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Science and Technology Parks initiatives in southern Africa; challenges and success stories

Roundtable 4

STPs at different economic and social stages

Author:

Budzanani Tacheba (btacheba@gov.bw)

Co-Author:

Alan Boshwaen

Botswana Innovation Hub, Science and Technology Park, Botswana

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Executive summary

Science and Technology Parks are rapidly gaining popularity in least developed economies, some of which have invested heavily financiallyon these initiatives in an attempt to leapfrog from being resource based to being knowledge based economies. The question that beckons is whether such investments are a prudent route to economic prosperity given the multitude of challenges that these economies are still trying to emerge from.This paper reviews current initiatives in Africa with particular focus in Southern Africa.

Introduction

Numerous countries in Africa have in the last decade embarked on projects for the establishment of Science and technology Parks, business incubators and Centres of Excellence. This drive is to a larger extent due to the push towards meeting the job needs of new graduates and integration into the knowledge economy[1]. In recent years Science technology parks concept has seized the imagination of Africa Public Policy makers[2] . In southern Africa such moves have been associated with the development of new or revised Policies on Science Technology and Innovation. Recently there has been a push towards knowledge based economies, away from the resource based economies[3] that most African Countries are still trying to emerge from. Such concerted Efforts have seem many least developed countries (ldc) and medium income countries coming up with specific models of science and technology parks.

The Science technology and Innovation Policy frameworks within most African countries are still at their infancy. There is need especially in Africa to develop a completely new set of metrics within these policies that would allow implementation and monitoring of such special purpose vehicles (SPV) in the African Context.Science and Technology Parks have been discussed and defined by among others[4]. **The very essence of a science park is to manage the flow of knowledge between universities, research and development institutions, industry and government**. **From the definitions and characteristics of science parks in various studies, networking is regarded as one of the most important benefits science parks can offer to its tenants[5]**. Science and Technology Parks are seen as "seedbeds" for innovation.

In southern Africa there are initiatives that are strongly focussing on outwards attraction, i.e. to bring Foreign Direct Investment (FDI) and very little focus on inward looking, i.e. strengthening capacity building.The most common of the specific areas of focus in the generic models of science parks in southern Africa is Information and Communications Technologies (ICT). Information and Communications Technologies (ICT) have enabled appropriate solutions to and number of problems including health problems of selected rural areas in Africa. Other areas are Biotechnology Solutions to the food security and poverty alleviation in certain part of Africa[6]

Innovation often refers to a broad social and economic activity within emerging societies,it transcends any specific technology, even if revolutionary, and is tied to attitudes and behaviours oriented towards the exploitation of change by adding value[7]. As developing countries embark on and advance second-generationreforms—changing "rules of the game" in public finance,education, innovation, health systems or infrastructure provision—theyface an acute shortage of competent, motivatedpeople to lead and manage the reforms[8]. This is typical in countries that have been affected largely by brain drain. This is

[1]Economic Commission for Africa, 2009, technology Parks, Incubation Centres, Centres of Excellence: Best Practices and Business Model development in North and Southern Africa. United Nations Economic and Social Council.
[2]Tavares, R., 2009, Science and Technology parks: An overview of the ongoing initiatives in Africa. *African Journal of Political Science and International Relations*, **3** 208 - 223.
[3]World Economic Forum, http://www.weforum.org/s?s=reports
[4]Cabral, R. and Dahab, S. S. (1993) 'Science Parks in Developing Countries: The Case of BIORIO in Brazil'. In Biotechnology Review No. 1: The Management and Economic Potential of Biotechnology, vol. 1, pp. 165–178
[5] Chan, K., Pretorius, M., 2007, Developing Technological Capability in Science Parks: A Networking Model Approach, Portland International Centre for Management of Engineering and Technology, pp 565 - 573
[6]Tavares, R., 2009, Science and Technology parks: An overview of the ongoing initiatives in Africa. *African Journal of Political Science and International Relations*, **3** 208 - 223.
[7]Dijkema, G. O. J., Ferrao, P., Herder, P. M., and Heitor, M., 2006, Trends and opportunities framing innovation for sustainability in the learning society.*Technological Forecasting and Social Change* (**73**) 215 - 227.

[8]The World Bank, 2010, talent Abroad Promoting Growth and Institutional Development at Home: Skills Diaspora as Part of the Country, *Economic Premise: Poverty Reduction and Economic Management Network (PREM*), Number 44

one of the major impediments to having the skills required to facilitate operational STP and Business Incubators in Southern Africa. Countries such as Botswana have trained a large number of their health sector practitioners in the West especially in Europe. Most of theseskills remain in the Diaspora to the detriment of their national health sectors. Normally the skilled workforce would be the most appropriate to take up key technical positions in their countries as new technology based platforms are being introduced.

A classical success story that is currently being embraced in Africa is that of Rwanda which almost two decades ago now was ravaged by wars borne out of ethnic intolerance. According to Harvard Professor Ricardo Hausmann, Rwanda's economyhas grown to be one of the fastest seen in a decade. Since independence, Rwanda growth has outperformed most other African nations with an average GDP per capita growth of 4.7% between 2000 and 2010[9]. Rwanda has embraced ICT as the key driver for the country's economic reforms. Recently the investment into fibre networks around Kigali has been applauded. However, an export per capita is still unexpectedly low and FDI has shown limited dynamism. Prof. Hausmann argued that richer nations have more productive knowledge, make more products and make complex products. Rwanda at present makes simple products, with its exports characterised by only a very small number of particularly simple products (coffee, tea, minerals). In order to make the transformation into a middle income country, Rwanda needs move into the production of complex products. This way of thinking is closely related to the conception of connectedness explained by Professor Collier with reference to Rwanda's place in the regional and global economy.

According to Prof.Hausmann, Rwanda should aim to expand its production into areas that (1) are already closely related to existing capabilities, and (2) are closer to a large number of other areas that Rwanda might expand into in the future. He identified two potential sectors for expansion based on these criteria: food processing and construction materials.

In southern Africa, ICT has also been embraced and a major driver of economic diversification. The need for substantial bandwidth has led to collaborative investments into Submarine cables. This was borne out of the realisation that the Far East economies like India have used this vehicle to greatly enhance their economies by doing high end outsourced services from the west. This facilitated the development of call centre facilities mainly servicing the west. In Southern Africa the most prominent of the submarine cables are the East Coast Submarine Cable Systems (EASSY)[10] and the West Coast Submarine Cable System (WACS)[11]. These are anticipated to contribute greatly to bandwidth capacity in theregionwith a huge impact on telecommunications costs in the region. This will have profound impact on the establishment of services offering in the communication sector, including the call centre and data centre businesses.

Every year around the world, nations urgently need assistance to cope with natural disasters, refugees, famines. Such chronic urgencies for "foreign aid" tend to drive out actions aimed at achieving crucial goals for long term economic development. The vision that Science Technology Parks initiatives in Africa should be implemented as less costly solutions with respect for the cultural contexts and providing a real solution to local ventures and SME's is embraced. There is a common notion that those countries that are mainly affected by poverty and famine there is very little hope for them to capitalise on the latest economic growth strategies including those that include building science technology Parks. The argument is that they will remain in this state primarily because any aid channelled to them shall immediately be

[9]Hausemann, R., 2011, Rwabnda Growth Forum, International Growth Centre.http://www.theigc.org/
[10]East Coast Submarine Cable System, (EASSY), http://www.eassy.org/
[11]West Africa Cable Syatem (WACS),

used to address the more pressing issues of famine.[12]Countries such as Malawi are still being affected mainly by famine but there are already efforts towards developing STP and business incubators.

Objectives

The aim of this paper is to review the literature on Science and Technology Parks in Africa to get insights into their models, methods of monitoring (metrics). Identify the major challenges in the implementation of these megaprojects. Provide critical assessment of the challenges. The paper also looks at the underlying policies for STI in the countries that would otherwise pave the way forward for implementation. Key element including business plans for the STP and viable financial models for sustainability are looked into. The highlights on successes where appropriate and take note of the key elements for success of such stricture. Come up with conceptual model as to whether there is a success model for Science and Technology Parks. The paper also looks as the need for creating the critical mass of membership to complement the Science park development programme.

The aim therefore is to provide a comprehensive analysis of STP initiatives in Africa with the pros and cons of such initiatives based on the last ten years experiences.

Science and Technology Park Concepts in Southern Africa

Almost all countries in the Southern Africa Development Community (SADC)[13] now have some special focus towards development of a STP or a Business incubator, with some countries having up to 6 such initiatives at different provincial level. At the Centre is South Africa which has utilised its cooperation agreements with Finland to establish a robust national system of Innovation. Initiatives such as COFISA have amassed information on developing grassroots innovation. This has greatly enhanced South Africa's products commercialisation, including originally less lucrative industries like those of herbal medicine. Currently South African Companies process millions of tonnes of herbal medicinal products on a commercial basis mainly for export. They have found means of opening new markets abroad for these relatively new products.

The Finnish model of Innovation has left a strong mark in the southern Africa region, this has also been facilitated by the support from the Finnish government of regional network platforms. In 2011 the Southern Africa Innovation Support Programme (SAIS)[14] was commissioned in Namibia. The programme is a regional support for strengthening regional innovation systems from Finnish government. It has its rudiments on the COFISA programme implemented in Southern Africa and is meant for allowing learning from best practices. At least four Science and Technology Parks and Business incubators in the region are involved in this programme.

The Finnish model of Science and technology Park is normally inclusive of the following:

[12]Nichols, R. W., 2007, Perspectives on science and technology in development: Does the urgent drive out the important? *Technology in Society*, **29** 369 - 377

[13]Southern Africa developing Community (SADC), http://www.sadc.int/
[14]Southern Africa Innovation Support Programme (SAIS), http://www.saisprogramme.com/

1. development of iconic building structures
2. Attraction of FDI.
3. The provision of Incentives packages
4. Provision of seed funding (venture capital, Grants, Training grants etc...)
5. Establishing Development Programmes
6. Government being the major investor.
7. Developing Incubation facilities.
8. Developing Regional networks.

This model normally lacks:

1. A holistic financial model for sustainability
2. Most of the Cost are left to private sector support
3. Does not address the lack of the critical mass (as opposed to European environments)
4. Disregards lack of the skills base to immediately go high tech.
5. Disregards the market push for incubates and resident company product lines.

Key Challenges

Southern African science parks are characterized with poor innovation levels and lack of technological capabilities. However, through networks, one can build and develop the necessary technological capabilities In order for networks to bring out the most beneficial outcomes, i.e., **access to new knowledge.It is necessary to understand the environment that the network operates in, as well as the network structures**. However there key challenges that are currently being experienced regionally.

1. Financially sustainable STOP and Business Incubators.

   The regional STP's are mainly driven from Government coffers with very little economic impact being noticeable. Most of the STP and business Incubators receive Governments circumvention on annual basis. Although some have viable real estate businesses, these are still not enough to facilitate the structures. Current initiatives are towards developing full business plans for the STP and incubators including financial models that are sustainable. Such models would show how the STP would be a self financingentity with private sector participation. To achieve this private sector has to be brought into the picture at a very early state of conceptualisation. To a larger extend the development of STP and Business Incubators in Africa have been facilitated by Governments who mainly provide equity for the implementation of the project with little efforts devoted to the financial sustainability.

2. Most Science and Technology Parks in Southern Africa lack the vibrant Industry, academia, private sector interaction which is noted in western STP. This then hampers the positive innovative ideas development in the facilities. With small innovation capacity, this means there is a low output in products that can be sent to the market. Low market push leads to low uptake of the products by the market.

3. Regionally the skills base in the STP is relatively limited. The ratio of post graduate level researchers to support stuff in these facility is far much low compared to Western Science Park, hence the level of R&D and Innovation is largely compromised.

Success Stories

One distinguishing factor for a successful STP implementation is FDI investment promotion. This involves pro-active chasing of potential investors and addressing the specific barriers that prevent them from investing in the country. Investors should be thought about as partners, and the government as having a stake in their business through the future benefits of tax receipts among others. Rather than offering tax incentives (which weaken the stake that government has in future profits) or *generic* Special Economic Zones[15], the government should aim to find ways to increase the productivity of investments – creating value for both the investor and Country. Key Success factors are noted in the Southern Africa concept of STP.

1. Foreign Direct Investment allows the stimulation of local sectors into being globally relevant. Generally STP that bring among their midst multinational Companies manage to develop more networks that facilitate growth in the sectors. This is because multinationals invest a freebies for the local sector Companies and community to facilitate interaction. An example is Microsoft which provides a wide range of free software to businesses and start-ups in STP and Business Incubators that it establishes in.
2. Developing entrepreneurship and a strong market push for products coming from the STP. Often the Marketing of the products is not well presented leading to low uptake, However, STP's which have an entrepreneurial focus tend to find means through which their products find a market.
3. Many success factors in Southern Africa Parks are not financial.However, there are a number of innovations that are people centric that are being seen, especially in the mobile phone applications arena.

Conclusion

Efforts have been made to develop models that will help Southern African science parks to develop long-term technological capabilities and competencies to compete successfully in today's highly competitive world. However this study's assessment shows that in order to be successful key challenges have to be considered and removed as these pose as barriers to successful STP and Business Incubators. A recommended way forwards is that STP development models be more diversified and not only be based on similar conceptual model, i.e. the Finnish model. There is need to sensitise Governments about the perils of heavily investing the STP without properly aligning the sustainability strategies, looking at skills base, addressing capacity building issues and establishing the best cost models.

[15]Farole, T. 2011. Special Economic Zones in Africa; Comparing Performance and Learning from Global Experience, The World Bank publication, Washington DC.