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1. Subtheme: S1.1 History and conditions for success

2. Title: Towards Overcoming the Innovation Chasm in Botswana: Some Strategic National and Institutional Interventions

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4. Keywords: Innovation, Chasm, Policy, technology, intellectual property, partnerships

5.1 Introduction

Favorable descriptors such as “good governance”, “Africa’s miracle”, “Africa’s beacon of democracy”, “leading diamond producer”, “a stable socio-political and economic climate” are likely to come up in any discourse on Botswana and should bode well for innovation. Paradoxically, descriptors such as “venture capital”, “intellectual assets”, “angel investors”, “serial entrepreneurs”, “bio-entrepreneurs”, “intellectual capital management”, “patent attorneys”, “corporate research and development capacity” are unlikely to be mentioned indicative of the reality of Botswana’s national innovation credentials when measured against contemporary innovation norms. Though not exhaustive, both sets of descriptors when viewed as a collective, arguably paint an enabling environment for innovation to thrive. To a certain degree, the picture depicted by the first set of descriptors above may have contributed towards entrenching a deep-seated innovation chasm in Botswana, suggesting that conventional innovation enhancing paradigms such as the triple helix model may not, after all be the way to entrench and reap fruits of innovation in Botswana. This may be largely attributed to certain contextual realities in the country. By developing world standards, Botswana stands poles apart as a very prosperous middle-income country as can be deciphered from its GDP performance spanning the period 1980 to 2006 as shown in **Figure 1**. Much of her prosperity may be attributed to her endowment with enormous natural resources such as diamonds and other minerals, but more importantly, to a commonly acknowledged sustained and astute culture of

good governance and the equitable management of her natural resources by successive governments. The mining sector for example, accounts for about one-third of GDP, 90 percent of export earnings and more than 45 percent of government revenue (AfDB/OECD, 2006).

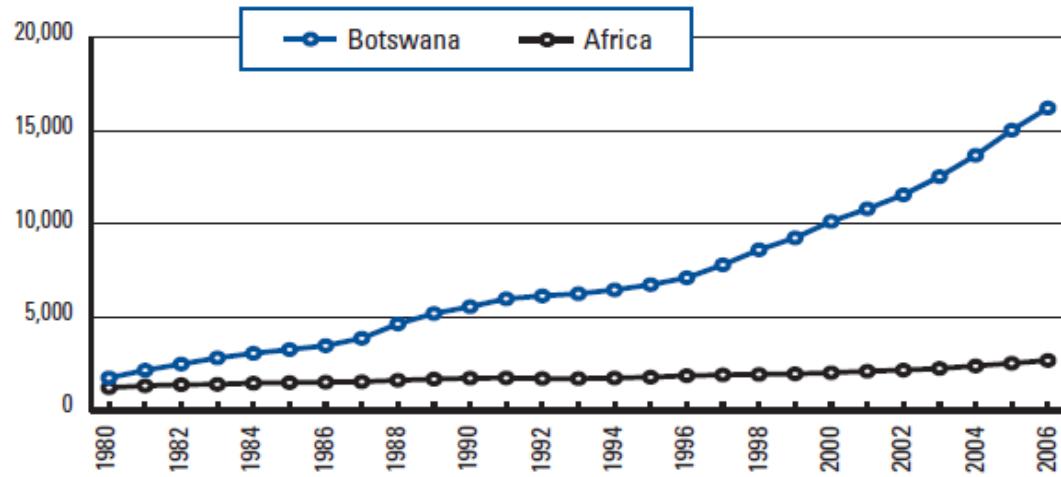


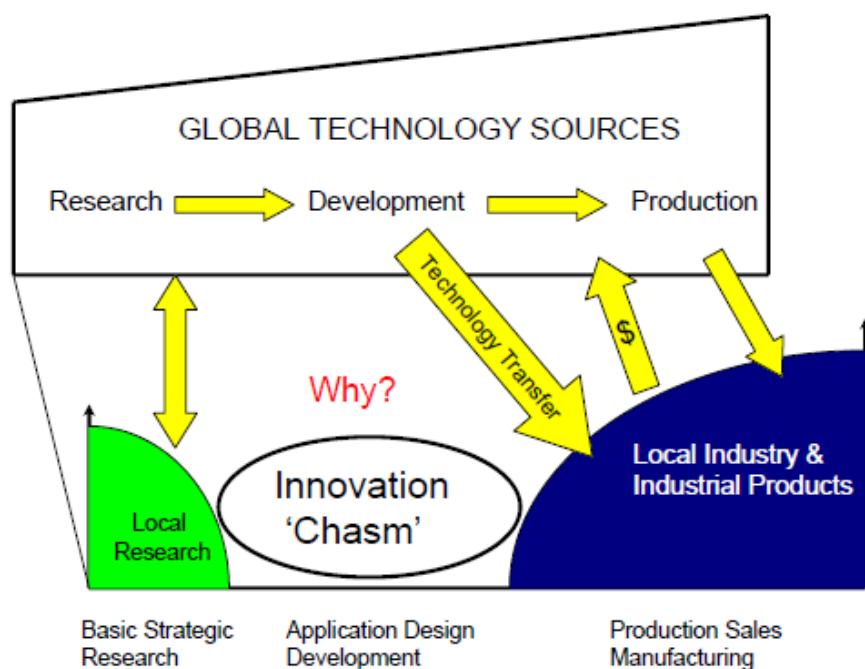
Figure 1. GDP (PPP US\$) per capita, 1980-2006 (Source: AfDB/OECD, 2006)

However, Botswana's economic growth took a severe hit from the impact of the global recession on the mining sector and the high returns from high economic growth based largely on mining activities are not projected to be sustainable in the long term beyond 2016 (BOTA, 2010). Recognizing that future growth rates depend on the improved performance of other strategic sectors, the Government of Botswana embarked on a strategy for economic diversification, and to support the improvement in performance of other strategic areas including agriculture, transport, education, health and innovation (BOTA, 2010). In particular, innovation appears to be top of the government's strategic agenda in realizing her aspirations towards economic diversification, with the government having set itself the impressive goal of developing an "innovative and prosperous nation" as stated in its Vision 2016, Botswana's blueprint for socio-economic development (Mellalieu, 2006). This paper is an attempt to provide a comment on the national innovation system in Botswana and to appraise some national and institutional interventions that have been put in place in attempts to ameliorate the innovation chasm in Botswana. The paper further explores, whether, the triple helix concept of innovation is the best approach to overcome the innovation chasm in Botswana, given Botswana's uniqueness in a number of areas relevant to stimulating innovation.

5.2 State of the Art

The rate of technological progress is one of the important factors that determine the ability of a nation's industry to open new markets and to develop new products and services that command high prices in domestic and international markets (Porter, 1998). A lot of competitive countries have been able to use this model to create jobs that support high wages and not merely the creation of employment of citizens at low wages (Byat et al., 2009). It is generally accepted that innovation plays a critical part towards technological progress. Various definitions for innovation have been proffered. DTI (2003) defines innovation as the successful exploitation of new ideas, often involving new technologies or technological applications. In broad terms, innovation represents the process by which ideas for new or improved

products, processes or services are developed and commercialized in the market place, and involves a series of scientific, technological, organizational, financial and commercial activities (Comins, 2008). DTI (2003) suggests three reasons why innovation is important for UK companies and country; reasons, which are probably valid for other countries including Botswana. Firstly, DTI (2003) believes that trade liberalization and a rapid reduction in communication and transport costs implies competition against countries with much lower costs and well-educated labour forces. Secondly, technology and scientific understanding is changing the world faster than ever before, with innovative developments in ICT, new materials, biotechnology, new fuels and nanotechnology releasing new streams of innovative products, and creating many opportunities for entrepreneurial businesses to gain competitive advantage and finally, DTI(2003) believes that new trends in global media communications have resulted in ever faster changing consumers' tastes as new fashions, ideas and products are spread across the world almost instantaneously as a result of the new 24hours, 7days a week media broadcast phenomenon. These factors call for more concerted efforts to be invested in innovation by both companies and governments. However, the process of innovation also involves experimentation and risk taking as some attempts to innovate will fail (DTI, 2003). In general, DTI (2003) further believes that such failures are dwarfed by successes and more importantly, such failures are laden with lessons that play a positive role in innovation systems as new knowledge may be gleaned from them and used to improve the chances of future success after careful evaluation (DTI, 2003). As shown in **Figure 2**, the failures in the process of innovation may arise from many challenges and pitfalls, which may be contextual in nature, that hamper innovation, especially at the interface between research findings and the production, sales and manufacturing of new products, processes or services from such research findings. The collective of these multi-faceted challenges and pitfalls preventing the translation of research findings into tangible products, processes for the market is generally referred to as the innovation chasm.



Source: South Africa's National R&D Strategy 2002, Cited in Comins (2008)

The innovation chasm further represents the stumbling blocks that militate against efforts designed to achieve the efficient transfer and application of new and technologies from research and development

institutions to commercial, industrial and development sectors in the form of products and services which provide growth and development. An innovation chasm may also be a symptomatic element of poorly designed or dysfunctional national innovation systems. A national innovation system denotes the system of interacting private and public firms, universities, government agencies aiming at the production of science and technology within national borders (Nelson, 1993; Niosi et al., 1993). Such interactions may be technical, commercial, legal, social and financial in as much as the goal is the development, protection, financing or regulation of new science and technology (Niosi et al., 2003). To further elaborate, national innovation systems denote an arrangement of public and private institutions that are organized through linkages and their interactive activities for the purposes of generating and using products, processes and organizational practices and has universities, public R&D institutions, policy-making bodies, the government, private enterprises, financial institutions and technology support agencies as its main players (Mugabe, 2007). Productive and quality university-industry collaborations are few and of low caliber or completely absent on the innovation landscape of most African countries, yet their role in bridging the innovation chasm cannot be overemphasized. This status quo which has essentially arisen from poorly funded university research has been blamed for contributing to most of the universities conducting research that is of little or no interest to industrial firms (Mugabe, 2009). Other reasons for poor university-industry collaborations in Africa have been identified as stemming from many of the transnational companies operating in Africa retaining their research and development capability in their home countries, and poor capacity to manage intellectual property within most universities in Africa (Mugabe, 2007). While collaborations between universities and industrial firms constitute an essential feature of vibrant national systems of innovation, the performance of national innovation systems is strongly influenced by political, economic and social factors (Mugabe, 2007; Mugabe, 2009). As such it may then be expected that well-designed, well-resourced and properly functioning national innovation systems, supported by political systems would to a large extent be devoid of any significant levels of “innovation chasms”, rendering the translation of at least a significant degree of patentable research results from research and innovation institutions into economic goods including tangible products, processes and services for economic development and growth.

5.3 Methodology

This study is a review and comment on national and institutional interventions designed to support innovation in Botswana. In this regard, information from several sources on innovation and innovation based entities in Botswana was reviewed and informed the commentary.

5.4 Findings & Interpretations

Various studies such as the World Bank Survey on Doing Business in the year 2009 rated Botswana third in Africa in terms of ease of doing business and also put Botswana at an impressive position 38 out of 181 countries worldwide in the same category. Other areas that Botswana fared well were in the important areas of reform of labour laws, and contract enforcement procedures. When all these and the many other positive attributes associated with Botswana's success as a middle income country are coupled with the government's heavy investment in education and training, illustrated by government's total investment and expenditure on research and development as a percentage of GDP currently standing at 0.4%, and having one of the highest total number of researchers per million people in the SADC at 139 among other factors (SARUA, 2007), a case for a vibrant research and innovation landscape is discernable. However, a deep-seated inability to harness these advantages and other favorable national attributes to improve its technology and innovation credentials appears to contribute to a deep-seated research and innovation chasm that characterizes the national innovation landscape in

Botswana. The Global Competitiveness Reports for 2006-2007 and 2008-2009 produced by the World Economic Forum in 2007 and 2008 showed Botswana's relative performance in the area of science and technology especially in areas such as technology readiness and innovation factors (Table 1), quality of research institutions (Table 2), and company expenditure on research and development (Table 3). Another study by Pouris and Pouris (2009) further indicates Botswana's relative performance on patents issued by the USPTO for the years between 2000-2004 (Table 4).

Table 1: African countries ranked on technological readiness and innovation capacities (World Economic Forum (2008)

Country	Technological Readiness (Rank/134)	Innovation Factors (Rank/134)
Botswana	89	98
Ghana	115	107
Kenya	93	50
Lesotho	125	110
Madagascar	111	97
Malawi	127	101
Mauritius	55	69
Mozambique	116	127
Namibia	85	104
South Africa	49	36
Tanzania	117	106
Uganda	121	90
Zambia	106	93
Zimbabwe	129	122

Table 2: Global Competitiveness Executive Opinion Survey of Quality of Scientific Research Institutions GCI 2007 (World Economic Forum, 2007)

Country	Score/7	Rank/128
Angola	2.5	122
Botswana	3.6	75
Kenya	4.5	31
Lesotho	2.8	115
Madagascar	3.2	94
Malawi	3.5	81
Mauritius	3.6	71
Mozambique	3.2	97
Namibia	3.0	105
South Africa	4.8	25
Tanzania	4.2	40
Uganda	4.3	34
Zambia	3.0	104
Zimbabwe	3.8	59

Table 3 Global competitiveness in terms of Company Spending on R&D (2006) (World Economic Forum 2007)

Country	Score (1-7)	Rank/128
Angola	2.5	112
Botswana	2.8	89
DRC	N/a	N/a
Kenya	3.8	34
Lesotho	2.2	124
Madagascar	3.2	61
Malawi	2.9	85
Mauritius	3.0	73
Mozambique	2.6	107
Namibia	3.0	80
Rwanda	N/a	N/a
Seychelles	N/a	N/a
South Africa	4.4	24
Swaziland	N/a	N/a
Tanzania	3.1	41
Uganda	3.0	72
Zambia	1.7	127
Zimbabwe	3.1	68

Table 4: Patents awarded to Southern African inventors by USPTO 2000-2004 (Modified from Pouris and Pouris, 2009)

Country	Utility Patents	Design Patents	Plant Patents
Angola		1	
Botswana	N/a	N/a	N/a
Lesotho	N/a	N/a	N/a
Madagascar	N/a	N/a	N/a
Malawi	N/a	N/a	N/a
Mauritius	N/a	N/a	N/a
Mozambique	N/a	N/a	N/a
Namibia	1	N/a	N/a
South Africa	557	61	10
Zambia	N/a	N/a	N/a
Zimbabwe	4	N/a	N/a

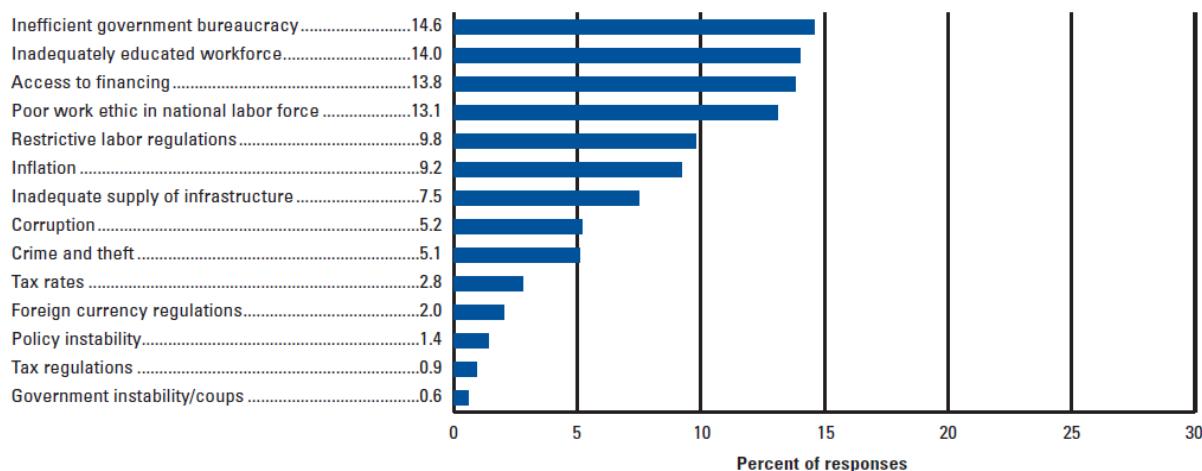
Furthermore, of the 83 patent applications received by the Registrar of Companies and Intellectual Property (ROCIP), the authority responsible for intellectual property management in Botswana between the periods 2006-2011, only 15 applications were submitted by locals and out of this, only 1 patent was granted (C.P Masena, 2011, Personal Communication). While the results of the above studies largely confirm Botswana's excellent performance compared to her peers on the African continent, the results nonetheless reveal the extent of the innovation chasm in Botswana when compared to contemporary innovations systems elsewhere. The findings potentially point to some of the areas that deserve further attention from the point of policy interventions in order to further improve its competitiveness at the global stage in the relevant areas. In seeking to address the innovation chasm, a number of institutional and national strategic interventions have been undertaken and are currently being undertaken. The government of Botswana has recognized innovation as one of the main pillars of its efforts towards diversifying the national economy which is predominantly based on the exploitation of mineral resources. Such recognition is evident foremost in its establishment of the Botswana Innovation Hub (BIH), the establishment of a second public university christened the Botswana International University of Science and Technology (BIUST), the accentuation of the roles and responsibilities of technology based public institutions such as the Botswana Technology Centre (BOTECH), the Rural Industries Promotions Company (RIPCO), the Rural Industries Innovations Centre (RIIC) and other government-orchestrated innovation support agencies such as the Local Enterprise Authority (LEA), the Citizen Entrepreneurial Development Agency (CEDA) and the Botswana Bureau of Standards (BOBS). Other interventions have been at the legislative and policy levels and involve the review of relevant pieces of legislation and the development of new policies. Institutionally, various public government institutions have begun the process of self-evaluation in view of making their own contributions towards enhancing innovation and bridging the national innovation chasm. Some of the national strategic interventions and institutional interventions are discussed in the following sections.

The Botswana Training Authority (BOTA)

Recognizing the poor quality of the skills output from vocational, educational and training institutions, which failed to meet the growing demand for specialized skills by the industry in Botswana, the government set up the Botswana Training Authority in 2000 to act as regulatory body to coordinate and monitor training provided by training institutions (BOTA, 2010). The main objectives of the Authority are to coordinate vocational training activities in view of realizing better integration and harmonization of vocational training activities in the country, monitor and evaluate the performance of vocation training and provide policy advice in the same domain in order to ensure the success of all vocational training programs in the country (BOTA, 2010).

The Botswana National Productivity Center (BNPC)

Respondents in a recent study indicated inefficient government bureaucracy, inadequately educated workforce, and access to finance, poor work ethic in national labour force, restrictive labour regulations and inflation as the most restrictive factors for doing business in Botswana (**Figure 3**).



Note: From a list of 14 factors, respondents were asked to select the five most problematic for doing business in their country and to rank them between 1 (most problematic) and 5. The bars in the figure show the responses weighted according to their rankings.

Figure 3: Respondent views on factors that deter doing business in Botswana (AfDB/OECD,2006)

Unsurprisingly crime and theft, corruption, tax rates, foreign currency regulations, policy instability, tax regulations and government instability, which perennially deter foreign direct investment in other developing countries, but is considered one of the ingredients necessary to stimulate innovation in these countries were not perceived by respondents as being problematic for doing business in Botswana. The findings above, especially those related to productivity, represent a long standing challenge, not only faced by the public sector in Botswana, but also the private sector that the government has made concerted efforts to address. The Botswana National Productivity Center (BNPC), established through an Act of Parliament, has a statutory mandate to enhance the level of productivity awareness as an advocacy function (BNPC, 2005). The BNPC further aims to empower individuals and organizations through training and consulting to be productive and competitive. To achieve this mandate, the BNPC provides productivity awareness and advocacy services, which aim to promote the adoption of productivity best practices in Botswana and also advocates for the improvement of the quality of the workforce with a view to enhance Botswana's global competitiveness. Other services such as the enterprise support services target local and regional institutions, both private and public and seek to strengthen the capacity to deliver through high level interventions such as consulting, coaching and training and other services in the domain of public sector reform(BNPC, 2005). An additional area of BNPC's interventions, that of public sector reform is focused on performance and productivity improvement tactics for the public service.

The Botswana Innovation Hub (BIH)

The Bontswana Innovation Hub (BIH) is modeled on best practices from science and technology parks the world over, drawing heavily on experiences from Finland, which is recognized as a leader in the area of innovation support (BIH, 2008). Although designed and being implemented as a vehicle to diversify the national economy, the BIH, based on the triple helix concept provides an unprecedented opportunity for the government, national and international research institutions, and national and international corporations to build a "Silicon Valley" type innovation enterprise in Botswana. However, contextual realities seem to point to other innovation models as a means towards improving the innovation chasm in Botswana. These contextual realities noticeably include the absence of large corporations such as big pharmaceuticals and other biotechnology based companies, the absence of venture capital or angel

investors with special investment interests in the domain of research and innovation and technology transfer, the dearth of skilled expertise in the area of intellectual property management such as qualified patent attorneys and the general lack of interest and a somewhat total and debilitating disconnection between research and innovation institutions and the corporations operating in the country. These private sector companies do not appear to have strategically position themselves towards actively supporting research, development and innovation in the country and therefore inadvertently make a significant contribution towards entrenching the innovation chasm in Botswana. This state of affairs is further compounded by other unique contextual realities such as a small population of approximately two million people, a largely natural resource-based and service-oriented economy devoid of large manufacturing entities, a high dependence on government business by a significant amount of local enterprises, government policies directed at citizen empowerment and also economic empowerment of citizen-owned companies amongst other factors. While the government policies towards citizen empowerment and entrepreneurial developments are laudable, an unintended effect may have been an over-dependence or sole dependence on government business by a large proportion of local businesses, losing the drive to become regionally and globally competitive in the process. Yet, the government's various support mechanisms do provide many platforms and enabling environments for local companies to design and innovate for the regional and global markets.

However, the vision of the BIH is to be the leading African destination for innovative businesses while its mission is to provide an attractive location for technology-driven and knowledge-intensive businesses to develop and to compete in the global market place (BIH, 2008). The BIH targets both local and foreign businesses, research and advanced training institutes with activities in its four focal areas including information and communication technologies (ICTs), mining technologies, energy and the environment and biotechnology. It is envisioned that the BIH will consist of world-class facilities including state-of-the-art telecommunications infrastructure with high capacity international connectivity and secured power, professional business services and business development services (BIH, 2008). Other offerings by the BIH include business development programs, initiatives for support of R&D activities and initiatives to promote innovation and entrepreneurship. To incentivize businesses to participate at the BIH, a suite of packages have been designed to attract potential businesses to the Hub. These include labour dispensations in the form of work and residence permit exemptions for management and professional staff of foreign companies, organizations and institutions that are registered to operate at the Hub. A training grant has also been instituted to facilitate the training of local staff by investors at the Hub at both the institutional and on-the-job training. Under the training grant scheme, investors that train local staff are exempted from the Training Levy and further receive 50% of the assessed cost of all approved training programs (BIH, 2008). Further incentives include competitive telecommunications packages, an innovation fund, a graduate internship scheme and business incubator services. The innovation fund is designed to provide access to government co-finance for product and business development and other research activities at the Hub.

The International Finance Services Corporation (IFSC)

The Botswana IFSC was established in 2003. It aims to establish and develop Botswana as a world-class hub for cross border financial and business services into Africa and the region. The IFSC is one of the key strategies that the government of Botswana has undertaken in its quest to reduce the county's reliance on mineral revenues. The IFSC targets financial and business services investors seeking to invest in international business companies, international insurance companies, investment funds, international banking, call centers and business process outsourcing and provides a sustainable low tax environment for doing business (IFSC, 2009, IFSC, 2010). As such, IFSC companies get a discounted

corporate tax rate of 15% of profits, and are also exempted from Withholding Tax on interest, dividends, management fees and royalties paid to a non-resident. They are further exempted from Value Added Tax, Capital Gains Tax and disposal of shares for Botswana IFSC Companies is also tax exempt. These companies also have access to Botswana's 200% tax training rebate. **Table 5** compares tax incentives extended to IFSC companies and other companies operating in Botswana.

Table 5: Exclusive Advantages of Botswana IFSC Companies (IFSC, 2009)

Tax	Botswana IFSC Company	Other Companies
Capital Gains Tax	Exempt	15%
Withholding Tax	Exempt	15%
Corporate Tax Rate	15%	25%
Value Added Tax	Zero rated	10%

It is clear from the above that there are compelling reasons for businesses to become IFSC companies in Botswana. An additional exclusive advantage that could be extended to IFSC companies for purpose of bridging the innovation chasm in the country could be the creation of additional tax breaks for companies that actively participate or spend a certain percentage of their total profits for promoting research, development and innovation in Botswana.

The Citizen Entrepreneurial Development Agency (CEDA)

In 2001, the Government of Botswana established CEDA to provide both financial and technical support for business development with the overarching objective of promoting viable and sustainable citizen-owned business enterprises (CEDA, 2008). As objectives, CEDA is expected to deliver on the following agenda: nurture enterprises to add value to the national economy, foster citizen entrepreneurship and empowerment, achieve economic diversification, encourage the development of competitive and sustainable citizen enterprises, create sustainable employment opportunities, promote the development of vertical integration and horizontal linkages between citizen enterprises and primary industries in key areas of the economy, and improve efficiency in the delivery of service to businesses in particular the small business support services(CEDA, 2008). A National Conference on Citizen Economic Empowerment (NCCEE) held in 1999 proposed the establishment of the outfit as a means of introducing the professional management of government financial assistance initiatives and to streamline a wide variety of projects providing similar schemes. CEDA's mandate is to address the need for coherent and holistic support for the development of small, medium and large scale enterprises. As such, CEDA delivers this objective through a number of subsidiaries and offers funding for capital expenditure, stock or working capital in new and existing business ventures (CEDA, 2008). The organization further provides training and mentoring for new and seasoned entrepreneurs and business advisory services to entrepreneurs in various skills identified through needs assessments conducted during project monitoring.

The Local Enterprise Authority (LEA)

The Local Enterprise Authority (LEA) was established by the Small Business Act Number 7 of 2004 as a Statutory Authority of the Government of Botswana. The LEA provides development support services to the local industry needs of SMEs in the area of training, mentoring, business plan finalization, market access facilitation and facilitation of technology adaptation and adoption (LEA, 2011). LEA further aims to promote and facilitate entrepreneurship and enterprise development through targeted interventions and strives to be the center of excellence for entrepreneurship and sustainable SMME sector development in Botswana. Through its Business Incubator programmes in areas such as light engineering industries, horticulture, leather, tourism, LEA strives to stimulate productivity and create more opportunities for small businesses in diverse market sectors (LEA, 2011).

Botswana Technology Center (BOTEC)

Botswana Technology Centre (BOTEC) is a research and technology development organization established by the Government of Botswana in 1979. BOTEC supports national development goals by aligning research, science and technology products and services with the Vision 2016 ideals and the National Development Plans (BOTEC, 2008). It is a research and development entity that operates under the Ministry of Infrastructure, Science and Technology. Since inception, BOTEC has consistently pursued the Government's policy objective of technology promotion and innovation as a tool for economic development and improvement of the quality of life in Botswana (BOTEC, 2008).

The National Food Technology Research Centre (NFTRC)

The National Food Technology Research Center (NFTRC) was created by the Government and funded by the Ministry of Commerce and Industry. Its vision is to be an international centre of excellence in food science and technology. Its overall mission is to generate food technologies that enhance economic diversification, food security and quality through sustained end-user focused research and development.

Rural Industries Promotions Company (RIPCO)

RIPCO was created by the government to promote industrial development and techno-prenurship through applied research (RIPCO, 2010). It aims to deliver research and development products and services to support industrial techno-prenurial development in Botswana. Central to its objectives are the research, development, innovation, and sourcing and adaptation of technologies, the commercialization and transfer of technologies, the provision of knowledge based services and the pursuit of contract research and development in partnership with stakeholders (RIPCO, 2010). It is estimated that government support to the organization currently stands at 90% of its budget while the balance of 10% is raised from the organization's internal operations (RIPCO, 2010)

Botswana Bureau of Standards (BOBS)

The Botswana Bureau of Standards is the main standards certification authority in Botswana created by the government with a mission "to establish national standards, promote and facilitate their implementation with a view to improving industrial competitiveness and efficiency to enhance trade and protect the consumer and the environment" (BOBS, 2011). It is responsible for all issues related to standardization and quality assurance at the national level (BOBS, 2011). The organization is also a full member of the International Organization for Standardization (ISO) and a member of the World Trade Organization (WTO). Its primary objectives include formulating standards and coordinating quality assurance activities in Botswana. In discharging this mission, BOBS offers a range of technical services

in the areas of standardization, testing of goods, certification of products, industrial and trade metrology, quality management systems, environmental management systems, and information and training (BOBS, 2011).

The University of Botswana

The University of Botswana, the premier higher education and research institution in the country is publicly funded, and was established in 1982. It is a broad based institution and has a wide range of academic and professional programmes. As the leading public tertiary education institution, the University of Botswana, in seeking to broaden its relevance to the national and international communities adopted a research strategy with an overarching objective of becoming research intensive by the year 2021(UB, 2008). The University Research Strategy also lays high premium on innovation and especially on the commercialization of its research efforts as a strategic objective towards extending its relevance to the broader community. Being endowed with the largest concentration of research-qualified staff and research facilities in Botswana, it is expected that radical institutional reforms, incentives and restructuring especially in the area of research management would play a cardinal role in attaining its stated research objectives. The University's Research Strategy was approved by Senate in February 2008 and identified seven strategic areas for intervention in order to meet its overarching objective. The identified areas are as follows: to increase staff participation in research, to increase and enhance student research training, to increase internal and external research funding, to increase international collaborative research, to increase the volume and quality of research outputs and to enhance the impact of its research. Emphasizing its intention of enhancing the impact of research, the University undertakes to give emphasis to the impact of research on the wider society and to ensure that research conducted at the institution has tangible public benefits. As such the institution hopes that new knowledge will be turned into action, innovation, products or services. With this understanding the University thus encourages and provides incentives for research that clearly maps out the route towards dissemination and application of research findings. The University thus undertakes to be a partner institution with the BIH and has developed several modes of participation for its envisioned engagements with the BIH in order to promote innovation and the commercialization of its own research results. The University had since set up a research commercialization office within the Office of Research and Development as an instrument through which research commercialization could be pursued. Other major developments with clear strategic goals of improving research performance at the institution have been implemented and include the acquisition of a research management system and the strengthening of research ethics, quality and funding activities.

The Botswana International University of Science and Technology

For economic growth and development to strive from research and innovation, a certain threshold of science and technology capacity must be present in any nation (Committee on Intellectual Property Rights, 2006). Recognizing the dearth of a strong science and technology base in the country, the government of Botswana created the Botswana International University of Science and Technology christened BIUST. The rationale for BIUST is best understood in the words of Wilmoth (2008) who states that “the rationale for BIUST will echo with other emerging economies: economic growth and sustainable development; overcoming acute skill shortages including engineers and technologists; reducing the unreasonable costs of providing tertiary education for over 7000 students in 2007 studying internationally; addressing demand for skills and innovation for advanced industries including through technology transfer; internationalizing the economy and aspiring to be an international education hub promoting social inclusion and equity through being an accessible and workplace relevant institution”. BIUST was therefore created to bridge the gaps in the country in science and technology, but more importantly, as a means of setting a firm foundation for the creation of knowledge-intensive industries through its research

and development (Wilmot, 2008). BIUST is expected to be a high quality research-intensive university with a focus on science, engineering and technology degree programmes at the Bachelors, Masters and doctorate degree levels (BIUST, 2010.). The mandate of the new university includes capacity building with the main objective of increasing the number of citizens with science, engineering and technology based degrees. It further aims to stimulate economic development activities in Botswana and to engage in applied research that would focus on solving a myriad of problems in Botswana and the Southern African Development Community (SADC) region. BIUST is expected to focus on applied and industry-driven research with an objective of addressing technical problems in industry, develop new products, processes and technology, as well as transfer of technology and quality and productivity improvement

Policy Interventions

In its untiring efforts towards diversifying the economy, the government has revised old pieces of legislation and policies, and has where the need arose, developed new policy and legislation in support of this initiative. Some other pieces of legislation and policies are also currently under development. The Registrar of Companies and Intellectual Property Bill of 2011 aims to provide for the establishment of an autonomous body, the Companies and Intellectual Property Authority. It is intended that this new entity will be charged with implementing the four pieces of the suite of legislations essential in fostering innovation and entrepreneurial development in Botswana. These are namely the Companies Act, the Registration of Business Names Act, the Industrial Property Act and the Copyright and Neighbouring Act. The Bill further intends to streamline certain offices provided for in the Companies Act, the Registration of Business Names Act, the Industrial Property Act and the Copyright and Neighbouring Rights Act into a single entity for seamless operation. Other pieces of legislation with implications for stimulating innovation and entrepreneurship include the Botswana Investment and Trade Centre Bill of 2011 which proposes to merge the IFSC and the Botswana Export Development Agency (BEDIA), the Botswana Trade Commission Bill, the National Export Strategy, the Investment Strategy for Botswana, the revised Industrial Property Act, the Research and Innovation Policy and the National Trade Policy for Botswana. The objective of the National Trade Policy, which is to facilitate the achievement of the broadest possible free and reliable access to markets for Botswana's exports of goods and services while simultaneously enabling producers and consumers to access the widest possible choices of international goods and services on the best possible terms, particularly has relevance on stimulating innovation and entrepreneurship in the country. The Industrial Development Policy and Competition Policy both aim to create an enabling environment for the private sector to develop and excel under conditions of free and fair trade. The Private Sector Development Strategy was designed with the aim of developing a vibrant and globally competitive private sector with a capacity to take advantage of the many market access opportunities availed by the Trade Policy.

5.5 Conclusions

It is evident from the foregoing that the government of Botswana has made commendable efforts towards bridging the innovation chasm in Botswana. However, a lot still needs to be done. The interventions described above appear to be largely implied measures that may contribute in closing the innovation chasm in Botswana. Perhaps what is required is much more forceful, creative and explicit interventions specifically designed to further close the innovation chasm in the country. It is worth noting that all the above interventions are government driven, very much in line with government's expected role in stimulating innovation as illustrated in **Figure 4**, but the government cannot be expected to do it alone. A common thread linking all these interventions in the form of established institutions operating in the innovation and entrepreneurial landscape in Botswana is that they all have an umbilical cord tied to the government of Botswana. It would appear that these institutions were largely created to address other

substantive issues, equally important in bridging the innovation gap such as skills development and entrepreneurial culture and not as an integral part of concerted and well-thought out effort on developing a well-structured national innovation policy. What appears to be lacking in all the above interventions is a common thread linking all these interventions purposely and explicitly with the objective of improving national innovation, but more importantly, the astounding lack of private sector involvement especially big corporations' and industries' active involvement in research, innovation and development activities in Botswana.

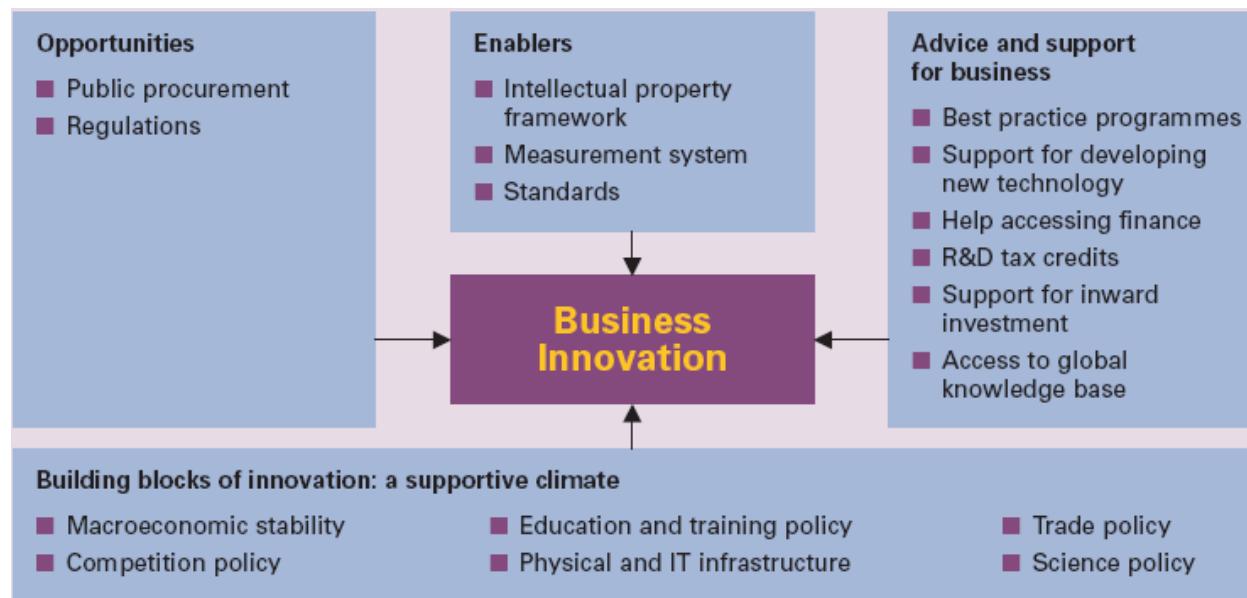


Figure 4. How government policies influence innovation (DTI, 2003)

It is clear that all the above interventions are largely government created and largely government supported and funded. In other words, the government of Botswana largely occupies two corners in the proverbial triple helix model. To a large extent, it occupies and rightly plays the role of funding and supporting research and development as would be expected, but also playing the role of getting hands-on in creating parastatals that play the role conceptually reserved for the private sector. The role the private industry is expected to play in the triple helix model is to absorb research outcomes from research and development entities and translate such results into economic goods, processes and services to spearhead economic growth and development. The role of the private sector in taking its rightful place within the framework of the triple helix model in supporting research and development in Botswana is therefore conspicuous by its absence. To do this, some private sector companies in Botswana may need to strategically transform into innovation-led companies and at the same time, new innovation-led companies may need to be established in key priority areas. Innovation-led companies, according to DTI (2003) have the following characteristics: they have a world-view, often requiring early expansion overseas; they pursue a balanced growth strategy modeled on organic growth and targeted acquisitions to enter new markets or for purposes of acquiring critical expertise; they pursue a balanced investment strategy, and are above average in the market led research and development. Additionally, innovation-led companies focus on what really matters to the customers, and build an innovation culture with corporate leadership that believes the development of new products and services will bring growth (DTI, 2003). The active involvement of companies in both internal research and development is critical in transforming into innovation-led companies and where private industry has correctly assumed such roles, evidence of this

has been easy to decipher. Such evidence is easily seen in among other exhibits, corporate sponsorship of whole buildings and complete science and technology based laboratories within academic, research and development institutions, provision of a wide range of scholarships for undergraduate and postgraduate students, sponsorships of large-scale research projects at research institutions, involvement in joint collaborative research projects, willingness to grant access to industry laboratories, testing facilities and equipment for use by academic researchers and a lot of other interventions. Such involvements are usually discernable in for example, in laboratories and buildings at universities and other research and development institutions being named in honour of private sector companies or corporations that have made such generous investments or donations or special purpose scholarships being named after corporations that availed them. Other areas where active industry participation within the framework of the triple helix model include the participation of private industry in co-operative education, an arrangement where students may be able to pursue a year or more of their degree studies at corporations. Furthermore, where the private sector is actively playing a role in stimulating research and innovation, industry associations may play an important advocacy role in contributing towards the review of the content of certain programs in order to meet industries' various needs. The above are just a few interventions that the private sector in Botswana could consider getting involved as a means of contributing their quota towards narrowing the innovation chasm in Botswana.

5.6 Policy Implications

In themselves, the interventions described above are laudable and showed that significant efforts have been expended by the Government of Botswana in stimulating innovation and bridging the innovation chasm. However, these efforts have been concentrated and directed largely at two of the three pillars making up the triple helix model. Future attempts to bridge the innovation chasm in Botswana must be directed at incentivizing and stimulating local private industry involvement in research, innovation and development initiatives in Botswana, irrespective of Botswana's contextual challenges as far as innovation is concerned. Such efforts would be directed at creating innovation-led companies in Botswana, with a vision of taking full advantage of local government incentives and channeling such advantages towards innovating for the external market. Current efforts at doing this through the framework of the BIH do not appear to go far enough, as the focus appears to target foreign based companies and enticing them to take up shop in Botswana. It may well be possible that such companies may have also have a pool of other investment destination choices also laden with incentives as alternative avenues through which to pursue their innovation objectives.

5.7 Directions for Further Research

In order to develop policies and additional strategies aimed at stimulating private sector companies to be more actively involved in research and development activities with a view of narrowing the innovation chasm in Botswana, it would be necessary to conduct further studies. Such studies would for example involve determining what factors deter private sector involvement in research, development and innovation activities, both internal and external to their organizations.

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