

Research Article

Adoption Level of Government and Private Sector Support on Innovation in TVET Institutions in Kenya

J. O. Abuto¹, O. Odek²

¹Department of Mechanical Engineering, ²Department of Electrical and Electronics Engineering, The Kisumu National Polytechnic, P.O BOX 143-40100; Kisumu. Kenya.

*Corresponding author's e-mail: ochiengodek@gmail.com

Abstract

Innovative technology is the cornerstone of any country's prosperity, the primary source of economic competitiveness, job and wealth creation. It is also regarded as the prime mover of our daily lives. From the 19th century's advances in manufacturing and transportation to today's cutting-edge technology in biotechnology, space technology and computer science, the world major blue chip companies have continuously developed and deployed innovative technology in their processes to create wealth. Nobel Laureate Robert Solow's classic 1956 economic model of productivity growth demonstrated that technological progress and innovation drove at least 80% of economic growth in the United States between 1909 and 1949, and innovation continues to be perhaps the most powerful engine of this prosperity to date. Today, the world is in economic crisis. There is tremendous unemployment of the youth especially in sub-Saharan African countries. The study sought to establish the adoption level of Government and private sector support on innovation in TVET institutions in Kenya. A cross sectional survey was done using structured questionnaires administered to lecturers and students of TVET institutions. The motivation of the study was based on the fact that in pursuit for elimination of unemployment there is strong need that innovation needed to be supported as a way of improved engagement for the youth and as a panacea to unemployment in Kenya. The research established the following; the government and private sector adoption level is low as 72% of the respondents a tested to the same. From the findings, 90% of the respondents stated that funding was a major hindrance to the commercialization of innovations. Finally the study sought to establish the challenges facing innovators in TVET institutions in Kenya. The following were sighted as challenges by the innovators; finance, marketing, dynamic technology, patenting and property rights, attitudes of the Kenyan buyer on "jua kali" products and finally machine tools to facilitate classic or near classic finish on the products.

Keywords: Innovations; Seed money; Private sector support; TVET institutions.

Introduction

The contribution of new technology to economic growth can only be realized when and if the new technology is adopted, widely diffused and used. Innovation involves finding a new and better ways of doing something basically to improve lives in the society. Much of our modern society life styles and activities are based on innovations that have occurred in the past that provide us with the standard of living we enjoy today [1]. Innovative technology is the cornerstone of any country's prosperity, the primary source of economic competitiveness, job and wealth creation. It is also regarded as the prime mover of our daily lives. From the 19th century's advances in manufacturing and

transportation to today's cutting-edge technology in biotechnology, space technology and computer science, the world major blue chip companies have continuously developed and deployed innovative technology in their processes to create wealth. Safaricom Mpesa technological innovation has made life easy in Kenya and has revolutionized the economic activities. Innovation continues to be perhaps the most powerful engine of prosperity to date [2].

The promotion of innovation, in particular technological innovation, in developing countries is becoming a fashionable subject. The growing interest in the subject stems from a recognition that it is necessary to go back to basics after experiencing the limits of traditional

economic policies encapsulated in the “Washington consensus” approach. This set of privatization, liberalization, and deregulation policies have clearly demonstrated their limits for promoting sustainable growth in the developing world. Similarly, policies focusing on modernization, in the sense of building infrastructure and institutions with a more interventionist government, have not yielded the expected fruits as supporting technological innovation could do [2]. Supporting innovation would be the only to curb crime especially in sub Saharan Africa [3].

Today, the world is in economic crisis, there is tremendous unemployment of the youth resulting to high poverty in many households, leading to numerous criminal activities in our cities. It should be noted that the most affected are the sub Saharan African countries. To harness the solution we must take a new look at the process of innovation and determine the best mechanisms to catalyse and accelerate innovative technology development as a source of wealth creation. This requires looking beyond both the mythos of the lone inventor and the market fundamentalist ideology that has dominated the business world in recent decades. Instead, we must look closely at several key innovations and technologies as they develop in a wider scale and involve government investment and private sector support to harness them [2]. While academic scholars and some policymakers have long realized the importance of government investment in stimulating technological change and innovation, such awareness has been conspicuously absent from the mainstream of most governments’ policy structure and planning system. This research project is meant to reintroduce the importance of public investment to that debate by citing some case studies of cutting age blue-chip companies that have basically thrived due government support on their innovation. The case studies that follow offer but a few examples of how government action has directly led to many of the key technologies we take for granted in our modern lives. These case studies demonstrate that strong and targeted government investment can and must play a powerful role in the critical effort to overcome innovation challenges. In the last ten years the Kenya government through the Ministry of education science and technology have show cased various innovation and exhibits

in ASK shows, NCST and TVET exhibitions and conferences conducted in Kenya. In these exhibitions more than 40 institutions have exhibited at least five innovations each year however out these none has been traced to the Kenyan market as a commercialized product they have remained as exhibits, prototypes or models in institutional workshops all these years. This has been as a result of lack of seed money to commercialize the production of these innovations. The innovations have only gotten funding for research, development and proto type fabrications but they have remained as such in the institutions workshops. The problem therefore has been lack of commercialization of innovations. Policies supporting technology development are known as “innovation policies”. Although governments have a long such practice of promoting innovation by various measures of both a direct and indirect nature, the explicit formulation of innovation policies began about 40 years ago in the 1960s. Since then such policies have been expanded and improved, while new analytical concepts, such as the concept of “national innovation system”, have been elaborated [4].

It should be clear that the concept of “innovation” encompasses not only “technological innovation”, i.e. the diffusion of new products and services of a technological nature into the economy, but equally it includes non-technological forms of innovation, such as “organization” innovations. The latter include the introduction of new management or marketing techniques, the adoption of new supply or logistic arrangements, and improved approaches to internal and external communications and positioning [5]. The role of any government in the support innovation is to provide the necessary financial support [2]. Experience shows that innovation flourishes in well-defined regions where there is a concentration of talent, energy, and vision. It is also crucial that support be delivered as close as possible to enterprises and individual innovators. This could be done through the establishment of antennas of central agencies which enjoy enough autonomy for project selection and funding, and matching funds based on the overall contribution of the project to the community. The resources and support programs should be in such a way that they stimulate infrastructure and other innovation programs. These approaches could

work in developing countries as long as they are implemented with simple methods and means in a certain transparency [3]. The establishment of technological parks or special industrial zones is a favoured model in a number of developing countries. A right approach is to build such techno-parks close to universities and associate dynamic business communities to their development [2]. Building of appropriate research structures. Research activities, from basic to more applied, need to be adapted to local needs and capabilities. In fact, a major problem in a number of developing countries is the lack of interfaces between research bodies and local communities. Improving linkages depends primarily on the conditions of financing of such research bodies. A key rule of thumb, illustrated by the experiences of the developed countries, is the provision of a definite share of guaranteed resources (core funding), ranging from 50 to 70 percent to the total available budget, and 30 to 50 percent of more volatile resources (contracts). Some developing countries have been able to transform large sections of their research structures along these lines; India is a case in point [6].

The legal and regulatory environment need to be made favourable by the government for innovation to develop; many of the major obstacles to innovations in developing countries are related to the institutional environment: government authorizations of various types, government procurement, technical norms and standards, competition, customs, industry-university relations, finance and banking, intellectual and other property rights, without counting those obstacles of a more informal nature. Such obstacles are not fundamentally different from those to be encountered in the developed world, but they are much more difficult to address, notably because of the absence of an efficient legal system [7].

Innovation can be conceived but manufacturing capabilities may be completely unequal to making them and as a consequence the government had to support the innovators and help in both the manufacture and diffusion of the technology by adopting the technologies. The following cases reveals this: Samuel Langley and the Wright brothers innovation only thrived after federal government put in fund to support the research and development of aeroplane manufacturing and Boeing industries

[8]. Government involvement, from research support to deployment initiatives, was the critical catalyst for this remarkable turnaround, laying the foundations for America's modern aviation industry. Government purchases enabled the application of new advances in technology to domestic manufacturing, and equally importantly, nurtured the emerging companies of the American aviation industry. Among the companies sustained by government contracts was a little-known manufacturer called Boeing [9]. An antique Apple II PC is another innovation that was actively supported by the federal government, particularly the U.S. military and space programs. This led to the rise of Silicon Valley. Indeed, today's personal computer embodies a decade's long collaboration between private innovators and an active government support [10].

The legend of the personal computer (PC), as it's normally told, emphasizes individual brilliance and initiative. The origins of today's industry titans like Microsoft and Apple are surrounded by romantic images of college dropouts tinkering away in garage workshops. This story is one of independence, of genius allowed to run free and inventions flourishing in the open market. Of course, the government is conspicuously absent here; as Bill Gates has said, "the amazing thing is that all this happened without any government involvement. "But it could have not, without private sector support [8]. The government was also heavily involved in the development of computer software. Defence agencies funded the basic R&D that led to early computer programs and programming languages. During the 1970s, in fact, defence spending fuelled over half of all academic computing research, and grants from the military's Advanced Research Project Agency (ARPA) established the first university computer science programs at MIT, Stanford, Carnegie and Mellon Colleges [8].

In addition to producing major computing advances through research funding and direct acquisition, the federal government also cultivated the innovators and engineers of the modern computer industry. Many of the minds behind the ground breaking work at Xerox's Palo Alto Research Centre (PARC), the famous computer research centre, and at corporations like Microsoft and Apple came straight from government agencies. Bill Gates and Steve Jobs

might be famous names today, but others were crucial in the PC's development, men like J.C.R. Licklider, a pioneer theorist of human-machine interactivity and computer networking, and Ivan Sutherland, whose government-funded Sketchpad project created the first interactive graphics program and led to the invention of the computer mouse [11]. Chivers, in his book the Gun narrated that Mikhail Kalashnikov began his career as a weapon designer and he designed Automatic Kalashnikov (AK-47) while in a hospital after he was shot in the shoulder during the battle of Bryansk. It is the Russian government involvement in this innovation that resulted into now renowned wonder gun [12].

Materials and Methodology

The study used cross-sectional survey design. Descriptive survey has been described as the method that involves seeking the opinion of a large group of people by questioning them about a particular issue [11]. The study focused on the students and staff innovations over the last five years i.e. 2008-2013. The population of the study was drawn specifically from TVET institutions. The institutions were purposively sampled based on their level of participation at the national TVET fairs and ASK shows with their exhibits. The study gathered the primary and data through the use of questionnaires with open and closed ended questions to capture qualitative and quantitative data on the adoption level of government and private sector support on innovations in TVET institutions.

The researchers particularly administered the questions and questionnaires to individual staff or students innovators that were sampled during the ASK shows in Mombasa and Nairobi from the various TVET institutions represented at these trade fairs. All these were done in confidence to allow for practically personal and un-influenced individual response. A total of 30 exhibitors were purposively sampled, and the researchers felt that this number was representative enough to elicit reliable result on the objectives of this research.

Results and discussion

The study sought to find out the adoption level of government and private sector support on innovation in TVET institutions in Kenya and the result are given in Table 1.

Table 1. Innovation in TVET institutions in Kenya

Innovation	Percentage
Not at all	12%
Low	72%
Moderate	10%
Good	6%
Excellent	0%
Total	100%

From the findings in table 1 it was established that the government and private sector adoption level is low as 72% of the respondents a tested to the same. Secondly, the study sought to find out why the innovations in TVET institutions have not been commercialized, the response are as follows on the following variables (Table 2):

Table 2. Commercialization of innovations in TVET institutions

S. No.	Statement	No. Response	%
1.	Funding(availability of seed money)	27	90
2.	Comparative technology	21	70
3.	Exposure(Lack of Exhibition)	12	40
4.	Poor Marketing strategy	10	33
5.	High cost of production	12	40

Funding (availability of seed money) was rated at by 90% of the respondents as major hindrance to the commercialization of innovations. Comparative technology was rated at 70%. It was clear that exposure that is done to the innovations is good as only 40% saw it as an issue that hinder commercialization. Poor marketing and high cost of production is not an issue that hinders the commercialization of innovations. Third, the study sought to establish whether both government private sector support and funding would accelerate the commercialization of innovations, the respondents that this support will accelerate the commercialization of innovation to a great extent (4.2) on a scale of 1 to 5.

The study rated the mean response on the following areas on a scale of 1 to 5 i.e. 1 no support at all to 5 supported fully.

Table 3. Acceleration in the commercialization of innovations

S. No.	Statement	Response				
		1	2	3	4	5
1	Innovations has been supported Financially				√	
2	Marketing					√
3	Technology		√			
4	Patenting				√	

1. Not at all; 2. Not sure; 3. Less extent; 4. Supported partially; 5. Supported fully.

The study sought to rate the extent to which the government private sector has supported innovation financially, the result reveals that the government has supported innovation partially (3.23). On marketing of the innovations, it was established that, the government has supported fully (4.78) marketing and exposure of innovations. Technology (2.3), most of the respondents were not sure. On patenting the government has supported partially (4.12) the innovation. Most respondents felt that the process of patenting is long and demanding. Finally the study sought to establish the challenges facing innovators in TVET institutions in Kenya. The following were sighted as challenges by the innovators.

Finance was identified as the major factor determining the development, growth and survival of innovative technology. Access to finance would allow the innovators to undertake productive investment and create wealth assisting in SDGs. initiated by governments with their donor agencies. Marketing, it was established that most innovation fail to see the light of the day due to the fact that, penetration to the market mix by new products innovated and produced locally is near impossible. Dynamic technology, the productive technology is rapidly changing, and their competitors are using cheap technology to produce the same product or alternative, thus rendering the innovation to be very expensive. Patenting and property rights, most of the innovators sighted that the patenting process has never been easy and thus their exhibits after the first show case, it

is being produced by other people and they have very little to do. Even the protection policy for innovative policy is near absent if it is not absent. Enhancement of this policy has not been established well by the relevant authorities. Attitudes of the Kenyan buyer on “ jua kali products”. The Kenyan customers believe on the imported logo so much that, this is also stifling local innovation. Machine tools to facilitate classic or near classic finish on the products. Most of the innovations though they can perform the work, their aesthetic standards is wanting and this is a big challenge to the innovators.

Other findings established that the government has done well in funding the innovations at level of exhibitions but support has been lacking at the crucial stage of commercial production which can assist institutions and individual innovators to create wealth and employment. It was also evident that, NCST has also supported scantily research and development and model fabrications to a few innovators.

Conclusions

There was a big challenge of how the innovative prototypes can be commercialized and therefore there strong need for the government and private sector support in the form of seed money and commercial logistics to assist in the innovative projects to take off. Tripartite collaboration between the government, private sector and TVET institutions needs to be enhanced for the achievement of vision 2030 government strategy on Science Technology and Innovation.

Conflicts of Interest

Authors declare no conflict of interest.

References

- [1] Drucker PF. Innovative and Entrepreneurship practice. Iowa: Harper & Row, Publisher; 1985.
- [2] Arnold Z. Case studies on American innovation. New York: World Energy Outlook 2008. 2009.
- [3] Aubert JE. Promoting innovation in developing countries. A conceptual frame work. World Bank Institute; 2004.
- [4] Jacob SH, Paul P. Why technology innovation relies on government support. Atlantics Politics and Policy; March 2016.

- [5] Glenn F. ARPA Does Windows: The Defence Underpinning of the PC Revolution. *Business and Politics*. 2001:3(3):213-237.
- [6] Dede C. Six Challenges for Education Technology. George Mason University; 1997.
- [7] Block F. The vital role of government in USA economic innovation. California: Scholars Strategy Network; 2010.
- [8] Roger B, NACA Origins (1915-1930). In *Orders of Magnitude: A History of the NACA and NASA*; 1989:1915-1990.
- [9] Mugenda MO, Mugenda AG. *Research Methods: Quantitative and Qualitative Approaches*. Nairobi: Acts Press Network; 2003.
- [10] Ruttan V. *Is War Necessary for Economic Growth? Military Procurement and Technology Development*. Oxford University Press; 2006.
- [11] Kenya sisal board. *Sisal industry in Kenya an overview*. Nairobi: Kenya sisal board; 2009.
- [12] Chivers CJ. *The wonder gun*. Simon and Schuster Publishers; 2010.
