The Critical Role Universities in Africa Should Play in Innovation for Economic Growth and Development.

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Abstract

This paper examines the critical role universities in Africa ought to play in innovation in support of economic growth and development. The prime motivation for this paper is to propose ways universities can support economic growth and development through innovation initiatives in their operations. Innovation involves the generation of a creative idea or insight: the insight must be put into action to make a genuine difference in economic growth and development. There are a wide range of approaches to conceptualizing innovation in the scholarly literature. Innovation can be looked at from the context of technology, commerce, social system, economic development, and policy construction. Information for this research was obtained from both primary and secondary data. Primary data was obtained from knowledgeable individuals in terms of what they considered to be the role of the modern African university in innovation for economic growth and development. However, the paper relied more on secondary data sources available in the internet (http://en.wikipedia.org/wiki/Innovation).

The key finding is that universities in Africa have an important role to play in innovation but must change their modus operandi in terms of curriculum development, teaching and assessment of student learning among others in order to remain relevant to the needs of the modern economy.

Key Words: Innovation, Knowledge Management, Science, Technology, Growth, Development

1. Introduction

The term innovation derives from the Latin innovatio, the noun of action from innovare meaning "to renew or change," from in - "into" + novus "new". The central meaning of innovation thus relates to renewal or improvement, with novelty being a consequence of this improvement. For an improvement to take place people must change the way they make decisions, or make choices outside of their norm. Schumpeter c.s. (~1930) states that "innovation changes the values onto which the system is based." When the value system changes, the old (economic) system changes to make room for the new one (better one). When that happens, innovation has occurred. (http://en.wikipedia.org/wiki/Innovation;Heyne et al, 2010; Gromov, 2011; Perez and Rushing, 2007; Christensen, 2002; Khan, 1989; Von Hippel, 1988).

A definition of innovation from an organizational perspective is given by many experts as the successful introduction of a better thing or method. It is the embodiment, combination, or synthesis of knowledge in original, relevant, valued new products, processes, or services (http://en.wikipedia.org/wiki/Innovation. A content analysis on the term 'innovation' within the organizational context, gives the definition of innovation as the multi-stage process whereby organizations transform ideas into improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace. (http://en.wikipedia.org/wiki/Innovation. For innovation to occur, something more than the generation of a creative idea or insight is required: the insight must be put into action to make a genuine difference. This initiative should result, for example, in new, better or altered business processes within the organization, or positive changes in the products and services provided. On a lower level, innovation can be seen as a change in the thought process for doing something, or the useful application of inventions or discoveries. Invention is an idea made manifest, and innovation, is ideas applied successfully in practice. The goal of innovation is positive change, to make life or someone or something better. Innovation and the introduction of it that leads to increased productivity is a fundamental source of increasing wealth in an economy and hence economic growth and development (Schumpeter, 1943; Von Hippel, 1988; Christensen, 2002; Davila et al, 2006; Roughead et al, 200---).

2. Literature Review

Innovation is an important topic virtually in all fields of study e.g. economics, business, entrepreneurship, design, technology, sociology, and engineering. Since innovation is also considered a major driver of the economy, especially when it leads to new product categories or increasing productivity, the factors that lead to innovation are also considered to be critical to policy makers (Heyne et al, 2010; Gromov, 2011;VonHippel, 1988). Thus, innovation can be looked at from a variety of contexts, including technology, commerce, social systems, economic development, and policy construction. There are, therefore, naturally a wide range

of approaches to conceptualizing innovation in the scholarly literature (Heyne et al, 2010; Gromov, 2011; Perez and Rushing, 2007; Joseph Schumpeter in "Theorie der Wirtsch aftlichen Entwicklung" (1912). (The Theory of Economic Development, 1934, Harvard University Press, Boston) appears to capture many of the key aspects in terms of the meaning of innovation from an economic point of view. The key aspects according to Joseph Schumpeter are:-

a) The introduction of an improved or better method of production, which need by no means be founded upon a discovery scientifically new, and can also exist in a better way of handling a commodity commercially.

b) The opening of a new market, that is, a market into which the particular branch of manufacturing of the country in question has not previously entered, whether or not this market has existed before.

c) The conquest of a new source of supply of raw materials or half-manufactured goods, again irrespective of whether this source already exists or whether it has first to be created.

d) The carrying out of the better organization of any industry, like the creation of a monopoly position (for example through fructification) or the breaking up of a monopoly position

Schumpeter's meaning of innovation is widely captured in Neo-Schumpeterian economics, developed by such scholars as Christopher Freeman and Giovanni Dosi(http://en.wikipedia.org/wiki/Innovation; Rogers, 1962; Davila et al, 2006; Roughead et al, 2007; Thomke, 2003; Tuomi, 2002). Innovation is also studied by economists in a variety of other contexts, for example in theories of entrepreneurship. In network theory, innovation is seen as an element introduced in the network which changes, even if momentarily, the costs of transactions between at least two actors, in the network. In the process there is newness or improvement of the old Heyne et al, 2010; Gromov, 2011; Perez and Rushing, 2007; Christensen, 2002; Khan, 1989; Von Hippel, 1988; Christopher Freeman and Giovanni Dosi; ; Rogers, 1962; Davila et al, 2006; Roughead et al, 2007; Thomke, 2003; Tuomi, 2002; http://en.wikipedia.org/wiki/Innovation).

The meaning of innovation from an organizational perspective is not very different from the economic meaning. Organizational development experts agree that innovation is the successful introduction of a better thing or method. It is the embodiment, combination, or synthesis of knowledge in original, relevant, valued new products, processes, or services. (http://en.wikipedia.org/wiki/Innovation. A content analysis on the term 'innovation' within the organizational context, gives the definition of innovation as the multi-stage process whereby organizations transform ideas into improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace.

(http://en.wikipedia.org/wiki/Innovation. All the definitions agree on the issue of newness whether through invention or improvement in goods, services or ways of doing things (Gromov, 2011; Christensen, 2002; Khan, 1989; Von Hippel, 1988; Christopher Freeman and Giovanni Dosi; Rogers, 1962; Davila et al, 2006; Roughead et al, 2007; Thomke, 2003; Tuomi).

3. Methodology

This study was undertaken by combining both secondary and primary data. Secondary data was mostly collected through review of literature housed in the internet. A complete list of references consulted is found in http://en.wikipedia.org/wiki/Innovation.*(To access the full list of references all what one needs to do is to Ctrl and click).* Several knowledgeable individuals were interviewed during the 2011International Conference on Business Innovation and Growth hosted by the University of Botswana in Gaborone between 13th and 15th May, 2011. Primary data was qualitative and mostly reflected the opinions of various respondents on what they considered the critical role of African Universities in innovation for economic growth and development.

4. Discussion

In today's highly globalised and knowledge based world characterised by hyper competition, innovation and creativity for that matter, is one of the critical areas to address in regard to economic growth and development. It is now widely accepted that firms that are not innovative will eventually perish. In the same vein, it can be argued that countries that are not innovative will not grow and develop. Yet still in the same way, universities that are not innovative will find it very difficult to remain relevant. Competition today is not new on the basis of previous competencies but on the basis of knowledge. Innovation helps leverage knowledge. This conclusion is true for countries, universities and institutions of higher learning. Knowledge management is the creation and subsequent management of an environment which encourages knowledge to be created, shared, learnt, enhanced, and organized for the benefit of the organization and its customers. Clusters and net works facilitate this process (Porter, M.E., 1998)

Universities are part of the 'innovation system. They contribute to innovation and economic development in various ways: Well-educated and competent graduates, research and service. With changing contexts of knowledge production, the old division between pure research (universities) and applied R&D (industry) has given way to new forms of partnerships and collaboration. Universities and other stakeholders must rise to the challenge (Neba, A. 2011; Nilsson et al, 2003; Fazackerley et al 2009; O'Sullivan, 2002 ; Perez and Rushing, 2007 ; Heyne*et* al, 2010)

An effective innovation system must be synergized; it must incorporate stakeholders in order

to help in knowledge creation and sharing. An effective innovation system of firms, research centres, universities, individuals and organizations has been identified by the World Bank as one of the four pillars of the emerging knowledge economy. Such an innovation system allows countries to assimilate and adapt global knowledge for local needs and to create knowledge. This increases competitiveness in this highly globalized world characterized by hyper competition in all spheres of life (Neba, A. 2011; Nilsson et al, 2003; Fazackerley et al 2009; Porter M. E, 1998).

The World Bank's Knowledge Assessment Methodology (KAM) appears to capture the critical aspects to consider in measuring the effectiveness of an innovation system. KAM measures the effectiveness of innovation systems using three variables, namely:

a) Researchers in Research and Development

b) Patent applications granted by the US patent and trademark office

c) Scientific and Technical journal articles.

Universities play a key role in the three areas above. Universities nowadays must and do play a new role in society. They are not only training students and conducting research, like always, but are also making efforts to put knowledge to use. Today's university must elide the traditional boundaries between academia and industry. This is really to say that the role of the university has changed in this process. While still retaining some of the traditional roles, universities today have taken over more vocational forms of higher education and research. Useful university research now focuses on the innovative potential of discovering the unknown and bringing it to realization through a consciously designed and intentional process of innovation. In this process the distinction between research and teaching shows signs of eroding (Todtling, 2006; Neba, A. 2011; Nilsson et al, 2003; Fazackerley et al 2009). It is common knowledge that African universities have dismal performance in terms of the three variables above. The Research and Development output of African universities, the production of scientific and technical journals and registered patents from the work of scholars are a far cry from what they should be.

In the case of universities, we have to talk of innovation in the context of Science & Technology (ScTI) as innovation depends on national performance in science and technology. China and India have recognized the need to focus on ScTI as way of achieving economic development and reducing poverty. No wonder such countries have performed very well in the modern era. For example, the research and development investment for China alone grew from US$ 7 million in 1994 to US$ 500 million in 2000, doubling between 1996 and 2002. Today, it is at much higher levels. The OECD countries have given special consideration to Science, Technology, Engineering & Mathematics
(STEM) skills in terms of measuring innovation. These courses offer significant skills in

regard to innovation and creativity for that matter. In addition to Science, Technology, Engineering & Mathematics skills (STEM), Management, Communications, and Entrepreneurship skills for university graduates are also required for an effective innovation system. One measure of competitiveness in these other skills (outside STEM) is the quality of business degree programmes at both undergraduate and graduate levels.

Anecdotal evidence suggests that in most African universities, issues of curricula are not given a lot of weight as there are too many other important issues such as dealing with growing number of students who qualify to join university (Ministry of Education – Kenya, 2007; Neba, A. 2011; Nilsson et al, 2003; Fazackerley et al 2009)

In the continent of Africa, South Africa provides a good case study in terms of the enhancement of innovation in its universities. In the past 15 years or so, the country has been enhancing its innovation system through the National Research Foundation (NRF). At present, the South African NRF has a special strategic focus on increasing the PhD throughput of South African universities. This is achieved through providing scholarships for doctoral students and through offering financial rewards to universities in proportion to the number of PhDs that graduate. Financial rewards are also provided for publications in refereed journal articles and in the registration of patents for authors as well as for universities. The NRF facilitates the registration of patents by university lecturers and researchers. In addition, the NRF operates a Venture Capital fund that is used to commercialize some of the innovations, inventions and patents. The overarching goal in these efforts is to improve South African ranking in the Knowledge Economy Index (KEI) and the Global Competitive Index. The ultimate aim is to create a knowledge-based economy to support future economic growth of South Africa (Ministry of Education – Kenya, 2007; Lewa, 2011)

It is commonly known that many universities in Africa do not explicitly measure their performance based on the PhD output, journal articles published or the patents registered per year. Very few African universities seem to bother with this. Many African universities do not have a choice when it comes to recommending text books to their students. The lecturers do not write text books; they publish minimally and seem to spent most of their time moonlighting (Neba, 2011; Lewa, 2011).

Another concern is that many universities in Africa do not align their enrolment and budgeting to the strategic economic sectors of their economies (Ministry of Education – Kenya, 2007; Neba, 2011; Lewa, 2011). Under the circumstances, innovation efforts are minimal. Universities must be at the forefront in forging Science–Innovation linkages. These linkages can take many forms: from contract and collaborative research and personnel transfers to technology licenses and creation of spin-off firms. University research must be more responsive to the needs of business and society. This therefore calls for increased and more efficient linkages between Universities and Industry and science and innovation. Such

linkages must serve to both facilitate industry's uptake and commercialisation of University research results and to ensure that the research carried out in universities is attuned to social and economic problems. Universities must forge links with stakeholders and stop the habit of doing research and keeping the results in shelves and cabinets where they eventually suffer from "death in the drawer" malaise (Neba, 2011; Lewa, 2011).

In an innovation driven economy, two critical considerations matter most: the need to identify platform technologies and the need to focus on some of the fastest growing areas of enterprise. These areas include Micro, Small and Medium Enterprises (SMEs), service industries, financial and monetary services, medical services, education, eco-tourism, African cultural artefacts and art (Ministry of Education – Kenya, 2007; Khan, 1989; Tuomi, 2002). The forecasted fast growth of African economies in the coming decades will engender development and production of new products and processes in the above areas. Key strategies to enhance the science, technology and innovations as an agenda, should also focus on scientific and technological empowerment and financial facilitation of the fastest growing sectors of the economy (Neba, A. 2011; Lewa, 2011). University research must be scaled up in order to achieve meaningful results. African governments must support research and become more proactive in utilizing research results from their universities.

It is now commonly argued that in order to remain relevant, universities everywhere need to align their degree programmes to the needs of the strategic sectors of the economy. These sectors include Agriculture, Water and sanitation, Energy, Tourism and the software services industry. In order for success to be realized there is need to develop skills and a large pool of high quality science, engineering, technology, and medical degree graduates. The slow growth of science, engineering and medical technology in African universities is a worrying trend. In most African universities, the initial science and technology focus has been lost due to the dramatic growth in the enrolment in non science degree programs which are easier to offer. Private universities that came on board to meet the needs that public universities could not meet ended up offering non science degree programs because these are easier to offer in terms of costs and man power needs. Technology degree programmes are capital intensive and undergo sophisticated approval systems from the authorities for as good cause, of course. (Ministry of Education – Kenya, 2007). These courses are therefore expensive to establish and without the reach of most private universities (Neba, A. 2011; Nilsson et al, 2003; Fazackerley et al 2009; Lewa, 2011)

There are many strategies that can be implemented to take advantage of the strengths of universities. The starting point is to increase the effectiveness of the innovation system in each of the countries. This could be achieved by improving the governance and management of science, technology, and innovation (Ministry of Education – Kenya, 2007). African universities should take the lead in pushing for the necessary changes and in ensuring that appropriate strategies and policy frameworks are put in place. Education ministries in many countries in Africa have proposed several strategies that can be used.

The Kenyan position is deemed inclusive and suggests the following strategies:-

a) Increase the Percentage of ScTI student population in all Universities
b) Enhance and Develop Adequate ScTI Infrastructure

c) Encourage participation of students in National and International Design and Innovation Exhibitions and Competitions

d) Strengthen Science and Technology Doctoral Programmes

e) Promote Technology Clusters to Allow Flexible Integration of Knowledge

f) Develop Business Incubation Systems at the Universities

g) Attract high value-adding Multi-National Enterprises (MNEs) and Small and Medium-sized Enterprises (SMEs) for increased (FDI)

h) Increase Investment in Science, Technology and Innovation in Universities

i) Increase ScTI Basic Expenditure in Research and Development (BERD) as a percentage of GDP to 1% in line with the Abuja Declaration of 1991

j) Increase Funding of ScTI from Internal and External Sources

k) Stimulate Venture Capital Activity

(Ministry of Education-Kenya, 2007; Lewa, 2011, Nilsson et al, 2003; Fazackerley, et al, 2009; Tuomi, 2002; Thomke, 2003; Davila et al, 2006; Roughead et al, 2007)

The above approaches engender strategic thinking which calls for key players in innovation endeavours in Africa to begin to operate outside the box (Lewa, 2011).

5. Conclusion and Recommendations

The 21st Century is witnessing an increased drive for universities to play a crucial role in the development of the knowledge economy especially through innovation initiatives. This is in keeping with the growing pressure on countries, both developed and developing, to adjust to the rapid pace of globalization through initiatives promoting innovation and competitiveness as a pathway for sustainable competitiveness. Universities in Africa thus must play a new role in society. They must not only train students and conduct research, but must also make efforts to put knowledge to use. The new university elides the traditional boundaries between

academia and industry.

In order to improve the linkages between university-private sector and government it is critical that social and humanity sciences education, research and publications be strengthened. The interface between science and technology is best understood through the study of social and human sciences. Universities in Africa must provide the lead in these areas. Since the impact of innovations and technology on society is the main preoccupation of social and human sciences, universities ought to take the lead in curricula development; in how many hours of tuition and study are needed in these areas and how the linkages with technology can be introduced in the class room (lewa, 2011; Todtling, 2006).

It is clear that the role of universities in innovation is more subtle than government policies in Africa have acknowledged. Universities that are active at the heart of successful technology clusters do not just spin out companies. They develop highly-skilled people who move between industry and academia; they incubate businesses and provide expertise; they produce knowledge that is used by technology businesses; they provide public space in which people from various overlapping branches of research meet (Fazackerley, 2009; COSINUS, 2011). Some universities in the UK perform these functions successfully. In Africa, only South Africa seems to have taken serious steps towards this end (Porter, 1998; Lewa, 2011; Neba A., 2011).

References

COSINUS (2011): Conference on 'Innovation Systems and the New role of Universities' 5 – 6 September 2011, UK (Conference Announcement Note)

Davila, T., Epstein, M. J., and Shelton, R. (2006). "Making Innovation Work: How to Manage It, Measure It, and Profit from It. " Upper Saddle River: Wharton School Publishing.

Fazackerley Anna, Smith Martin and Massey Alex (2009) in Research Note: Executive Summary: The Role of Universities in innovation ----.Nov. 2009

Gregory Gromov (2011). Silicon Valley History. http://www.netvalley.com/svhistory.html

Heyne, P., Boettke, P. J., and Prychitko, D. L. (2010).The Economic Way of Thinking. Prentice Hall, 12th ed. Pp. 163, 317-318.

Khan, A. M (1989). Innovative and Noninnovative Small Firms: Types and Characteristics. Management Science, Vol. 35, no. 5. Pp. 597-606.

Lewa, P.M. (2011): key Note Speech presented at the International Conference on Business, Innovation and Growth; Faculty of Business, University of Botswana 13-15th July 2011

Ministry of Education – Kenya (2007): The National Strategy for University Education 2007-2015

Neba, Alphonsus PhD (2011). Paper presented at the International Conference on Business, Innovation and Growth; Faculty of Business, University of Botswana 13-15th July 2011

Nilsson Jan-Evert, et al (2003). The role of universities in Regional Innovation Systems - A Nordic perspective, Blekinge institute of technology, Dec. 2003

O'Sullivan, David (2002). "Framework for Managing Development in the Networked Organisations". Journal of Computers in Industry 47 (1): 77–88.

OECD The Measurement of Scientific and Technological Activities. Proposed Guidelines for Collecting and Interpreting Technological Innovation Data. Oslo Manual. 2nd edition, DSTI,

Perez, T. and Rushing R. (2007). The CitiStat Model: How Data-Driven Government Can Increase Efficiency and Effectiveness. Center for American Progress Report. Pp. 1-18.

Porter, M. E. 1998, Clusters and the new economics of competition, Harvard Business Review, Nov/Dec98, Vol. 76 Issue 6, p77.

Rogers, E. M. (1962). Diffusion of Innovation. New York, NY: Free Press.

Roughead E, Lopert R and Sansom L. Prices for innovative pharmaceutical products that provide health gain: a comparison between Australia and the United States Value in Health 2007;10:514-20

Schumpeter, J. A. (1943) Capitalism, Socialism, and Democracy. Routledge, 6th ed. Pp. 81-84

Tödtling Franz (2006): The role of universities in innovation systems and regional economies. Expert meeting on The future of academic research, Vienna, 19-20

October 2006

Tuomi, I. (2002). Networks of Innovation.Oxford University Press. Networks of Innovation

Christensen, C. (2002). "The Rules of Innovation". Technology Review 105 (5): 32–38.

Thomke, S. H. (2003). "Experimentation Matters: Unlocking the Potential of New Technologies for Innovation". Harvard Business School Press.

Von Hippel, E. (1988). Sources of Innovation.Oxford University Press. The Sources of Innovation