institutions student interns will be attached to these groups in the next phase. Catalogues for technology and machin-

ery supplies are being compiled by the ministry which will help the other participating groups to source the required and appropriate machinery.

Mentoring and Counseling: The OVOP implementation team including the District Focal Persons and the JICA volunteers in the field carried out regular program monitoring through field visits, periodical meetings with district officials and farmers groups to offer mentoring and counseling practices. Other additional services provided by other development organizations that were offered depending on the nature required helped the groups. The specific services offered by the program included; assisting the groups with business planning, retraining on the operation, maintenance & servicing of the processing facilities, branding and marketing strategies, and in some cases modifications to the processing facilities in respect to installations were done for the safety, quality of products and convenience of the machine operators. Some representatives of the groups were taken for exchange tours to enrich their knowledge and technical capacity.

Table 4.8-5 shows a summary of the overall rating of the OVOP Program first phase

Table 4.8-5: Summary of the overall rating of the OVOP Program First Phase

Rating	HS (Highly Satisfactory)	S (Satisfactory)	HU (Highly Unsatisfactory)	U (Unsatisfactory)
Parameter				
Implementation Process		XX		
Relevance		XX		
Efficiency		XX		
Effectiveness		XX		
Impact		XX		
Sustainability		XX		

From this evaluation exercise and other studies conducted in incubators so far established in Uganda confirmed what (Markley & Mcnamara, 1994) concluded that incubators are long-term strategies for economic development and any evaluation must consider both short- and long-run impacts from a facility or program. The evaluation study indicated also that incubation process has the capacity to foster business and community development in contexts where business champions, advisors, mentors and sponsors effectively collaborate to build absorptive and entrepreneurship capacity.

The program however meets some weaknesses, not all was smooth. This section highlights some general challenges for technology transfer, adoption and development in Uganda;

- A weak national innovation system with un coordinated programs in the country
- A weak industry – academia linkage;

- Inadequate government funding to harness R&D and support start-ups;
- Lack of access to information and awareness about emerging technologies and opportunities on the side of SMEs;
- Lack of technical and entrepreneurial skills. Most SMEs are in need of training in technology adaptation, access to technology providers and other opportunities including incubation services.

Conclusions and Recommendations

The first phase operated as per the program design. Overall, the program transformed the mindset of farmers from being dependant to being self-reliant, started adding value to locally identified resources. Some farmers have improved incomes and livelihoods. The processes and means used to deliver program activities to beneficiaries were appropriate thus the overall rating of the first phase was “Satisfactory”. All the stakeholders embraced OVOP Program, an indication that it is relevant. The second phase thus recommended to mobilize more resources to consolidate the achievements of the first phase. However, there is need to encourage and improve on the level of collaboration with other ministries, government agencies, institutions and NGO’s in order to utilize their services (as service providers) and effectively implement the program. In general, all the groups including the district leaders were very appreciative of the initiative. It is possible based on the evaluation exercise, that given the support that the program requires from the key stakeholders, positive impact can be created.

In conclusion, incubators can stimulate industrial development, create clusters and act as hub of knowledge transfer, and as observed by (Lalkaka, 2001), a range of public-private partnerships among businesses, universities and government must be involved. Also, from the innovation system perspective, in order to achieve innovation success a significant number of players from different societal sectors need to interplay in an efficient way. It is also recognized that national and firms’ technological competencies cannot be changed rapidly. To enable business incubators as facilitating institutions or incubation programs for technology transfer, innovation and industrial growth requires a National business incubation strategy which will not only promote start-ups and SMEs but also undertakes capacity building for incubators. Therefore, some of general recommendations suggested for successful implementation of incubation program in Uganda include:

- Development of National Strategy to support Business incubators,
- Encourage universities and other research institutions to conduct research on innovative responses to local circumstances especially rural communities which would be incubated, including virtual incubators,
- Promoting the coordination between the key players within the innovation system (i.e. policy makers, R&D institutions, intermediary organizations and private sector),
- Development of adequate infrastructure and provision of public utilities, and
- Promote regular monitoring and evaluation mechanisms.

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Paper VIII

STRENGTHENING BUSINESS INCUBATION SYSTEM IN UGANDA: FEASIBILITY CONCEPTUAL MODEL FOR UGANDAN CONTEXT

Joshua Mutambi, Joseph. K. Byaruhanga, Lena Trojer

Abstract

The global experience of economic development is demonstrated by successes in industrial development, technological innovation and export promotion. Developing countries are continuously laying strategies to follow the same. It is stressed that actions for promoting industrialization and private sector led economic development at the global, national and local levels call for a range of public-private partnerships among businesses, academia and government. The business support system including business incubators are one component of the overall business development support and competitiveness system.

This paper highlights the challenges faced by private sector mainly the micro, small and medium enterprises that constitute a large percentage (over 80%) of private-sector in Uganda. It further discusses the concept of business incubation services and how it can be popularized in Uganda based on public-private partnership and open innovation approach.

It concludes with a feasibility conceptual model for consideration in establishing a multipurpose/mixed-use business incubation facility given that the demand is very high. An urgent need for the public-private partnership policy framework and government commitment in fostering innovation and entrepreneurship is identified.

Key Words: Business incubation, Entrepreneurship, Industrialization, Open innovation, Uganda

1. Introduction

Small and medium sized enterprises represent over 80% of the private sector in Ugandan economy. Important as they are, they are faced with a number of challenges which hamper their survival rate and growth. The main challenges identified include; lack of capital or affordable finance, access to power/electricity, Bureaucracy in setting up a business and understanding business issues such as licensing, property rights, etc., access to technology (basic equipment) for production, lack of business advisory services, lack of assistance in market development and information on export issues, standardization and branding issues, and proper working premises.

In the circumstances as mentioned above, the task of improving the competitiveness of SMEs may find very good solution in promoting business and technology incubation systems. Business incubators, innovation centers, science parks and industrial parks have shown themselves to be effective instruments for assisting entrepreneurs in start-

ing a new business, nurturing young enterprises, and helping them to survive during the start-up period when they are most vulnerable (Löfsten & Lindelöf, 2002), (Dee, Livesey, Gill, & Minshall, 2011). The business incubator industry is a powerful tool for the creation of SMEs, supporting them in start-up phase, and for increasing their growth rate (I. S. Akçomak, 2009). The early stage businesses if incubated, provided access to good infrastructure, management, linkage to financing and knowledge can raise their chances of surviving by more than 85 % as has been pointed out by Centre for Strategy & Evaluation Services, (2002) (Robinson, 2008). Uganda wishes to expand on her network of business incubators by establishing business incubators that can utilize networks and partnerships, incorporate a number of groups such as small businesses and university students/graduates to create a critical mass of entrepreneurs and stimulate industrialization.

Business incubation has been defined by a number of international organizations UN-ECE, UNIDO, NBIA, UBKI, and others as a dynamic and systematic process of business enterprise development. A business incubator is an initiative that systematizes the process of creating successful new enterprises, by providing them with a comprehensive and integrated range of services, which include floor-space made available on flexible and affordable, but on temporary basis; common services that include secretarial support and shared use of office equipment; hands-on business counseling; access to specialized assistance such as research and development support and venture capital; and networking activities operating as a reference point inside the premises among entrepreneurs and outside to the local community (Lalkaka, 1997; Buys & Mbewana, 2007; Bergek & Norrman, 2008; Dietrich & Harley, 2010).

An incubator can be a hub; it can serve as a catalyst for social networking and a place for social interaction. An incubator can provide the structure where many clients can cooperate and build supportive networks; entrepreneurs can also share resources and work with advisors that they might not be able to afford otherwise. In doing so, the companies thrive and so does the local economy. Business incubators have been promoted to achieve but not limited to the following objectives:

- Economic development
- Creating value added jobs & services,
- Creation of technology based new enterprises,
- Facilitating transfer of technology,
- Fostering the entrepreneurial spirit,
- Speedy commercialization of R&D output,
- Specialized services to existing SMEs,
- Accelerating formation of productive clusters and other associations,
- Promoting export based enterprises/ internationalization,

(Tang & Llerena, 2006) pointed out that China Government under the China Torch program initiated establishment of business incubators, science & technology industri-

al parks, university science parks in order to strengthen innovation, develop high-technology and realize industrialization. (Wang, 2009) asserts that among other achievements of technology incubation program in China was promoting the development of high and new technology industrialization, leading to the development of emerging industries in many cities.

The aim of this paper is to answer the following questions;

- Is there need to develop business incubators in Uganda?
- Are there any existing support institutions and services necessary for supply side development?
- What should be the guiding principles for such proposed concept based on private public partnership and open innovation approach including methods for monitoring and evaluation?

This chapter discusses the concept of establishing business incubation program and operating a business incubator model based on the public-private partnership and open innovation approach. It intends to have all the specifics of Business incubator concept agree-able by all the stakeholders; an integrated systemic approach built in to ensure entry and exit from the incubator; value addition services; and sustainability issues;

2. Methodology

The methodology used for this work included; literature review of published materials, policy and other official documents and strategies; meetings and discussions with policy makers and academicians formally and informally during conferences and workshops; field visits and consultations (Universities such as Makerere University, Busitema University, Kyambogo University; business incubators such as Uganda Industrial Research Institute, Food Science & technology Incubation center, Software Business Incubation center, other agencies e.g. Management Training and Advisory Center, (MTAC), Uganda National Council for Science and technology (UNCST), Private Sector Foundation of Uganda (PSFU), Enterprise Uganda, Uganda Investment Authority (UIA), Uganda Bureau of Statistics (UBOS); private sector associations such as Uganda Small Scale Industries Association (USSIA), and Innovative Clusters);

Focus group discussion and enterprise interviews were conducted. Ministries consulted include Ministry of Finance, Planning and Economic Development, Ministry of East African Community Affairs, Ministry of Gender, Labour and Social Development; Ministry of Trade, Industry and Cooperatives, Ministry of Education and Sports. The districts sampled for this study were 13 distributed across the country.

3. Data Collection, Characteristics, Principles and Models

This section summarizes the findings with functional recommendations of an appropriate business incubator model. The characteristics of incubation system and brief comparison of establishment and management of incubators have been presented. Fi-

nally, the principles for consideration and proposed funding mechanism and management process model are discussed.

3.1 Demand/ Market Analysis

In Uganda and within the region generally (EAC and COMESA), according to the analysis of the information gathered from both primary and secondary data sources, there is potential for entrepreneurship and innovation. There is an increasing amount of start-up firms and SMEs with ideas that need to partner with researchers, university graduates and universities to realize their dreams. There is a dire need to create business incubators and technological and financial support mechanism to maximize the opportunities for technology transfer between academia, research institutes and private sector including clusters.

Clusters can be defined as a group of firms, related economic actors, and institutions that are located near each other operating in a particular sector and region and designed to stimulate innovative activity by promoting intensive interactions, sharing of facilities and exchange of knowledge and expertise and by contributing effectively to technology transfer, networking and information dissemination among the undertakings in the cluster. All the 13 Chief Administrative Officers interviewed expressed the most enthusiasm and that business created out of business incubators are important for jobs creation and rural/ municipalities economic development. So many graduates have approached the Ministry of Trade, Industry and Cooperatives for technical and financial assistance to start their businesses or projects. Such demands need structural conditions and personal entrepreneurial developments. Therefore, the demand for incubation services is increasing in Uganda.

An example is during the MSI project within the UNCST, 2007-2010 and under the window C (ideas/ project proposals from academia-Industry), over 50 proposals were received, out of which only 6 were funded. The rest were left out due to limitations in funding, others needed pre-incubation and incubation services. The same has been happening under the Ministry of Trade, Industry and Cooperatives and from the clusters development program.

From the field work and surveys that were carried out by the author, the possible productive activities included; manufacturing of chemicals and pharmaceuticals such as soap making, paints manufacturing and manufacture of health products; energy and environment conservation such as wind energy generation, solar energy generation, bio-fuels; steel fabrication and manufacturing such as the rural transportation vehicle; ICT and agri-business proposals. Some proposals need physical space and facilities for incubation while others can be incubated at their sites on virtual basis.

What has been observed again mainly from clusters was lack of trust amongst themselves and lack of proper business development guidance which incubators and Technology Transfer offices would offer. Such as agreements on percentage gains after the business has started and is operational. The general services that are offered by incubators are indicated in the next section.

3.1.1 General Services offered by Incubators

The figure 4.9-1 below shows the general services offered by incubators.

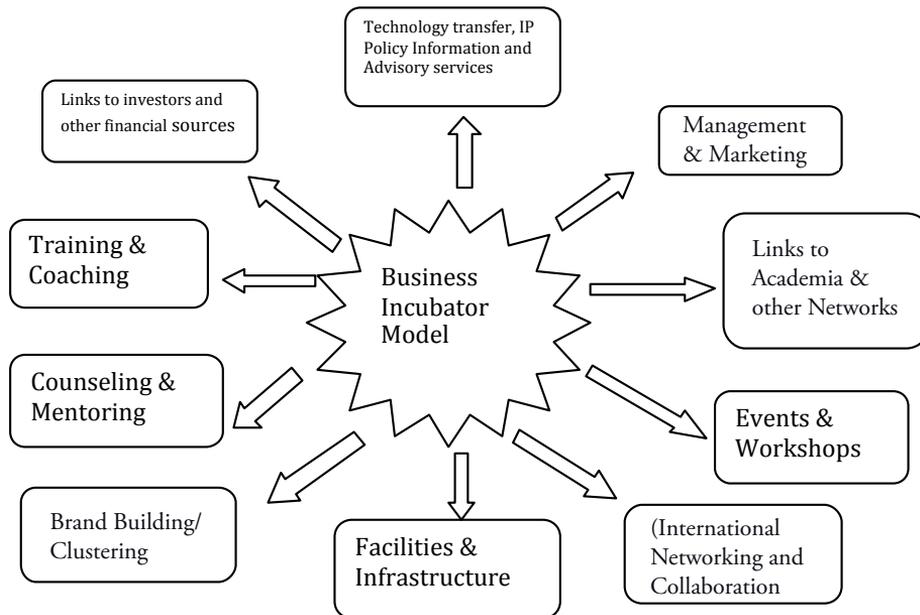


Figure 4.9-1: Business Incubation Process Services:

The following are general services and functions offered by Incubators. Applicability to the situation in Uganda will vary. In general physical requirements will be more applicable at the outset.

- Physical or industrial infrastructure - Office and or workshop space on an affordable basis. Having a registered business place is the first essential step in business start up, and access to water, electricity, telecommunication, laboratories and industrial machines.
- Information, communications and technology services - Access to telephone and Internet services is a big opportunity for a start-up business.
- Business planning, assistance, resources, counseling services - One of the main tasks of a business incubator is to help make a business plan and to advise on bookkeeping and filling in tax-forms.
- Advertising and marketing services - Provides display shops, business logos, meetings with potential investors and distributors.
- Financial advice services - Advising businesses on their funding and investments as well as on their daily financial transactions.
- Skills and Training services - Teaching market economic principles, professional and technical skills.
- Network services - It is important for a business incubator, in particular for a virtual business incubator, to have links and relationships with other organizations which can promote and sustain the interests of its client businesses.

3.2 Ownership

The ownership and hosting of a business incubator can be through a number of methods:

A non-profit business incubator runs with the help of a community, government or an economic development Organization. It requires individual communities to make significant contributions or commitments to the effort. There must be local champions who can spearhead the project to completion. A private or for-profit incubator is usually owned by a business individual, venture capital investment groups or real estate development partnerships. A business incubator can be hybrid i.e. a joint effort between a local and central government, universities, a non-profit organization and a private organization. A business incubator may belong or operate as an affiliation of a university. The purpose of a business incubator connected to a university is to help in the development and transfer of new technology, utilization and access to university resources. A public private partnership business incubator takes advantage of both the expertise of the private sector and the use of public and university resources.

3.2.1 Operational Business Incubation Models

The operational business incubation model determines the way an incubator will be organized and operated. The structure, scope of services offered, incubator funding opportunities and the level of external alliances. There are a wide range of operational business incubation models globally. The most common among them are;

- (i) Physical Incubation: physical “with walls” facilities often termed business incubators. These provide high quality flexible accommodation for a limited period, to suitable new businesses. They are designed to provide a tailored supportive environment.
- (ii) Virtual Incubation: virtual incubators or “without walls” incubation deliver all incubation outreach services to suitable businesses who are not located within a physical incubator and shared infrastructure. Their main support focuses on advisory services, marketing support, access to network of contacts, technologies, human resources, fiscal and accounting help, support to obtain capital. Other scholars such as (Bøllingtoft & Ulhøi, 2005; Hansen, Chesbrough, Nohria, & Sull, 2000) have referred them as “networked Incubators’ model. This from the practical point of view, in addition to providing the physical facilities, emphasis is focused on collaboration and networking arrangements that account for complex social dynamics at the incubators. Such kind of networked incubators is uniquely suited to growing businesses on a virtual basis due to growth in the ICT or in the internet economy (Hansen et al., 2000). It has been argued by Hansen et al., (2000) that networked incubators are likely to be more successful than others because of the mechanisms to foster partnerships among start-up teams and other successful firms thus facilitating the flow of knowledge and talent across companies and forging of marketing and technology relationships between them.
- (iii) Hub and Spoke Incubation: this model is a hybrid of the physical and virtual, where dedicated satellite locations providing quality outreach services are linked to a central physical incubator, usually connected to university, research institution, or Science Park through the common availability of services. Combining the traditional physical incubators and the virtual incubators is believed to be well suited for creating value and wealthy

in the new dynamic economies. It is flexible, adaptable and modern model of business incubation process to handle complex, interrelated, interdependent and extremely dynamic activities (Mcadam, Galbraith, & Mcadam, 2006).

Business incubation practices vary in the extent of initiation, diffusion as well as the variety of incubators that are operating in each country. Table 4.9-1 below gives an overview of selected aspects of different incubation models and environments in different regions worldwide.

Table 4.9-1: An overview of Worldwide selected Aspects of different incubation environments

Region	Different aspects of Incubation models
South America	<p>Business incubators in five countries (Argentina, Chile, Bolivia, Brazil, Peru). These countries have both physical and virtual incubators sponsored by national governments, universities, and other sources. However, in Bolivia and Peru the concept is still very new (Robinson, 2008).</p> <p>Development: a number of incubators are scattered across cities and universities, a situation in Argentina, Brazil, and Chile. In most cases, incubators are closely associated with universities.</p> <p>Funding: Mostly funding is provided by governments directly processed through government agencies or indirectly through universities that provide facilities and employees without charging the incubators/ firms on their campuses. In Chile, there is CORFO and FONTEC (fund for development and innovation), while in Brazil there is ANPROTEC and FINEP for technology ventures.</p> <p>Brazil represents a highly developed system of business incubation. In Peru and Bolivia, there is no organized involvement at the government level in developing and diffusing incubators. They are however strongly promoting microfinance alternatives</p> <p>Measuring Performance: Governments/ agencies have developed concrete performance measures for incubators to continue getting future funding of incubation activities</p>
China	<p>The Government has been a staunch sponsor and supporter of technology parks, business incubators and small enterprises.</p> <p>The Chinese business incubation program is under the TORCH program office for policy guidance and funding in the Ministry of Science and Technology(MOST) (Wang, 2009)</p> <p>Tenancy is usually 3-5 years.</p> <p>A number of science parks and technology business incubators are scattered across the country and within universities with the aim of turning scientists and technicians into entrepreneurs, contribute to job creation and income generation, and commercializing high technology products.</p> <p>Clients are assisted financially through grants and loans (Zhang, 2011).</p> <p>There are University- based and Government –based Technology and Business Incubators in China.</p>

India	<p>The National Science & Technology Entrepreneurship Development Board (NSTEDB), established in 1982 by the Government of India under the aegis of Department of Science & Technology, is an institutional mechanism for promoting knowledge-driven and technology-intensive enterprises. The Board, having representations from socio-economic and scientific Ministries/Departments, aims to convert “job-seekers” into “job-generators” through Science & Technology (S&T) interventions. These objectives have been operationalised by NSTEDB through two major interventions. Namely, the scheme for Science & Technology Entrepreneurs Parks (STEP), which was started in the early 1980’s, and the Technology Business Incubators (TBI) programme launched in early 2000. The essential feature of this TBI programme is that the tenant companies leave the incubator space within 2-3 years. In India, TBI are located near sources of technology and knowledge, i.e. around R&D institutions and Academic institutions(universities) or have strong links with such institutions to ensure optimal use of already existing expertise and facilities.</p>
South Africa	<p>Accordingly to (Buys & Mbewana, 2007), business incubation was first practiced in South Africa in 1995 when the Small Business Development Corporation (SBDC) established “hives of industry” within existing premises in African townships with access to infrastructure. In 2000, the government launched “the Godisa Initiative under the departments of Trade and Industry and of Science and Technology. The aim of the program was to create technology-intensive small, medium and micro enterprises (SMMEs) through the enhancement of technological innovation, improvement in productivity and accelerated international competitiveness. The 12 Godisa incubators by 2005 were scattered within major cities in South Africa (Johannesburg, Durban, Cape Town, Randburg, Port Elizabeth, Middleburg, Nelspruit, Richards Bay)</p>
Asian Countries	<p>Japan, South Korea, Singapore and others Governments have been responsible for development of science and technology, and industry, including development of techno-preneurship and high-tech enterprises through science parks, technology incubators and similar other mechanisms (UNESCAP, 2001). Science parks and technology business incubators/ innovation centers are distributed in regions and according to sectors. Such programs are funded through National Agencies or Boards, e.g. in Singapore, the technology Incubator Program was launched by the National Science and Technology Board (NSTB) and management of incubators is tendered out to successful incubator management companies.</p>

United States	<p>Technology and business incubators in USA were supported as a strategy for business creation, job creation, commercialization of new technologies among others. They are funded from federal government and other agencies such as local governments, corporations and Small and Medium Business Administration (SMBAs). Most technology incubators have benefited from state grants in one form or other, private venture capitalists, and usually created in partnership with academic and research institutions.</p> <p>Majority firms in the incubators remain for less than two years.</p> <p>In US, nearly half (46%) of technology incubators reported taking equity in some or all of their tenants. (Dee et al., 2011)</p>
Sweden	<p>Sweden has a large and well resourced incubator program. Sweden Government highly supports innovation activity initiatives, business incubators, science parks and innovation centers.</p> <p>Through the Government Agency for Innovation Systems- VINNOVA and other growth or innovation orientated authorities (e.g. ISA, NUTEK), funding is distributed to various organizations and academic institutions to support innovation systems, business development activities.</p> <p>Majority of incubators have mixed revenue sources from a variety of stakeholders such as banks, foundations, venture capitalists.</p> <p>There are various business incubator models in Sweden. Some offer free business development services including seed financing, while other incubators offer equity finance.</p> <p>There is an online assessment tool for monitoring their own performance and enables a centralized data collection demonstrating value provided.</p>

Source: Constructed by the author

3.3 Objectives of the Incubation Concept Model in the Ugandan Context

The main objective is to develop a portfolio and principles of incubation environments, virtual outreach, and develop synergies and linkages with existing incubators through an effective institutional arrangement so as to support start-up companies, institutions and or individuals in the field of technology transfer, research, skills and enterprise development based on the open innovation approach.

Specifically:

- (i) To foster the culture of youth entrepreneurs (existing and new businesses) and commercialize research through open innovation collaboration incubation processes
- (ii) To attract and develop human resources and skills that will facilitate utilization of ideas and technologies generated by innovative enterprises or entrepreneurs into business models;
- (iii) To partner with clusters initiatives through capacity building and networking, information sharing, technology transfer, and market development;
- (iv) To mobilize resources, share facilities and services for the maturation of new businesses based on open innovation perspectives

The proposed conceptual business incubator model is structured on the public-private partnership (university, industry and government) and open innovation approach in the field of business development and for commercialization of research products. It

shall focus on developmental return rather than financial return. It includes identifying desired and achievable results or impact goals, identified indicators as a basis for determining whether the incubation program and its selected businesses or projects are progressing towards their impact goals. This model therefore focuses on the outcome and impact of the incubation process based on the resources (human and material) used by the incubators.

3.3.1 Expected Benefits

The proposed PPP model aims at enhancing the quality of their management, marketing and personnel support for incubatees to actively promote the innovation and entrepreneurship process.

It also aims at improving efficiency in local innovation systems by building linkages and networks, promoting technology transfer and diffusion; develop capacity for incubation practices; supporting start-up businesses and commercialization of research done in universities, research institutes and firms including outreach or virtual incubation process; and creating technological and industrial businesses (i.e. to how they organize and manage the incubation process).

The recommended prototype model in the present circumstances is mixed-portfolio technology business incubator pursuing any business activity from technology and manufacturing to agro-processing and services. This one will encourage growth of all kinds of businesses. In addition, with more than 70% of Ugandans living in rural areas and the government strategy of supporting cooperative movement in rural communities, increased access to ICT facilities, establishment of more academic institutions regionally, a PPP technology business incubator model with an outreach/ virtual incubation-basis will serve more local entrepreneurs or firms (textile, Agri-business, leather sectors).

3.3.2 Mission

The Incubator will;

- Link up within and outside the country in mutual self-interest with other business incubators, academic institutions and private sector bodies for interaction, dissemination and scouting of ideas and potential new entrepreneurs
- Support the potential entrepreneurs in developing their business models
- Guide and support the potential entrepreneurs with knowledge networks, information and technology transfer with the community of partners
- Support exploitation and utilization of resource endowments and opportunities for local development and growth of industrial clusters

3.3.3 Expected Outcome

The expected Outcome is “an integrated incubation system” that will contribute to achieving the targeted goals of increasing employment among youth and productivity, improving entrepreneurial culture and industrialization process (i.e. a transformed Ugandan Society from a peasant to a modern and prosperous country within 30 years)

(Republic of Uganda, 2010). The incubation process is realized to have various important impacts related to the incubator as an organization, the incubatee (tenant) and the society as socio-economic impact. A general recommendation is to always ensure that results and impact goals meet what is known as the SMART criteria (Specific, Measurable, Achievable, Relevant, Time -bound). However, in some situations the desired impacts are not always directly measurable. In this case approximated indirect indicators are applied.

3.3.4 Open Innovation Incubation Model Environment

Within the open Innovation Incubation model, several processes take place to facilitate and promote innovation, collaboration, and the development of ideas. Start-ups and SMEs can apply for the incubation program where there are guided and supported through all processes of developing their businesses. The Figure 4.9-2 shows the proposed open innovation incubation model presenting a synergistic business environment with actual conditions to promote continuity of businesses generated from open innovation incubators, academia/ educational institutions and research centers, government and industry- firms, industrial/science parks, professional associations, non-governmental organizations, etc (triple helix actors). The model considers a life cycle from the business incubation program point of view:

- *Pre-incubation stage* (overall activities needed to support the potential entrepreneur in developing their business idea, business model and business plan to boost their chances of effective start-up creation)
- *Incubation Stage* (support resources and services given to start-ups or ‘infant’ entrepreneurs until they realize their business models to graduation stage and expansion)
- *Post-incubation stage* (activities to be carried out when the incubatee has reached maturity phase, leave the incubator and ready to thrive on their own)

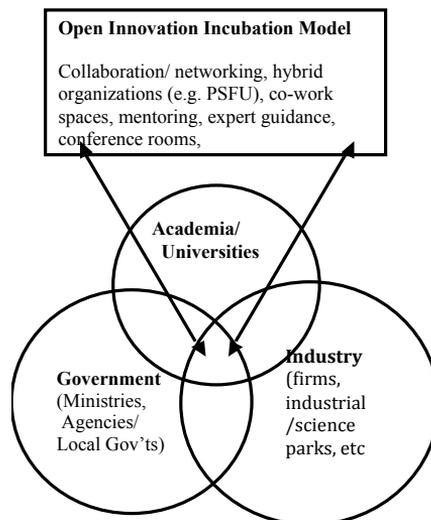


Figure 4.9-2: Open innovation Business Incubation Model
Source: Constructed by tAuthor based on Triple Helix Model

3.4 Mechanism for Financing Incubation Infrastructure and Innovation Support

There is need to establish regular and clear government/ public funding support for incubator projects and innovation. There must be financing plan for infrastructure building and business development. Continuous facilitating the development of new and existing networks of individual incubator projects with the aim of achieving critical mass sufficient to attract the private sector, particularly in the development of training and support services is highly desired.

The targeted sponsors or partners of the proposed model are expected to be: (i) public-the central government, local governments, (ii) Private sector- business enterprises, (iii) Non-Government sector- NGOs and development partners.

The proposed open innovation conceptual program will build on what has been initiated by the Millennium Science Initiative (MSI) funded by the World Bank under the Uganda National Council for Science and technology (UNCST) (Uganda National Council for Science & Technology, 2007). This is a similar program model used in Sweden, the VINNOVA Agency.

An Implementing Agency can be appointed such as Uganda National Council for Science and Technology (UNCST) to oversee the implementation of such a program. If UNCST is agreeable, another window D for the hybrid of the three existing windows to fund development of business incubators would be proposed to be introduced in the administrative structure as indicated in the Figure 4.9-3 below. UNCST can execute implementation of the proposed model under PPP.

Under Window D, the model that can be referred to as Business Incubation Fund which shall be managed by a Board of Directors or an Innovation Council to supervise and coordinate the funds and implementation process, composed of representatives of senior government policy makers, universities/ research institutions, and also business development experts. To respond to the increasing levels of demand of incubation services, and to develop an integrated network/system, there is a need to develop new and local physical, hybrid and virtual incubational environments/centers.

Within the Agency, there will be a management team responsible for day to day activities and management functions of the incubation program. They will recruit experts/ consultants in different business areas to provide tailored business development services to target firms whenever demand arises. The incubator model will promote a wide range of approaches to socially-focused innovation: from a series of incremental changes to the fundamental alteration of a business's traditional models; from the creation of new products and services, to the formation of new partnership networks to develop and deliver products and services, and to the introduction of new management processes that underpin the partnerships and product offer.

According to the discussion held with UNCST, the total number of applicants was 465, but only 39 project proposals were selected for funding in different universities and science institutions including private sector institutions. This showed the need for incubation services.

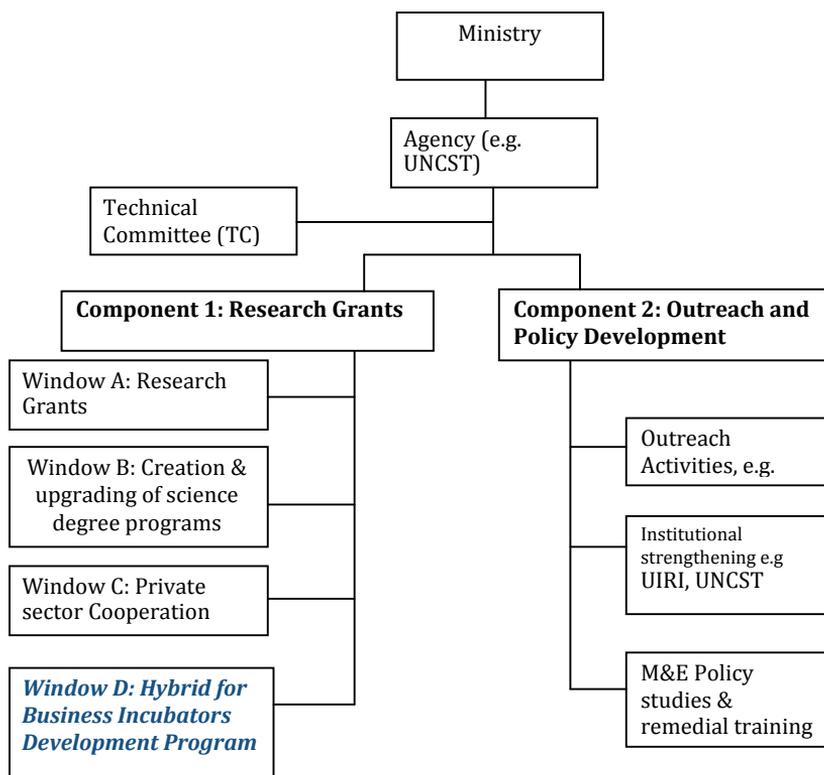


Figure 4.9-3: Administrative Structure for Implementing MSI
(Source: Author and UNCST, 2007)

3.5 Adaptation of Good International Practices: Business Incubator Operational Guidelines

Business incubation involves many players, and the efficiency of each affects the overall effectiveness of the system (Lalkaka, 2000). Likewise, the evaluation process is multi-faceted, calling for step-by-step analyses of the forces within the incubator and some outside. The complexity of incubator programs requires close cooperation among players and the sources of success can be expressed as five inter-linked rings (Lalkaka, 2001): Public policy that facilitates venture creation and provides the business infrastructure; Knowledge base of university and research; Private sector partnerships for mentoring and marketing; Professional networking, national and global; and Community involvement to promote entrepreneurship.

The Figure 4.9-4 below shows the interactions among incubator stakeholders.

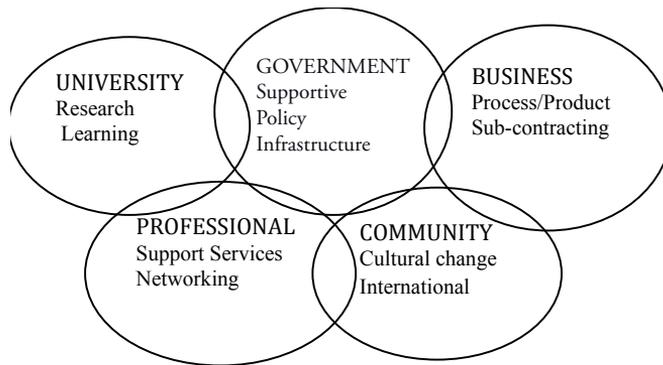


Figure 4.9-4: Interactions among Incubator Stakeholders
Source: Lalkaka (2001)

The various direct and indirect factors involved in incubating the incubator (incubation process) are analyzed together with the location, governance, services and facilities design, all of which will affect its performance. The key issues to be considered when starting up new business incubator are: Resources, management, services, public support and market. For the incubators to deliver, case studies illustrate the following best practices to be effectively coordinated;

- *Knowledge base and tool kits:* using Universities, R&D centers and other agencies as source of added value (i.e. Incubators, academic institutions, policy makers, technology development councils and offices)
- *Networking:* Building and managing entrepreneurial networks through meetings and workshops, creation of websites, and connectivity to other networks and new markets and others
- *Capacity building-*training and facilitating entrepreneurs with managerial skills and techniques for adding value to their operations, identification of innovation strengths and gaps, IP rights, technology transfer, business relationships between tenants, offering the most for clients and making the incubator as a node in supplier/production networks
- *Financing:* Facilitate capital acquisition and access to credits for the implementation of the clients' business development strategies.
- *Monitoring, Evaluation and Benchmarking:* Institutional growth towards sustainability cannot be managed or improved unless it is measured. Identification and monitoring quantifiable milestones with clients and setting tailored business development program; and holding regular review analysis of the package of services to fit the collective/individual needs of the entrepreneurs.

3.5.1 Implementation based on Good Business Incubation Practices

According to literature, interaction with incubator managers and practitioners, in 1996, NBIA's board of directors developed a set of industry guidelines to help incubator managers better serve their clients (NBIA, 2009). Although success or failure depends on other factors including contextual factors, there are common practices that are seen necessary for a good incubator success. According to NBIA, (2009), there

are two core principles that characterize effective business incubation and broadly applicable to incubation program around the world regardless of their focus or mission:

- (1) The incubator aspires to have positive impact on its community's economic health by maximizing the success of emerging companies.
- (2) The incubator itself is a dynamic model of a sustainable, efficient business operation.

In addition to commitment to the two core principles of business incubation above, management and boards of incubators should strive to focus on:

- (i) Objectives- Consensus on Vision and mission of the incubator are very crucial and depending on the demand and national or sector strategies. Commitment to the 2 core principles of business incubation is a typical key success factor.
- (ii) Governance, Leadership and Management: Business Incubator's leadership is a very important aspect that influences the success of incubation process. A strong leadership and management develops a sustainable business plan, adjusts the plan as needed, and ensures that the business meets the desired objectives. A committed and skilled management can guide entrepreneurs through the development process (i.e. incubation process)
- (iii) Board of Directors: Board of Directors is an important component of Incubation process. The incubator shall have a Board of Directors comprised of people with business acumen and experience especially in small business development, policy and economic development. The members should come from all the key sectors-representatives from government, local government or municipalities, business community, civil society and academia and external partners. Board Members should be selected from every area in which the incubator has needs including where the incubator operates.
- (iv) Sources of finance for incubator and clients: Although, the incubator is purposely to serve the start-up firms and small businesses, itself should be seen as an organization that needs to be sustained by implementing a good business model. For not-for-profit incubators, sources of funding could be government (central and local governments/municipalities), institutions/universities, Non-government Organizations and development partners, Private sector or a combination of all.
- (v) Outsourcing resources and support activities (adopting open innovation approach): Open innovation concept values knowledge created outside the firm or organization (Mayer, 2010; Vanhaverbeke, Van de Vrande, & Chesbrough, 2008). According to (Lemola & Lievonon, 2008), the open innovation approach focuses on two particular factors. It regards resources residing outside the boundaries of an organization potentially as valuable as expertise that the organization has acquired for itself. Secondly, that the innovating firm or organization is not considered as the sole platform for commercializing results of research, development and innovation activities. The incubator can greatly benefit from existing organizations that provide small businesses with services through collaboration. Therefore, in order to sustain itself, incubators should have proper policies that encourage collaboration and networking.
- (vi) Methodologies for client identification, selection and graduation or exit. A business should have a reasonable chance of succeeding in order to be worth the incubator's time, money, and effort. The incubator will then provide other business development support services such as management and organization, business counseling and coaching, business plan development, cost-effective marketing suggestions, business growth mentoring, and strategy development, networking and linking to other networks.

- (vii) Location of the business incubator, infrastructure, services and logistics availability. A successful business incubator requires excellent staff, consultants, convenient location and infrastructure including technological facilities. The incubator has to develop stakeholder support including a resource network that helps the incubation program.
- (viii) Monitoring and Evaluation. The incubator has to focus on maintenance of a management information system and collection of statistics and other information necessary for ongoing program evaluation, thus improving a program's effectiveness and allowing it to evolve with the needs of the clients.

3.5.2 Other important factors to consider for establishing a Business incubator

- (a) Building Logistics: There are several important issues that should be considered while starting up an incubator which include; the host institution or key stakeholders, location of the incubator, space available for use, common and working space. The location of the incubator should be easily accessible to clients and visitors; it should have enough parking spaces and have convenient access to public transportation.
- (b) Incubator management: Staff of incubator, selection and graduation of clients and the interaction between management and clients are some important factors to consider for the performance and success of incubation. Transparency and openness of the clients to share issues and problems with incubator advisors helps them to openly discuss their problems and solutions. Staff needs to provide mentoring and business education in best practices to clients, encourage networking and introduction to potential partners. The incubator needs to stay apprised of the business situations that its clients face. It is important that Memorandum of Understanding (MoUs) or contracts with defined terms be signed.
- (c) Shared Resources: Business incubators provide several shared services and resources to their clients. They share for instance, reception and administration services, secretarial services, conference rooms, etc. By providing a single resource for all the clients to share, the incubator is able to help keep its costs down. Our proposed incubator should provide common resources such as these. Where there are quite a number of businesses and resources are highly demanded, the incubator management can expand on the facilities as they are needed, step by step.

3.6 *Management and Operational Structures of the Proposed Model*

3.6.1 Governance, Leadership and Management

Since, in Uganda, the incubators initially have depended on public financing, it is important that the operation costs are critically considered and expenses effectively controlled. The main operating costs are towards infrastructure and building costs including maintenance; Utilities, equipment and supplies; Services to tenants including promotion, security and programs; and salaries for staff and consultants. A strong mix of public and private sector commitment with clear roles and responsibilities will need to be observed. It is better to build an effective Board of Directors committed to the incubator's mission, monitoring and to maximizing management's role in developing successful companies. Therefore;

- The incubator should have at least 3 committed staff members when it starts, which usually consists of an Executive Director/Chief Executive Officer/ Manager and two more professional business developers. Additional staff can be hired later on a full-time or

part-time basis as the need arises for them. Then a Board of Directors with a broad range of backgrounds, such as lawyers, accountants, and business professionals appointed.

- Incubatee selection is an important incubator management task. The task of identifying firms that are weak but promising and need incubation is an uphill task that needs better understanding of markets and process of new venture formation (S M Hackett & Diltz, 2004). The selection of tenant firms should follow developed criteria and accept companies that have a viable chance of success depending on the idea and the entrepreneurs focus approaches.
- The incubator should provide helpful business support services to its clients to differentiate itself from a typical office space. The business support services generally identified include entrepreneurial training and business development advice, as well as services concerning general business matters such as accounting, legal matters, advertising and financial assistance ((Bøllingtoft & Ulhøi, 2005). It should provide technology such as copiers and internet access, as well as connections to separate business assistance organizations for its clients.
- Most importantly, the incubator should provide its clients with some form of advisory services board made up of some experienced and committed individuals. This advisory services board should meet on a regular basis to discuss the status of the companies and set milestones for them to achieve. Reports should be produced as tools for supervision in addition to daily monitoring and continuous assessment. The devotion and enthusiasm of the advisory board and management determines the degree of quality and how the services are supplied.
- Mediation: Another important role of incubators is intermediary role between the incubatees and other players in the innovation system. The incubator should also provide plenty of opportunities for its clients to interact and share experiences with each other. By establishing network mediation or linkages to critical resources such as financial capital institutions, knowledge and technology, market resources and human capital, incubators can provide resources for their business support services and survival of new ventures (Bergek & Norrman, 2008). This could include hosting social dinners or regular peer-to-peer meetings, exhibitions, business council meetings, trade fairs, etc.

3.6.2 Marketing Strategy

In order to attract tenants, funding and build network, marketing strategies must be developed by;

- quickly establishing the presence and identity of the centre in the public mind-
- fully inform and educate the general public on the primary functions of the incubator and what it has to offer and its benefits
- develop strong and productive links with a range of organizations (industrial associations, universities, R&D institutes, financial and management institutions, consultants, NGOs, and civil society) that will help the incubator and assist the tenants
- The incubator can advertise through sign posts along roads, local periodicals, brochures, radio stations, banks, internet sites such as Face book, existing business resources that interact with entrepreneurs, and others. It can also hire a marketing consultant to arrange an ideal marketing strategy

3.6.3 Location and size of Space

The location of a business incubator largely reflects the aims it pursues. The general purpose (mixed-use) business incubator which encourages growth of all kinds of businesses can be located within the industrial park or in town depending on availability of space with the collaboration of Universities around and outside. This can help to reduce the gap that exists between the users and suppliers of technology. However, specialized or industry specific incubators focusing on technology based industries and ICT may be located within the Universities and or within the science park/industrial parks if available.

From the research and Ugandan context, the appropriate space is 1,500-6,000 square meters (0.25-2 acres) since, there is a possibility of supporting virtual businesses.

3.6.4 Monitoring and Evaluation of Business incubator Performance: Measuring Impacts

The importance of monitoring and evaluation of business incubator performance as well as monitoring new businesses and assistance intensity in business incubators has also been acknowledged as an important component in the business incubation process (Abetti, 2004; Sean M Hackett & Dilts, 2004; Khalid, Gilbert, & Huq, 2012). Assessment is another management concept that aims at integrating all relevant factors. An assessment can also be used as a basis for a process of continuous improvement. This leads to three main objectives of an assessment;

- (i) Analysis of the status quo and determination of potential improvements
- (ii) Support and acceleration of change processes
- (iii) Measurement of whether objectives have been achieved.

With regard to identifying, monitoring and measuring the impact and benefits of a business incubator program, incubator performance can be assessed against their specific missions and objectives/goals and related to their “incubator models” i.e. to how they organize and manage the incubation process (Lalkaka & Abetti, 1999; Lalkaka, 2000; RESI & MBIA, 2001; Centre for Strategy and Evaluation Services & European Commission, 2002; Bergek and Norrman, 2008). The BI assessment framework covers mainly three categories: Impacts, effectiveness and sustainability.

As mentioned in the earlier section, during monitoring and evaluation of the performance of the incubators, most incubators have typically concentrated on the direct outputs and outcomes of the incubation process including the establishment and operational phase, e.g., financial performance, number of training programs carried out, keeping track of number of firms graduating from the incubator, reporting how many distinct services are available to clients, average incubation time, jobs created and networking activities (directly measurable aspects). However, there has been less focus on indirect and social aspects (Bøllingtoft & Ulhøi, 2005) and how different incubators organize and manage their incubation process (Bergek & Norrman, 2008). This type of data only offers a quantitative picture of the situation. Measuring the impact and

assessment often requires integrating with qualitative information from both incubator internal and external evaluations to improve performance. For instance, according to (Khalid et al., 2012) adapted from Hackett and Diltz (2004a), state that the time intensity of assistance provided, comprehensiveness of assistance provided, and the quality of the assistance provided all characterized this component of business incubation process. 'Time intensity of assistance provided' refers to the percentage of working hours devoted to monitoring and assisting incubatees, while 'comprehensiveness of assistance provided' is a measure and it refers to the degree to which strategic, operational, and administrative-related assistance are provided by the incubator to the incubatees.

Recognizing, that incubation process concept has expanded rapidly globally and that implementation in different countries is context specificity (varying features in different countries), this chapter based on the best practices intends to develop an appropriate model that can be adopted for Ugandan situation. Good measures of performance of an incubation system are the medium-term benefits accruing to the clients, sponsors, local community, region and nation. There are some direct measurable and less easily quantified indirect and induced economic impacts of the incubators. According to RESI and MBIA, (2001), the direct economic impacts are generated as new business create jobs and hire works to fill new positions. The indirect economic impacts are caused as the new firms purchase goods and services from other firms. In either case opportunities are created and incomes rise. This enhanced income drives the induced economic impact that results from households increasing their purchasing power from local businesses and increased culture of entrepreneurship as well as interest in industrialization process.

Implementation and delivery of incubation services shall be monitored and evaluated on a regular basis according to the targeted goal and objectives with reference to impact and benefits including indirect and social aspects. In addition, it is expected that the business incubation program will be alert to new ideas and new ways of doing things. Market and innovation diagnostic studies must be continuously carried out to keep competitive and guided by good practices. This will help the program to continue with a high flow of quality entrepreneurs with potential to grow and penetrate the export markets. Developing key indicators to monitor or promised outcomes enables managers to asses that degree to which intended or promised outcomes are being achieved. The model should include monitoring performance and evaluation template.

Monitoring and evaluation should be embraced by all the partners in a coordinated fashion. It must be driven by clear reporting mechanisms between the entrepreneurial tenants, the incubator management and facilitating partners to share ideas, knowledge, concerns and progress.

In order to understand the progress and ensure implementation of regular monitoring and evaluation practices, the following shall be carried out;

- (i) Develop a performance based monitoring and evaluation framework. Regular monitoring of progress against targets ensures that the impacts and lessons learnt are maximized and the risk of failure is reduced.

- (ii) Benchmark against the best – incubation environments/centers should be benchmarked against the best incubation centers or institutions nationally, regionally and internationally.

Benchmarking is a dynamic process of identifying good outcomes in organizations which could be attributable to their successful practices and adapting these to another group's operations. It is a continuous learning and self-correcting process with quantitative comparisons of performance at participating organizations (Lalkaka, 2000). According to (AUC, ECA, & AfDB, 2011), the Aus Industry-Best Practice Program (1995) defined benchmarking as below:

“An on-going systematic process to search for and introduce international best practice into your own organization, conducted in such a way that all parts of your organization understand and achieve their full potential. The search may be products, services, or business practices and processes of competitors or those organizations recognized as leaders in industry or specific business process that you have chosen.”

Measures of incubator success or failure vary depending on context and objectives. Incubators fail for some of the same reasons that their client-businesses fail. They fail to perform according to expectations for a variety of reasons. The following are the key issues that should be addressed to enhance the actual performance.

3.6.5 Key Issues to be addressed for Monitoring Performance of Business Incubators

The key issues to be addressed for monitoring performance of Business Incubators after analysis and adapted from best practices for business incubation (Lalkaka, 2001; CSES-EU, 2002; NBIA, 2007; (Gdoura, 2008); InfoDev reports, 2009-2012) will be the following;

Key Issue 1: Definition of the goals of incubator

- Realistic, consistent with the environment and resources of the country
- Incubator should be able to offer the tenants on the long term and sustainable basis, valuable resources at affordable cost.
- Focus of the incubator should take in account the main market opportunities that can be seized.
- Market and financial constraints / risks, should be clearly identified and addressed.

Key Issue 2: Organization and Governance

- Legal Status / structure consistent with its mission and Business model.
- Having an incubator Advisory Board of stakeholders representatives and consensus among staff correlates with many measures of success
- Additionally, competent / professional management team, dynamic director with business experience.
- Attraction or recruitment of number of qualified professionals including volunteers, interns, retired senior professionals or established companies to provide consulting or mentoring services.

Key issue 3: Sustainability

- One of the main challenges / issue the incubator management has to face is sustainability;
- Rental of space is not sufficient to cover all the costs of incubator;
- Revenue may come from equity participations in client companies, payment of royalties when a patent or new product is commercialized and small percentage fee charged from tenants depending on their categories;
- Agreement with universities R&D programs can provide public funding on kind support to incubators;
- Public support and international donors support usually required during the first years of life of an incubator;
- Management is urged to consider long-term sustainability strategies such as collaboration with other business incubators, universities and other institutions and finding partners who can help.

Key Issue 4: Admission Criteria/Selection

- Admission criteria should be clearly set and guidelines and transparent evaluation procedures applied;
- Screening activity should be conducted by using standard procedures and forms (sometimes flexible) and managed by team of professional evaluators;
- Screening process should be conducted according criteria fully consistent with the goals of incubator;
- Selection should be conducted in an ongoing effort to identify applicants' needs, while determining whether the services offered by the incubator can have "value" to the applicant;
- A detailed business plan should not be a requirement, only brief description of the concept based on the Need, approach, benefit and competition (NABC) method Carlson and Wilmot, (2007);
- Potential synergy among clients. The incubator should avoid incubating companies directly competing in the same market / product, in order to avoid potential conflict situation;
- Business incubator should consider virtual membership to extend their positive reach
- A scoring system should insure coherence and transparency of the selection process.

Key Issue 5: Incubation Process

- Facility provision: the incubator should offer modular, inexpensive operational space;
- Optimization of common space to foster informal networking among tenants;
- Staffing and professional services: the incubator should have at least 3 employees with a very broad skills base to offer business support and development services. They should offer professional advice, coaching, counseling and mentoring at a very reasonable cost if "for-profit incubators" and free if "Not -for profit incubators" for both start-ups and established SMEs;

- They should encourage business development continuous improvement and information dissemination
- Networking opportunities: they should arrange organization of seminars, forums and promotional events facilitating contacts, knowledge spillovers and networking among companies located inside and outside the incubator;
- Access to capital: Capital is one of the most valuable and needed services for new entrepreneurs' network. This should be either through public – private partnerships, collaborative agreement with VC funds if available, partners from the banks for debt capital or various types of early stage financing, holding companies, lending programs for economic development;
- Adopting Open Innovation Incubator Concept (Open Incubation) and Business Model discovery frameworks such as Business Model Canvas (Osterwalder & Pigneur, 2010) combined with the NABC method: Staff can be assigned to coordinate and facilitate collaboration between other incubators either in the country or outside the country for any support or partnership required. Start-ups can be assisted to develop their business models based on the business model canvas framework. This tool guides them in creation of collaborative support networks and partnerships (network mediation) to encourage interaction of incubator clients with universities, corporations and government agencies (collaborative development and sharing of knowledge and resources-tools, expertise, market information, benchmarking with a network of producers and service providers etc). Introduction of Video conferencing facilities between incubator sites or institutions. Provision of computer based and special rooms for installed facilities such as Skype which is a popular type of video conferencing software can be used and saves time and travel expenses.

Key Issue 6: Graduation

Incubator should clearly define and communicate its graduation policies / procedures – time limits, type / amount / value of services that would provide by the incubator during the incubator process. In Ugandan context, the general 2-5 years after which incubatees graduate will apply.

Key Issue 7: Measuring and evaluating the impact of Incubation initiatives

- Performance outcome: program sustainability and growth, tenant firms' survival and growth, jobs created and innovation boosted ;
- Management policies and their effectiveness: measuring the effective use of resources against incubator's objectives. Organization and governance of the incubator, financing and capitalization operational policies and target markets;
- Services and their value added: assessment of the perceived value added to the client firms in terms of services and facilities provided, and the perceived value associated to the knowledge sharing and the incubator environment.

4. Proposed Evaluation Model of Business Incubators based on the Process Approach

Institutional growth towards sustainability cannot be managed or improved unless it is measured. The proposed EO-TSF evaluation model adapted and modified from Klimova, (2009) is for evaluation of incubators and provides a wide range of indicators.

It can be flexibly modified for purposes of particular evaluation based on Vision, Goal and Strategies for incubator development. The model defines two main groups of impact indicators namely; E-Enterprise development (development of individual firms), O- Other fields of regional development and three main groups of performance indicators are; T- Technical facilities, S- Services offered by the incubator and their quality, the incubator staff, and F- Financing and stakeholder relationships of the Incubator. Stakeholder relationships in an open innovation model approach are very important. It is considered in the model because effective relationships within an organization's network of stakeholders are essential for its long-term survival.

The process approach (input-output approach) is preferred in that it is in the management and control of the interactions between the processes and the interfaces between the functional hierarchy of the organization at different stages of development. There is a causal relationship between resource conditions, managerial choices and organization performance success. Adoption of open innovation principles is proposed for enhancement of the capabilities required for incubators sustainability. (i.e. financial, human, natural, technological and social capitals). In addition, another recently emerged tool that has been proven useful to start-ups recommended for incubation process is application of a Business Model Canvas (Osterwalder & Pigneur, 2010). Figure 4.9-5 shows the appropriate EO-TSF model and Table 4-20 and Table 4-21 show the impacts and performance valuables that can be applied in monitoring, evaluation and benchmarking activities. Application of the proposed model can also be helpful for the incubator through the M&E process, the overall strengths, weaknesses, development needs and possible solutions can be identified.

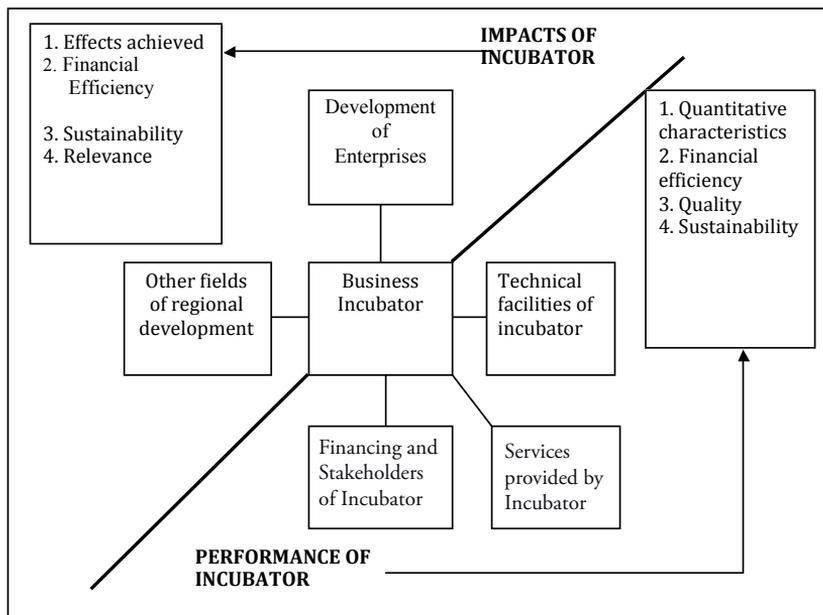


Figure 4.9-5: EO - TSF Evaluation Model.
Source: Author and Klimova, (2009)

Table 4.9-2: Incubator Impact on Enterprise Development and Other fields

Incubator Impact	Effects achieved	Financial efficiency	Sustainability	Relevance
Enterprise Development (based on the Vision, Goal and Strategies)	Number of newly established firms including virtual firms per year	Savings of incubated firms	Survival rate of firms	Usefulness of services
	Number of firms ready to move out within the incubation period and rate of graduation			Contribution of incubator to success of incubated firms
	Firm turnover and its growth rate		Continued operations after exit	Image and credibility of firms
	Firm profit and growth rate			
	Number of employees and growth rate			
	Intellectual property rights owned by incubated firms		Technology innovations	
	Mobilized risk capital		Amount of co-financing available	
	Comprehensive development of firms			
Other fields of regional development	Number of new jobs created	Costs per one job	Retention rate	Conformity of incubator mission and strategy with development priorities
	Quality of new jobs	Tax recoverability	Graduation rate	Character of incubated firms
	Share of jobs/staff by local people	Costs per graduate		
	Technology transfer	Costs per incubated firm		
	Tax revenues			
	Contribution to GDP			
	Multiplication effects on new jobs and turnover			
	Contribution to community development			
	Replication of the model			

Table 4.9-3: Performance of a Business Incubator

Incubator Performance	Quantitative characteristics	Financial efficiency	Quality	Sustainability
Technical facilities	Incubator space	Investment costs (per sq meter)	Satisfaction with technical facilities	Level of demand for tenancy
	Number of incubation units	Investment costs per incubation unit	Flexibility of space	
	Occupancy rate			
	Length of incubation process			
	Duration of establishing company			
Services offered	Scope of offered services	Running costs of incubator	Satisfaction of clients	Level of demand for services
	Number of provided consultations	Cost level of offered services	Proportion of incubator staff to incubated firms	Planned utilization of services
	Capacity building Trainings and other tasks		Quality of incubator staff	Interest in new services
	Human resource Incubator staff or other networks contributions , skills, finances, etc		Enhancement of skills	Incubator/university market links, collaborations and interactions
	Workforce Competencies/ Performance of incubator staff		Usefulness of services	
Financing and stakeholder relationships of incubator	Rate of the rent	Financial leverage		Breakeven point
	Price level of offered services			Surplus of revenues (cash flow)
	Other revenue sources / stakeholders			Financial coverage of services
				Participatory culture

Source: Author and Klimova, (2009)

5. Conclusion and Recommendations

In conclusion, the paper outlined the guiding principles of business incubation services and conceptual feasibility model based on open innovation paradigm approach. Complete feasibility analysis for specific incubators and implementation can be developed based on specific site, building, business plan and budget. Business incubators need strong government support, strong management teams, consensus on objectives (SMART), private sector involvement, clear understanding of constraints and realistic expectations. There is an urgent need for approved and operational public-private partnership policy framework that will see among other activities fostering innovations and entrepreneurship. In this respect, adoption and implementation of open innovation incubation approach could lower the costs of traditional single incubators and raise synergies.

The assumptions underpinning the proposed concept of open innovation business incubation model are:

- It is assumed that all the partners will play their roles, adjust to open networking and synergistic culture, and keep committed to the goals of the program.
- Infrastructure facilities: The government as the facilitator of industrial growth should expand and constantly upgrade the infrastructure facilities, preferably at regional level and thereby bridge the disparity in infrastructure facilities between the rural and urban areas
- The incubation process will not only target in-house incubating tenants but also virtual incubating firms. This is aiming at reducing costs and reaching out to many potential firms that need incubation facilities and services.

The principal lesson learnt from global strategies (i.e. American, European and Asian strategies) was the pre-eminent role played by the local private sector and home grown public sector interventions including developing science or business parks. This strategy has been successful in most countries worldwide. Government can therefore adopt and encourage the PPP open innovation incubation model, establish an innovation and industrialization Fund for facilitating development of business incubation centers and other related innovation programs.

Furthermore, it should support incubators in addressing the entrepreneurial culture, advance developing of business plans and finally construct and facilitate the incubation centers. As a consequence, clustering behavior shall be encouraged through a common set of objectives, such as asset utilization, user satisfaction, marketing, etc. It emerged that successful implementation depends on approaches, monitoring and evaluation of business incubators as very important for the quality of provided services, effectiveness and efficiency in achieving their defined objectives and sustainability is a continuous process, a goal that takes time and needs commitment.

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PART III

CHAPTER FIVE: DISCUSSIONS

5.1 Introduction

The study was undertaken to examine stimulating industrial development in Uganda through open innovation business incubators in collaboration with other innovation actors in the Ugandan context. The papers presented in the previous chapter explored the background, literature review, challenges, case studies and operational constraints. Recommendations and conclusions were drawn. The purpose of this chapter is to present the general discussions.

This thesis has indicated a wide range of issues that are related to the desired structural transformation of the Ugandan economy towards industrialization processes. 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 supportive 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. The need to transform Uganda's economy through science, technology and innovation as well as private sector-led remains central in development plans. This section discusses the main findings that emerged from the study.

5.1.1 Long Term Strategy for Structural Transformation and Manufacturing

Analysis of public policies that support science, technology and innovation as well as industrialization indicated that government had for long targeted mainly foreign direct

investors without giving opportunities to potential local indigenous or youth entrepreneurs. As a result these groups were least likely to create sustainable businesses and expand employment potential. Structural policy actions to support local entrepreneurs and major improvements in institutional management, supporting business, technical and vocational educational training (BTVET) and apprenticeships can produce significant payoffs. On the positive side recent policies and plans are targeting all groups, the youth, women and disadvantaged people in associations and cooperative societies (National Development Plan). Archibugi and Michie, (1997) also pointed out that governments should consider high level interventions in the following policy actions: Improved education access to promote an adequately trained workforce;

- Creation of opportunities for local technical change and network of infrastructures;
- Effective accessible and affordable extension services;
- Agro-processing to add value to agro-produce;
- Technical training to improve technological innovation and;
- Provision of investment incentives and creation of economic ties among countries.

Based on the above policy interventions as lessons drawn, higher productivity, entrepreneurship would be realized as well as promoting industrial development. There is therefore a dire need to focus on taking action on the agreed policy and strategic frameworks towards entrepreneurship and private sector development targeting not only agriculture but also manufacturing sector (structural transformation – i.e., the re-allocation of resources across the broad economic sectors, agriculture, manufacturing, and services – is a prominent feature of economic development). Research findings indicate that early stage businesses have to be provided access to good infrastructure, management and knowledge support, all within the environment of access to finance and support institutions. The government, which is now promoting universities in fostering research and entrepreneurial activities, needs to keep committed to the triple helix and incubation models as long term strategy for promoting synergy and maximize service delivery. With a number of capacity building support programmes and initiatives in the country, many people and households are diversifying their income-generating activities into non-farm activities (target is each household, Uganda shillings 20 Million per annum), with a focus on local and regional markets and job creation. The household diversification into non-farm activities i.e. informal businesses, trade and manufacturing mainly fabrications and agro-processing is helping in raising their household incomes (Bakeine, 2009).

These initiatives and many more will need further subsidized infrastructure support facilities such as business incubators, business and industrial parks. Taken together, the interactions and knowledge accumulated demonstrates that there are opportunities for industrial development. Real economic activity is projected to increase more strongly with positive contributions from both domestic demand and net exports (BOU, 2012).

5.1.2 Improving Institutional Support Systems to Entrepreneurs

The study in Paper II on support institutions, discussed a number of institutions and programmes in place to support clusters and enterprise development as well as their challenges. In addition to infrastructure development and human resource development, all the industrialized countries developed functional and coordinated institutions for generating new industrial knowledge and information. These are public or quasi-public institutions (universities, government research institutes,) and public-private commercial institutions. All these are complements to industrial firms (Archibugi and Michie, 1997). Uganda government has tried to address issues of infrastructural institutions, management and organization by developing science and management capabilities (for example, establishing and supporting Universities and other public skills development institutions that introduced public and business administration, management and organization courses at all levels in order to address decision making skills, financial literacy skills, negotiation skills and presentation/ communication skills). However, the major challenge found out was the lack of institutional coordination or collaboration among key institutions and agencies. It is therefore important to review the range of government SMEs and industry assistance programmes to reduce duplication and improve effectiveness.

In terms of improving competitiveness and promoting Private Sector Development as well as Research and Technical Development, the study recognized efforts by the government to invest in infrastructure development such as improving road transport infrastructure, energy infrastructure by ensuring increased energy generation, supply and access in the country, and promotion of Information and Communication Technology infrastructure. What is still missing is the efficient appraisal and regular funding for research and product development, innovation and industrial projects.

The study further recognized the revival of Uganda Development Corporation (UDC) as an investment arm of government, which can also support innovative projects through equity mechanism. Just like in Sweden, there are companies, which after incubation phase receive some public funding during their expansion phase through holding companies and initiatives with private/public partnerships. The same can be arranged in Uganda through UDC. In terms of Human Capital Development, the government liberalized the education sector. However, Government continues to invest in a range of educational establishments including universities, secondary and primary education schools as well as business, technical, vocational education and training institutions. The study however recommends hands-on training and guided career preparation and provision of an innovative environment as pointed out by Amabile, (1996). This will go hand in hand with creation of appropriate entrepreneurial climate and mind set change in the region and within ministries, agencies, and universities.

Another concept that has been piloted in industries, which can be incorporated in the open innovation business incubation system, is Cleaner Production. Cleaner Production (CP) has been defined as the continuous application of an integrated preventative environmental strategy to processes, products and services to increase eco-efficiency

and reduce risks to human and environment (UNEP, 2002). UNEP (2002) further pointed out that CP helps industries to cut down on raw material costs, production costs as well as waste treatment costs and can make industries to achieve sustainable development. From the lessons learned for successful execution of Triple Helix model, government support is paramount, and without universities, business incubators and entrepreneurship education will not be possible.

5.1.3 Supporting Science, Technology, Innovation (STI) and Clusters for Development

The study in paper II, III and IV recognized the importance of the evolving concepts, clusters, science, technology and innovation (STI) as well as data (indicators) in the development of nations. In addition, while most of these concepts are still at early stages of development in Uganda, they have increasingly gained acceptance at a policy, academic and industrial operational level. The STI Indicators approach is useful for identifying the linkages and outcomes of STI activities, which can then be used analytically to shed light on the impacts. However, from statistics we can deduce that there is little linkage between industry and other public research sectors i.e. government agencies and higher institutions. The study identified that there was minimal coordination at operational level and strategic interconnection between and within institutions including the existing business incubators. Lack of coordination and collaboration in institutions and firms affect efficiency, innovativeness and competitiveness. As a result, there is an absence of effective innovation system in Uganda. Enhancing the operation of the national innovation system is the major route for increasing the creativity of firms and trans-disciplinary knowledge production as emphasized by Gibbons et al. (1994) and Etzkowitz, (2003) with the “triple helix model” of university-industry-government relations. Therefore more efforts should be made to promote linkages among knowledge generation and productive institutions (triple helix actors’ interactions) in Uganda.

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. Although according to the survey, Uganda’s competitiveness in science, technology and innovation (STI) is relatively better among other countries in the East African region (AU-NEPAD, 2010). But it is still lagging behind in industrial development. The problems among others stem from lack of innovation infrastructures, the weaknesses in the collaboration and partnerships within the triple helix actors, training of STI and entrepreneurship human capacity and inadequate resources, which are the principle significant factors for promoting innovation and industrial development.

The process of clustering in SMEs (innovative clusters) is in its earliest stages of development and represents an initial step in affirmation and stimulation of networking between economic actors. The study (Paper III) found out that there is potential for emerging innovative clusters to promote innovations and SMEs competitiveness and growth, if the support for collaboration and maintenance under the Presidential initiative for researchers and scientists, development partners and government ministries/agencies is maintained. The argument is confirmed by the Sida evaluation report on

Innovation systems and Cluster initiatives (Sida, 2012). Universities such as Makerere have started reaching out to industry and communities (Turyagyenda, 2004), cluster firms and industry are beginning to get closer to universities, and the government encourages the interplay by providing the policy environment and some financing. As the interactions intensify, entrepreneurial capacity and generation of enterprise formation will rise. Since cluster initiatives and other value addition programmes such as OVOP are spreading across the country and can lead to enterprise start-ups, the research recognizes the need for local governments and / or municipalities together with universities to get involved in the triple helix activities and support the formation of business incubators within municipality areas to facilitate commercialization of ideas from clusters as indicated in paper VII. This interaction will promote the growth of regional innovation systems and there will be a difference in the future STI indicator trends as well as enterprise formation. This argument is supported and emphasized by Etzkowitz and Leydesdorff, (2000), and Leydesdorff, (2001).

This thesis recommends the regular and systematic collection of STI data and development of STI indicators, especially indicators of impacts. Further action and significant support is necessary for the improvement of indicators measuring knowledge flows, quality of STI statistics and support to clusters to ensure that the businesses become more successful.

5.1.4 Establishment of a Contestable Funding Mechanism

Recognizing that industrialization to happen requires;

- An environment that promotes and fosters innovation; input resources including scientific and technological expertise,
- Investment capital and narrowing the digital divide through acquisition of information and communication technologies (ICTs).

There is need to promote the diffusion of newly acquired or developed or adapted technologies among the relevant stakeholder constituencies (scientists, engineers and entrepreneurs in academic institutions and universities as well as private sector).

This therefore demands for establishment of a contestable innovation and industrialization fund. Innovation creates jobs in the development, manufacturing, marketing and distribution of new and better products and services. The proposed fund would be underpinned by a coordinated strategy, overseen by a gazetted body like UNCST or UDC for either institutional funding or contestable (project based competition) funding. The fund would be open to applications from publicly funded research agencies, universities, industry, individuals or other non-public sector research organizations as partners based on agreed government objectives and outcomes. An innovation and industrialization fund is purposely meant for promotion of innovation-related activities in the country, including offering support to development of technology-intensive enterprises in the country. It can offer the scientists and researchers relevant support for their research work and to assist innovative ventures in the small and medium scale sector, having good scope for commercialization but having characteristics of high

risks and high gains. Different countries have different funding framework systems like VINNOVA in Sweden, the TORCH program in China, etc.

Establishment of incubation centers at UIRI, Makerere University (Makerere University Food technology incubation centre and ICT), and the Presidential Initiatives including the Innovative Systems and Clusters Development programme and the Africa Institute for Strategic Animal Resources Services and Development (AFRISA) indicates that implementation with commitment can make an impact on innovation and entrepreneurship. There is a need for synergies between the public and private sectors to maintain the support for these initiatives. Adopting more tools and other innovative projects will enhance transformation of ideas into businesses and improve products' commercialization process across the country. Some of the innovative products to be commercialized include; New Castle Vaccine developed and incubated under UIRI, the milk booster (The milk booster is a new innovation by Makerere researcher involving the use of sugar cane industrial waste of molasses mixed with other ingredients like maize bran, cotton seed cake, urea, mineral salts and lime.), engine driven centrifugal pumps for irrigation designed by Makerere, and many more under the clusters program. All the funds spent on these innovative projects can be pooled together under an Innovation and Industrialization Fund framework for incubators' continuity and sustainability.

The fund can also help in creating the ability of innovative SMEs to generate socio-economic benefits, value addition to indigenous raw material and employment generation. The fund can be utilized by incubators to provide cost effective business development services and well-managed workspaces, which are necessary for innovation and scientifically proven research and spin-off technologies from laboratories to industries.

The objectives of the fund can be:

- (i) To enhance applied research and technology development capacity among scientists, engineers and entrepreneurs in academic institutions and universities as well as private sector through commercializing their results;
- (ii) To contribute in development of the Science or business parks where incubators can be located. New firms emerging from the incubators can remain in the same science or business park;
- (iii) To facilitate and conduct various informational services relating to entrepreneurship development among innovators;
- (iv) To provide key stakeholders with funds to acquire significant research infrastructure that will enable partnerships with the private sector to support business innovation;
- (v) To facilitate the incubators, actualization of the industrialization thrusts and to foster an increased application of science and technology in economic activities.

5.1.5 Improving Incubation processes and Structures

The “open innovation” approach or model is spreading worldwide. Currently USA, Canada, Europe and Asia is being touted as a superior path for firms or organizations to achieve long-term success in today's fast moving market environment and scarce re-

sources contexts. Organizations including business incubators have adopted the model and are realising significant achievements although with some limitations (DeCleyne et al., 2013; Shaherose, 2013). The Document Services Valley Open Innovation Center at Maastricht University, the Netherlands, supports existing and new entrepreneurs – large and small – with the development of new services concepts in an open innovation environment (Document Services Valley, 2013).

There are some lessons to learn from Sweden that include but not limited to the following: There is tough selection process (based on broader selection criteria critically the business idea, persons behind and business benefits) for clients to be admitted into incubators. They all have business developers with varying roles (coaches, consultants, etc) that are attached to different incubatee companies depending on the numbers. Incubators use external resources and advisors in their business offering services. Incubators organize seminars, one-on-one meetings, workshops as well as mentoring and networking programs as methods of transferring know-how. There is relatively good access to seed funding and private capital via business angels and venture capital companies as well. Potential incubatees come from different sources - industry, academia, etc. All the incubatees interviewed indicated satisfaction of the incubation services provided. The incubators have a clear picture of their processes and how they have developed over time. They adopt different models and tools including open innovation that target different aspects of the entrepreneurial journey for their success as pointed out by Minc incubator manager in Malmo (<http://www.minc.se>). All incubators interviewed have universities or organizations/ foundation bodies that prepare students or potential entrepreneurs with their ideas (pre-incubation) before they are admitted into incubation process. Their success is attributed to the strong collaboration and interactions between the universities, industry and government and operating in an open innovation environment. All the four incubators are at maturity stage, with management team competencies, knowledge and formal networks and pool of advisors while Ugandan and Tanzanian incubators are at development stage and managers strive to meet the operational requirements.

Consequently, the incubators play a vital role in helping innovative start-up companies in the process of gaining a foothold in the market. It is also essential that these companies develop corporate concepts that are of such quality and show such potential that they can obtain private funding at later stages. However, funding has to come from public sources in the early stages because access to private seed capital is limited. Similarly, the incubators depend on a great influx of innovative concepts, (inter)personal capabilities or team skills, driven by dynamic entrepreneurs, so that they can select the concepts that show most potential and good marketing prospects. Based on the analysis, the incubators ability to perform and deliver services efficiently depends on the relationships with different actors and their functions, as well as the experience and skills of the incubator (Aaboen 2008). This relates to research question 1 and addressing objective (iii) and (iv).

As mentioned above, the scope of services or activities incubators/organizations offers (undertakes) influences their performances and is closely linked to the environment in which they operate and management practices (Amabile, 1996). Management usually determines the organizational context characteristics (Sun and Wang, 2008). In this context, Ugandan incubators need to learn from these experiences and implement the appropriate models to collaborate on an open innovation perspective, treat other participating organizations as potential partners (mutual trust) and operate in an efficient and transparent manner following fundamental principles and best practices as outlined by Lalkaka and Abetti, (1999). It is observed that the incubator is not simply a shared space, it is also a network of individuals including staff (counsellors), advisory board, professionals, universities, venture capitalists or financing institutions, government agencies, policies and the communities around that provide incubator and incubatee support. Therefore, Uganda incubators will further need to adapt best practices and governance structures that will promote effective business models in a dynamic environment and with a triple helix model. If the national innovation system is going to be successful, it also has to contain these elements. The incubated companies may seek for loans or get support by public funding during their expansion phase through holding companies such as UDC and PSFU competitiveness initiatives with public-private partnerships may relocate to business/industrial parks.

The study recognized also potential for virtual incubators and acceleration programmes as incubator activities in Uganda, although incubatees under these arrangements miss interactions and exchange of knowledge between peers and other entrepreneurs. Specific programs for coaching and mentoring, workshops for meeting opportunities may be arranged to access the entrepreneurial network.

In summary, successful business incubators operate as a business, have a positive impact on a community, have an effective board of directors, provide a nurturing environment, hands-on assistance and a variety of services for start-up and fledgling firms during their most vulnerable years.

5.1.6 Promotion of Strong Collaborations and Partnerships

Adoption of newly developed technologies, knowledge, collaborations and partnerships can significantly facilitate the transfer of scientific knowledge in the development of firms and tangible products and processes as well as services that can be of great value to the economy and society in general including industrial incubators as confirmed by Clausen and Rasmussen, (2011). 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. Already, some sectors such as health, energy generation, education and services sector are implementing co-investment projects based on PPP even without a law in place. As Akintoye et al., (2003) pointed out PPP investment enhances legitimacy both by increasing participation of the actors most familiar with the problems and priority targets and by increasing the efficiency in service delivery. The benefits derived from collaboration and partnerships are diverse. Essential components for successful collaborations and partnerships to focus on are trust, cooperation and

mutual benefit. The PPP principle has been promoted worldwide as a good alternative to funding of expensive and long-term undertakings, including industrial parks. The PPP law will guide the procurement, development, implementation and monitoring of structural development programs. This will help in creating sustainable investments, reduction in waste of scarce resources, delivery of effective services, employment and thrust of the growth processes.

The reported slow progress and performance in the case of the Presidential Initiative on Banana Industrial Development (PIBID) project is due to poor collaboration and coordination (not involving key stakeholders in planning, designing and implementation stages). It has not benefited from the synergies that exist among the stakeholders (Monitor, 2013). Key lessons can be learnt from the development project of NetPort-Karlshamn experience where the triple helix model of three institutional bodies, university, industry and government are increasingly working together (Henningsson and Trojer, 2004). Henningsson and Trojer, (2004) pointed out that the Swedish government and Karlshamn municipality have provided the infrastructure and other policy resources and work closely with the businesses and university through collaboration and partnership. It is among the triple helix model success stories.

Furthermore, in Sweden, start-up business growth is based on many business developers (such as consultants, coaches, venture capitalists, etc) with varying roles, new approaches and deep commitment to the companies, which are still lacking in Ugandan and Tanzania practices. Increasingly though, the private sector and non-government organizations have been encouraged to become more involved in social and infrastructural investments in Uganda. The non-state actors have shown interest and are even more involved in policy formulation and determining policy priorities. Private sector involvement can be secured through participation in the boards that supervise the agencies or institutions. Business incubation can also adopt the PPP arrangements as well as open innovation approach, which has proved applicable in promoting innovation, commercialization of research findings and entrepreneurship (Gouveia et al., 2010; DeCleyne et al., 2013).

Application of innovative measures and new approaches discussed already will help to re-orient and support existing enterprises and start-ups' growth and business incubators as well. These measures are aimed at in particular to promote private sector investment, increase job creation value creation forms and customer development models. This confirms the argument by the author that open innovation business incubator practices linked up in a cluster based business approach can stimulate such achievements to occur. The incubators act as innovation intermediaries that essentially match ideas, entrepreneurs, resources and technology to enable innovations in other organizations, sometimes at a cost. Laursen and Salter (2005) also confirmed that firms, which have open search strategies - those which search widely and deeply - tend to be more innovative. Evidence has shown that supported collaboration of government, academia and industry facilitates innovation and creative development while providing balance between knowledge, social benefit and profit motivations (Leydesdorff, 2005).

Training more local entrepreneurs in more competitiveness and entrepreneurship techniques and within an open innovation environment, they can be in position not only to manage their businesses but also to transfer associated specialized equipment (technology) and skills from firms within the region and those based in the advanced industrial economies. They can also stimulate and organize joint ventures in the country and within the region, as Jin Cho (2009) noted. Chien, (2007) and Wang and 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). It is in this context that the concept of national systems of innovations elaborated in paper six assumes such great importance.

5.1.7 Adopting New Management Principles and Methodologies

Monitoring and evaluation contributes to institutional strengthening. UN Millennium Project (2005) argues that accountable and efficient public administration requires transparency and administrators, who are qualified, motivated, and adequately facilitated. It also requires efficient management systems to disburse and track large investments, and monitoring and evaluation systems. Additionally, according to Blank (2007) finding customers is more important than building technology (Customer Development Model). The model is built on the idea that moves learning about customers and their problems as early in the development process as possible. Another concept that has gained traction within business model innovation is the Business Model Canvas that describes a way of developing business models based upon nine building blocks such as value proposition, customer segments and revenue streams (Osterwalder and Pigneur, (2010). Getting feedback through monitoring, evaluation and new methodologies from the customers/stakeholders will help to build and refine a product or service that solves their problems. Monitoring and evaluation based on quantitative assessment criteria, clear performance indicative targets based on refined input-output performance measures and benchmarks are very important and essential in order to minimize the possibility of implementation failure (improve the operations and outcomes of business incubators anywhere) (Cheng and Schaeffer, 2011).

Effective management of business incubators requires effective performance measurement. The way in which an incubation programme is designed, the quality of its management, and the nature of the participant firms, will all affect the likelihood of eventual success (Irene et al, 2009). Paper VIII responding to objective number four presents an appropriate incubator model and a performance measurement framework with detailed indicators that can be useful in monitoring and measuring performance of incubator institutions. It is built from the existing methods, based on the feedback and ideas from experts. With limited financial resources provided by the government towards science and technology development strategy, these characteristics as well as their potential synergy with an open innovation and PPP framework arrangement

in Uganda will make the methodologies suitable for incubation and on a sustainable growth path.

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. Improvements in the dimensions and challenges mentioned in this summary discussion are crucial given the aspirations of Uganda Government as an export-oriented, middle-income, industrialized economy within the next 20 years. It will need strong collaboration and partnerships between the public sector, private sector and civil society actors (i.e. the government, academia and the industry).

5.2 Research Contributions

This thesis has contributed to the incubation literature, integrating with the other bodies of knowledge such as cluster theory, innovation systems, open innovation, public private partnerships and entrepreneurship both empirically and conceptually. The papers included in this thesis discussed the institutional support systems, piloted models and comprehensive understanding of incubation processes in context and broadly. Specifically to policy makers, practitioners and researchers are:

- Developing an open innovation based business incubation model that will guide policy makers and practitioners in incubation activities as well as industrial development processes and advancement of clustering of SMEs approaches in Uganda and low-income countries is a main contribution by this research. By applying an open innovation approach and business model concept/canvas (applications and conceptual tools), business incubators can enter into innovative partnerships with service providers and launch incubator networks to enable faster and lower cost sharing of knowledge, skills and resources in incubation process. The model (to be tested) can be used to improve the existing business incubators for the purposes of creating more enterprises and attracting more talents.
- The systematic collection of STI data and development of primary STI indicators as well as the institutional framework (UBOS, UNCST and MTIC) in Uganda gave the initial baseline data and developed indicators that can be updated periodically for information and country comparison purposes. It provided a step forward towards a systemic approach to measure STI and evidence based policy making processes for policy-makers and analysts.
- Initiating “One Village One Product (OVOP)” Programme in Uganda using the virtual business incubator model based on open collaboration that is well under implementation was a contribution towards this research as well. It is providing a demonstration of using business incubation process (learning by doing) utilizing local resources and developing the practice of local innovation system (national/local government, industry and academia) and social entrepreneurship. Although innovation plays a key role in our considerations, business incubators are not exclusively devoted to high-tech and innovative enterprises.
- Contribution to the current body of knowledge, literature and thorough understanding of innovation systems, open innovation business incubation concept and processes especially best practices suited to the Ugandan situation and low income countries. In addition, fully academic researched knowledge on the entire incubation system will inform policy makers and incubation practitioners’ implementation gaps not only in Uganda, but also regionally.

CHAPTER SIX: CONCLUSIONS, RECOMMENDATIONS AND FUTURE RESEARCH

6.1 Conclusions

The study illustrates the adaptability of Business Incubation Systems in stimulating industrial development in Ugandan context and presents a feasibility concept of the suitable appropriate model for consideration in Uganda. The long term goal is to transform MSMEs into viable business entities that will not only create employment but also contribute sustainably to value addition, income generation and export growth in the region. The targeted sectors include: light manufacturing and assembly, food processing, bio-innovations, service-based, ICT services and software development, and R&D activities. These efforts will facilitate inculcating the culture of entrepreneurship in rural areas, the private sector, universities and tertiary institutions' graduates. Hence, stimulating industrialization process in Uganda. Business incubators are necessary but not sufficient conditions for industrialization. The findings support the argument that a combination of factors and outcomes are necessary for achieving the required goals. The study confirmed that entrepreneur spirit, resource-based capability and competitive attitude are critical determinants of a start-up's viability and achievements. It is recognized that under different contexts combined with the diversity of available resources, it is challenging to identify consistent and uniform benefits arising from incubation processes. Based on their associative positive impacts as has been usually measured business incubators can be enablers and catalysts for industrialization process. As the concept of business incubation in the country continues to grow and

the numbers of incubatees increasing (for example at UIRI, 39 incubatees both in house and virtual as of 2012), they should not be viewed as stand-alone government entities, but can work alongside other organizations/ institutions, private - sector and schemes to promote broader strategies including industrial clusters and innovation (networks). There are many challenges but yet opportunities for growth based upon the findings. As confirmed by Bergek and Norrman,(2008), Gouveia et al., (2010), DeCleyne et al., (2013) and the study, more results can be achieved if the existing Ugandan incubators operate as a network based on open innovation model that will foster interactions and open collaboration between various stakeholders. Hence, implementation should utilize all sources of knowledge and resources from within and / or without, public- private sector partnership, acknowledging that all stakeholders-governments, researchers, entrepreneurs, investors, NGOs and civil society have important roles to play.

More importantly, relationships with external partners such as universities and other tertiary institutions, government and private labs, civil society and individual entrepreneurs and consultants/experts can bring ideas, resources and emerging technologies in Ugandan incubators. These are consistent with the theory of an open innovation approach and can play a significant role in the transformation and growth of incubation industry in Uganda and within the region.

Overall, the findings suggest that an approach to industrial development in a developing country like Uganda needs an active role by the State. This has been confirmed by the pronouncements of H.E the President of Uganda that Government is committed to undertake reforms that will create a more attractive business environment for private sector investment. These reforms include human resource development, power sector reforms, infrastructure development (roads, railway line network, water distribution, mineral resources extraction, markets construction as well as industrial parks) and science and technological advances. These reforms, if complemented with business incubators, a culture of entrepreneurship will be created, innovation stimulated and cost of starting business reduced.

The research concludes that adoption of an open innovation approach can clearly enable fostering incubation and innovation systems as well as entrepreneurship development programs. Through public-private partnerships and open innovation practices integrated into incubation systems, industrial development transformation activities can be greatly enhanced. Finally the new open innovation incubation model, the principles and performance monitoring guidelines will guide future interventions in Uganda's efforts to promote incubation activities.

6.2 Recommendations

This study has pointed out various elements of value creation of incubators. It suggests and recommends specific measures to incubation managers and practitioners, researchers and policy implications related to the discussed priorities as summarized below;

- (1) Formation of a national business incubation network or association. A national incubator network accelerates the nurturing of more diverse concepts, approaches and forms of innovation (social as well as technological) that allow economies or societies to respond to uncertainties and surprises arising from the complex interacting of the innovation systems
- (2) Incubators should act as entrepreneurship and technological information hubs and consider themselves as service providers. The incubators should further be important partners with the youth entrepreneurship programs that should act as the pre-incubator phase in the incubation process.
- (3) Incubators should adopt up-gradation and proven reform processes/best practices that will promote innovation, SMEs development and private sector growth (tools such as Business Model Canvas framework, the Needs, Approach, Benefits and Competition (NABC) method, licensing businesses, the business definition/mandate, financial management, growth, marketing/communications, organizational management, technology, risk and service delivery) and focus on the implementation time frame for the actions discussed to support the process of innovation.
- (4) Government should encourage involvement of all relevant actors in the process of development of business incubators including existing big companies in operations and exchanging experiences. Collaboration enhances interaction between entrepreneurs and universities/research institutions to train fundamentals of innovation and entrepreneurship and strengthen clustering of SMEs.
- (5) Develop and strengthen policies, plans and strategies oriented towards intellectual assets, standards and quality assurance to meet international standards and easy access to data, cleaner production practices and construction of business and industrial parks. The government needs to formally set up a National Cleaner Production Center (NCPC), build capacity for adoption and propagation of cleaner production technologies, promotion of investments in implementing CP measures and persuading indigenous research and development in CP.
- (6) Establishment and implementation of STI funding mechanism. The government should establish an Innovation and Industrialization Fund and Directorate of MSMEs designed in particular to support MSMEs in innovation and in research and development, as well as institutions with potential projects. The fund will support incubators and help in creating the ability of MSMEs to generate socioeconomic benefits, value addition to indigenous raw materials, employment generation and supporting rural industrialization.
- (7) Facilitate and promote value creating interactions between universities, industry and public supporting institutions. Through a pro-active strategy of innovation and learning which includes (i) linking and collaborating with external partners and sources of technology and knowledge, (ii) identify and leveraging the external technology and knowledge and (iii) training of senior incubator managers or leadership to support open innovation incubation, adapt, use and improve the acquired knowledge and technology and build internal skills to leverage open innovation.
- (8) Progress with implementation should be monitored through monitoring and evaluation tools with clear performance indicative targets (metrics) and structural benchmarks (SBs) and create platforms to share the necessary knowledge and information.

Looking across different dimensions, the good practice shall be providing physical incubators, virtual incubators and other incubator activities. Business incubators and

clusters are important for the provision of business development services, knowledge and information sharing and thus pivotal wheels to industrialization and competitiveness.

6.3 Future Research

This study was the first attempt to examine the performance, impact and effectiveness of business incubators in Uganda and in comparison with other countries. It contains obvious limitations such as limited data from incubatees. The open innovation business incubation model has been designed as a modified conceptual model of an efficient incubation management and processes to increase the survivability of innovative business formations as well as sustainability of incubators. The open innovation paradigm approach is identified because of its contribution in a number of ways. Implementation of open innovation depends on the premise of innovation intermediaries that help firms and organizations to save time and transactions considerably. In addition to an open innovation paradigm approach, application of the business model canvas in the incubation processes of firm formation brings in another dimension of hands-on approach. It is interesting to understand their effect, how they perform and are managed in the existing institutions including in virtual incubators.

Therefore the areas in which future research needs to be done include;

- a) Testing the proposed model and evaluation of incubators particular business development promotional techniques with a special attention on their internal characteristics, their knowledge and possible application of open innovation and business model canvas as approaches to incubation processes, innovation and successful startup development.
- b) Observing and analyzing these approaches in practice at various incubators to deduct final prepositions about their efficiency in low-income economies like Uganda. Application of the monitoring and evaluation model promises a long-term valuable contribution for the entrepreneurs and incubators program.
- c) Participating in the development of SMEs mixed- use business incubator in Kampala and applying tools for assessing the performance and management of already established business incubators in Uganda as well as improving the generation of quality data and STI indicators.
- d) Research and Integration of strategic elements that ensure sustainability of the industrial development in Uganda such as cleaner production practices in the business incubation concept to support sector specific product value chains
- e) Developing policy guidelines to establish the Innovation and Industrialization Fund to facilitate the technological innovations, incubators and industrial projects in the country.

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