



The Scinnovent Centre
SCIENCE, INNOVATION AND ENTERPRISE



Stuck on the road to the market:

Why Kenya suffers from stunted innovations

Scinnovent Discussion paper **01**

www.scinnovent.org

Stuck on the road to the market: Why Kenya suffers from stunted innovations

Authors: Bolo, Maurice., Odongo, Dorine., Awino, Victor., Achieng, Vivian and Onyango Calvin.

The Scinnovent Centre

Corresponding author: Maurice Bolo

Email: Bolo@scinnovent.org

© 2014 The Scinnovent Centre

Editing, design and layout— Scinnovent Centre publishing services, Nairobi.

ISBN 978-9966-1858-0-8



Cover photo—C.Schubert, CCAFS.

Citation: Bolo, M., Odongo, D., Awino, V., Achieng, V., and Onyango, C. 2014. *Stuck On The Road To The Market: Why Kenya Suffers From Stunted Innovations*. The Scinnovent Centre Discussion Paper 01. Nairobi, Kenya: The Scinnovent Centre.

About the Scinnovent Centre

The Scinnovent Centre is a policy and development think tank registered in Kenya as a not-for-profit company.

Our primary concern is that despite advancements in science, technology and innovation (STI), poverty levels in Africa are increasing; environmental degradation is worsening; the ecosystem has become more fragile; sustainability has been compromised and livelihoods threatened. So the big questions remain: why have the developments in science, technology and innovation not made any significant difference in African development? Why have STI policies not translated into practical change on the ground? How come pockets of success piloted across countries have not scaled?

Our work focuses on understanding the barriers to the adoption and use of science, technology and innovation for decision-making and wealth creation. We focus on three main barriers namely: (i) Policies and legal frameworks that shape incentive structures for the generation, sharing and application of science, technology and innovation (ii) Institutional and governance frameworks including the rules, norms, habits, structures, practices and mindsets that condition behavior towards science, innovation and entrepreneurship and (iii) individual and institutional capabilities including technical, organizational and managerial skills required to turn science and technology into business and social enterprises

Our goal is to link the ends (societal development needs) with the means (science and technology-enabled innovations) and act as the bridge that closes the gap between advances in STI research on the one hand, and the uptake and application of research outputs for social and commercial needs on the other. To achieve this goal, we conduct research to generate evidence that supports policy and decision-making; offer targeted training programmes that enhance the skills for innovation; and facilitate dialogue and interactive learning amongst different actors with a view to helping our key stakeholders (rural communities, the private sector and decision-makers) translate the knowledge, technologies and skills into practical action that changes lives.

For more information, contact us:

The Scinnovent Centre

P.O. Box 52486 - 00100, Nairobi, Kenya

Tel/Fax: + 254-20-2173433

Tel: +254-20-2470946

Email: info@scinnovent.org

Web: www.scinnovent.org

Twitter: @Scinnovent

Facebook: www.facebook.com/scinnovent

Blog: www.scinnovent.wordpress.com

Slideshare: www.slideshare.net/Scinnovent

LinkedIn: www.linkedin.com/company/the-scinnovent-centre

YouTube: <https://www.youtube.com/user/TheScinnoventCentre>



Gate 123 | Mountain View Estate | Off Waiyaki Way, behind Total Petrol Station
P.O. Box 52486 - 00100 GPO, Nairobi, Kenya
Tel/Fax: +254 - 20 217 34 33 | Email: info@scinnovent.org
Website: www.scinnovent.org

Contents

Acknowledgements	i
Acronyms	ii
Summary	1
Introduction	2
Methods and data sources	4
The findings	4
Innovation	5
Funding	6
Skills and expertise	7
Policies and markets	8
Private sector support and education curriculum	9
Intellectual property rights	10
Discussion	13
Access to credit and financing for innovation	13
Training and mentorship in innovation-enabling skills	14
Infrastructure to support innovation	14
Need for a cultural and mind set change	14
Sensitization and support for intellectual property rights protection	15
Recommendations	17
References	18
Appendix I: Innovators' Details	19

Acknowledgements

This work was carried out with the aid of a grant from the International Development Research Centre (IDRC), Ottawa, Canada

We give special thanks to the National Commission for Science, Technology and Innovation (NACOSTI) for organising the annual science week and giving The Scinnovent Centre the platform to conduct this survey.

We also thank all the innovators who gave their time to respond to this survey.

Acronyms

GDP	- Gross Domestic Product
ICT	- Information and Communication Technology
IP	- Intellectual Property
IPR	-Intellectual Property Rights
KEKOB	- Kenya Kountry Business Incubation
KENIA	- Kenya Innovation Agency
KEPSA	- Kenya Private Sector Alliance
KICC	- Kenyatta International Convention Centre
KIPI	-Kenya Industrial Property Institute
NACOSTI	- National Commission for Science, Technology and Innovation
NRF	- National Research Fund
R&D	- Research and Development
S&T	- Science and Technology
ST&I	- Science, Technology and Innovation
STI	- Science, Technology and Innovation
TTIs	- Technical Training Institutes
UNESCO	- United Nations Education Science and Cultural Organization

Summary

There has been renewed vigor towards harnessing science, technology and innovation (STI) for development in Kenya. A number of policy initiatives (financial, legislative and informational) have been set up by the government in collaboration with other players in the national innovation system, to support the translation of knowledge into practical applications for social and economic use. For instance, the country's development blue print, the Kenya Vision 2030, has been anchored on science, technology and innovation as the bedrock upon which the three pillars (economic, social and political) are erected. This is a clear demonstration of the government's acknowledgement of the important role for STI in attaining its envisaged middle-income status by the year 2030.

Additionally, the enactment of the Science, Technology and Innovation Act (2013) heralded a new era in the STI landscape in Kenya (Republic of Kenya, 2013). This Act provides for the creation of the National Research Fund (NRF) and allocation of 2% of GDP to research and development, an initiative which is unparalleled in Africa and has the potential to significantly boost research and development in Kenya. The Act also provides for the creation of the Kenya Innovation Agency (KENIA) to scout for and promote innovations in the country. This is a landmark development, with KENIA envisioned to establish offices in all the 47 counties and work closely with county governments in scouting, selecting, promoting and supporting local innovations. Further, the Act provides for the establishment of the National Commission for Science, Technology and Innovation (NACOSTI) whose objective is to regulate and assure quality in the STI sector, and advise the government on STI matters. This elevates the position of STI within government's ranks and provides a framework for guiding the development of STI in the country.

NACOSTI has been providing seed funding to various innovators as part of its efforts to support STI in the country. While the numbers of those benefitting from this seed funding has continued to increase over time, the transition to market has rather been slow and stagnant in most cases. This slow transition/stagnation is a pointer that while finance/capital is a key handicap to innovators, there are other factors undermining the full commercialisation of products from their innovations. The purpose of this survey was to interrogate these other challenges facing innovators in Kenya with a view to making recommendations to the various actors within the national innovation system on the various kinds of support required to ensure Kenyan innovators meet their full potential.

The survey was conducted during the Annual Science, Technology and Innovation (STI) Conference and National Science Week held on 19 to 23 May 2014 at the Kenyatta International Convention Centre (KICC). The survey targeted exhibiting innovators during the conference, and a total of 34 respondents were reached. Semi-structured questionnaires were administered to capture their views on a range of issues including intellectual property rights; financing; market access; receptivity of the market to local innovation; policy support; role of the private sector and role of universities and other training institutions.

The recommendations emerging from the study include the need for government to (i) fast-track the establishment of venture capital to fund innovation and provide tax credits for investments in R&D, (ii) spearhead preferential purchasing of locally manufactured products through its procurement policies (iii) entrench technology and business incubation centres in all the technical training facilities and (iv) enhance awareness, sensitization, and support for intellectual property rights protection

Introduction

A recent report by the United Nations Educational, Scientific and Cultural Organization (UNESCO) has highlighted Science, Technology and Innovation (STI) as one of the most important and enabling tools, that lead to shifts in comparative advantage and competitiveness of economies worldwide (UNESCO, 2010). It further reports that while on the one hand Africa is replete with natural resources, intellectual capital, indigenous knowledge and culture, on the other hand it is still at a comparative disadvantage when it comes to overall development. This has been attributed to several obstacles including low investment in science and technology, low education levels and brain drain (among others) which results in poor infrastructure development, a small pool of researchers and minimal scientific output. (UNESCO, 2010). Research and development in Africa attracts significantly less public funding than other sectors such as education and health, with only 0.3% of GDP dedicated to research and development on average across the continent. This is seven times less than the investment made in industrialized countries. Access to higher education and brain drain are seen as big challenges, with the 2008 enrolment reported to be below 4% in 25% of total African countries, and in 2009, at least one third of Africa's scientists and technology graduates were living and working in developed countries (ibid).

The weak link between research in the universities and research centres and the immediate needs of the private sector, and relevance of research findings to the local industries has also been identified as a fundamental issue. The Commission for Africa reports that there is insufficiency in African Universities towards meeting the needs of the industry, due to mismatch between Research and Development activities and national strategies and goals for industrial development (Commission for Africa, 2010). This limits the access and use of these research findings by the local industries from the public research institutions.

Isolation between what universities teach and the needs and demands of private sector is cited by many scholars as one reasons for weak performance in building technological capabilities. Despite the concentration of R&D in some fields like agriculture and medicine, community services remain a peripheral appendage to the university system in most African countries (UNESCO, 2010).

The Kenya Vision 2030 (Republic of Kenya, 2007) and the Kenya Constitution (2010) explicitly place a premium on the role of science, technology and innovation in guiding Kenya's transition to a knowledge-based society. To achieve the goals in the second medium term plan (MTP II), the STI sector has proposed a number of guiding principles including: Public Private Partnerships (PPPs); linking industry with academia; value chain analysis; synergy (as opposed to institutional competition) and initiatives for closed-cycle cluster approach for enhanced cooperation. These principles, it is hoped, will enable the sector play a critical role in ensuring that all other sectors of economy have access to the necessary technologies that will increase production and quality in a diverse range of products, processes and services.

The ST&I policy 2008 (Republic of Kenya, 2008) and ST&I Act 2013 (Republic of Kenya, 2013) provides a platform to leverage ST&I to transform the economy through implementation of the national priority areas, create an effective and efficient Kenya National Innovation System, operationalise the triple helix, and commercialise research outputs through the Innovation Agency (KENIA), mobilize at least the equivalent of 2% of GDP annually from the government, private sector and other sources to fund the entire ST&I value chain. The ST&I Act 2013 also provided for the establishment of the National Commission for Science, Technology and Innovation (NACOSTI) as a successor to the National Council for Science and Technology. The Commission's objective is to regulate and assure quality in the science, technology and innovation sector and advise the Government in matters related to STI.

The National Commission for Science, Technology and Innovation (NACOSTI) instituted an innovation fund targeted at young inventors, innovators and entrepreneurs. NACOSTI funded 78 innovation projects between 2009 and 2013. The amounts varied from KSh. 3,857,000 (the highest) to Kshs. 200,000 (the least) with the average allocation being KSh. 978,266. The total funds disbursed under this fund amounted to KSh.76,304,762 for innovation projects in different thematic areas including agriculture

and food technology, energy, engineering, health, information and communication technology (ICT), pure sciences (biology, chemistry and physics), and social sciences. The area that received the largest share of the innovation projects fund is ICT, which accounted for 36.58% (KShs. 27,913,375) of the total grants awarded. Social sciences was the least beneficiary of these funds with only 1.9% (KSh. 1,448,000) being allocated to it.

The figure 1 below summarize the distribution of the grants awarded to innovation funded projects by thematic area from 2009 to 2013.

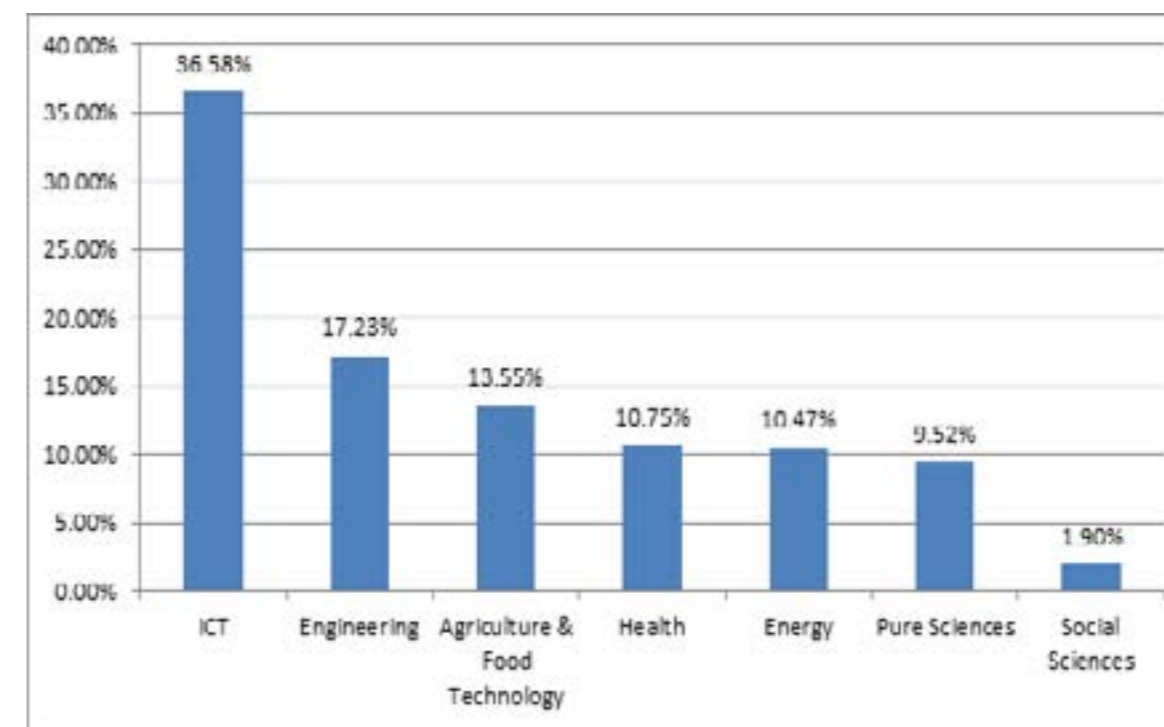


Figure 1: Distribution of NACOSTI funded innovation projects by thematic area

In spite of all these efforts, the STI landscape in Kenya still faces myriads of challenges including: a weak and largely dysfunctional national innovation system characterized by lack of coordination and interaction amongst the various actors, particularly the knowledge generating actors (the research system) and the intended beneficiaries/users of that knowledge (the private sector, broadly defined to include communities); lack of a national research policy and agenda that corresponds to the direct needs of the private sector; minimal funding for research from the public coffers and weak participation of the private sector in supporting research and development; misalignment of the educational curricula both at the universities and other tertiary institutions with the needs of the market; weak infrastructural support for innovation and entrepreneurship and a national culture that shuns local innovations in favor of imported products.

Against this backdrop, the Scinnovent Centre conducted a survey to investigate the challenges facing innovators and identify the barriers they face in commercializing their innovations. The report is organized as follows: Section two provides the context for the survey, followed by the methods and data sources in section 3. Section 4 presents the findings while section 5 presents the discussions and recommendations.

Methods and data sources

The survey was conducted between 19 and 23 May, 2014 to investigate the level of innovation, skills and expertise of the innovators, policy influences and markets, funding as well as the intellectual property rights used by the innovators. In this survey, innovation was classified into three broad types which included sustaining innovation, new market innovation and break-through innovation. This was based on Tidd (2001) who defines the three types of innovation as below:

- Sustaining innovation is that which aims at improving an existing product by developing generations until the product reaches the end of its life cycle. For example, production of handmade paper from the water hyacinth weed.
- New market innovation involves use or application of an existing product in a new way and sometimes even for different segment of customers. For example, a mobile phone based application for budgeting and shopping.
- Break-through innovation involves production of a new product, way ahead of the next best thing. It combines the functionality of several different products into one. For example, production of omega 3 fatty acids from Nile perch waste.

This survey further sought to establish the extent to which the innovators received private sector support if any. Private sector here was used to refer to large firms and private companies which are well established and have been in existence long enough to demonstrate significant influence in the economy. The study considered 'support' to include mentorship, training, incubation services, and financial support for start-ups.

The study employed a mixture of document reviews (relevant laws, reports and policy documents) with a questionnaire survey and in-depth face-to-face interviews. The questionnaires were administered to a sample of 34 respondents from 11 counties including Busia, Homa bay, Kericho, Kiambu, Kisii, Kisumu, Migori, Nairobi, Nyandarua, Tharaka Nithi and Uasin Gishu. The data was subjected to descriptive analysis using the Statistical Package for Social Sciences (SPSS).

The findings

Out of the total respondents reached, 17.6% were female while 82.4% were male. The respondents' distributions by education level and age are as shown in the **Table 1.1** and **Table 1.2** respectively.

Table 1.1: Distribution of respondents by education level

Level of Education	Percent (%)
Secondary	32.4
Tertiary College	23.6
University (Undergraduate)	38.2
University (Post graduate)	2.9
Others	2.9

Table 1.2: Distribution of respondents by age

Age	Percent (%)
Below 18 years	11.8
18-24 years	64.7
25-35 years	17.6
Over 35 years	5.9

Innovation

The analysis of the respondents' innovation revealed that 58.8% had a sustaining innovation, 38.3% had new market innovation and only 2.9% had a break through innovation. Table 2 shows the distribution of these innovations among the three categories:

Table 2: Distribution of the different innovation types

New Market Innovation	Break through Innovation	Sustaining Innovation
Light control system	Production of omega 3 fatty acids from Nile Perch waste	Extraction of natural dye
Mobile overhead shower irrigation system		Bioremediation of grey water using microbes
Test-tube washing machine		ICT in automotive engineering training
Networked security system		Motion detecting security system
Computer animation using PowerPoint		Making beads out of waste paper
Bicycle powered pump		Grain storage
Groundnut seller		Biogas production from polythene bags
Electrical and Electronic GPRS system		Landscape checkerboard crop production
Mobile budgeting and shopping application		Maize Thresher
'IKO' phone is a smart payphone that bridges access gaps in telecommunications		Simple water heater that can be used internally and externally
Potty Cleaner/Disinfectant		Production of handmade paper from water hyacinth
Trapping mosquitoes using homemade trap		Dehydrating eggs
Traffic rules compliant		Extracting ethanol from fruits
		Engine Block Lifting jack machine
	Production of caustic soda, NaOH and Hydrogen gas	
	Bio-decomposition of organic waste	
	Household water purification using seeds	
	Economical shoe polish	
	Making mosquito coil from locally available materials	
	Water-harvesting for greenhouse vegetable production (revitalized)	

The target market for these innovations were cross cutting from farmers, firms, government and learning institutions as well as households. The main target markets are households, recording 55.9%. This distribution of the market segments targeted by the innovators is shown in **Table 3** below.

Table 3: Distribution of market segments

Target market	Percent
Farmers	14.7
Firms	11.8
Government	5.9
House holds	55.9
Learning Institutions	11.8

Funding

Lack of finance/capital has been shown to be a major handicap to innovators in their quest to reach the market. Access to credit and financing for innovation were found to be a major barrier with 50 % of the respondents rating credit access as very hard to access, 11.8% of the respondents rating it as moderately easy to access and 38.2% rated it as hard to access. The respondents were asked to indicate the sources of funding for their innovations/projects. They were also asked to indicate how they obtained information about the sources of funds they used; as well as the ease of accessing the various sources of financing. The findings revealed that 82.4% of the respondents relied on donations from friends, family and relatives and 29.4% of the respondents obtained loans from banks and other financial institutions, while a further 35.3% and 26.5 % obtained grants and received support from non-governmental organizations (NGOs) respectively. None of the respondents had received loans government institutions.

The respondents were further asked to rate the ease of accessibility of the source(s) that they used, and on average 10 (35.7%) of those who obtained donation from friends, family and relatives rated it as very easy to access, 10 (35.7%) rated it as moderately easy to access while 8 (28.6%) rated as hard to access. On the other hand, of the respondents who obtained loans from banks and other financial institutions, 3 (30%) rated it as very easy to access, 3 (30%) rated it as moderately easy to access, and 4 (40%) rated it as hard to access. Similarly, 5 (41.7%) of the respondents who obtained grants rated it as very easy to access, 4 (33.3%) rated it as moderately easy to access, and 3 (25%) rated it as hard to access. 3 (33.3%) of the respondents who used Non-governmental institutions as their source of finance rated it as very easy to access, 4 (44.4%) rated it as moderately easy to access while 2 (22.3%) rated it as hard to access. 5 (38.4%) of the respondents who used other sources rated it as hard to access, 4 (30.8%) rated it as very easy to access, and 4 (30.8%) rated it as moderately easy to access. Figure 2 below gives a summary of the sources of funds used by the innovators and the ease of accessibility of these sources.

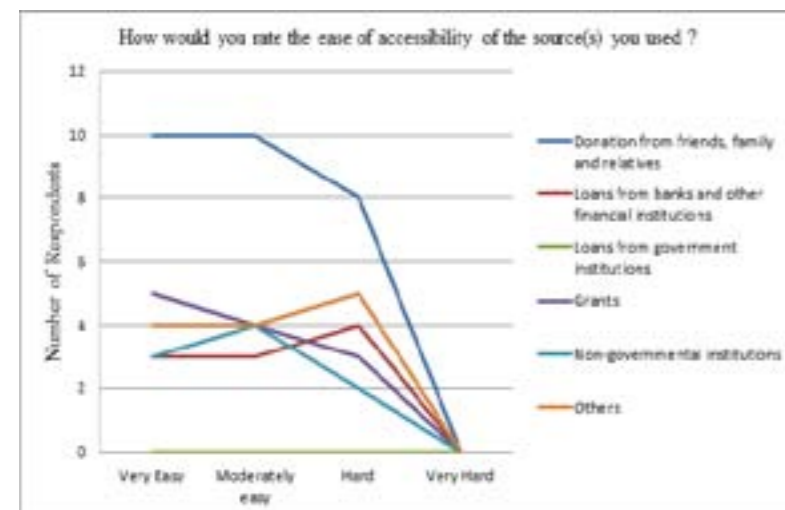


Figure 2: Funding sources and their ease of accessibility

In terms of sources of information on availability of funding, our analysis show that on average 47.1% got information from radio shows and television programs; 29.4% through their family, friends and relatives; 5.8% from the internet; 2.9% from other public fora; 11.7% from newspapers only, and 2.9% got information from a mixture of sources such as newspapers, friends, family, relatives and internet.

Skills and expertise

The process of translating knowledge into commercializable products and services requires a set of skills that are difficult to embody in one individual. In the survey, the innovators were asked about the skills they currently possess, to gauge where the weaknesses might lie and what other additional skills they may require to succeed in taking their products from the laboratories to the market. They were also asked to indicate and rate the support they had received (if any) from research and training institutes. This was to enable the team assess the role of our research and training institutions in bridging the skills gaps. The results show that on average only 8.8% of the respondents had training on marketing skills, 76.5% had training on technical skills, 8.8% had training on business management skills and 17.6% had training on other skills such as computer skills.

The research and training institutes had only offered support to 50% of the respondents. Table 3 below gives summary of the kind of support that the innovators had received from the Research and Training institutes, and how they rated the support; while box 1 shows what additional skills the innovators would require in order to optimize their potential.

Table 3: Type of support from research and training institutions

Type of Support	Supported Respondents (%)	Support received (%)		
		Very good	Good	Poor
Library access	38.2	46.2	46.2	7.6
Incubation Facilities	8.8	33.3	66.7	0
Marketing	11.8	25	25	50
Laboratory facilities	29.4	30	70	
Management	29.4	30	60	10
Others (internet access and mentorship)	8.8	100	0	0



Photo credit: Flickr

Box 1: Additional training/skills needed to optimize the potential of the innovators

- Business management skills
- Branding
- How to market and commercialize project outputs
- Information how to approach and win investors
- Marketing Skills
- Awareness on commercial laws i.e laws governing businesses
- Customer Relations
- Basic skills towards innovation management
- Patent Drafting
- Grant proposals development
- IP protection

Policies and markets

Policies and markets greatly influence the innovation environment and have a strong impact on how well an innovation will perform and eventually its market penetration. This survey sought to establish how government policies on taxation influenced innovation. On average the government taxation was felt to be fairly conducive for innovation with 52.8% of the respondents rating it as fairly conducive, 8.8% as conducive and 38.2% as un-conducive as shown in figure 3 below.

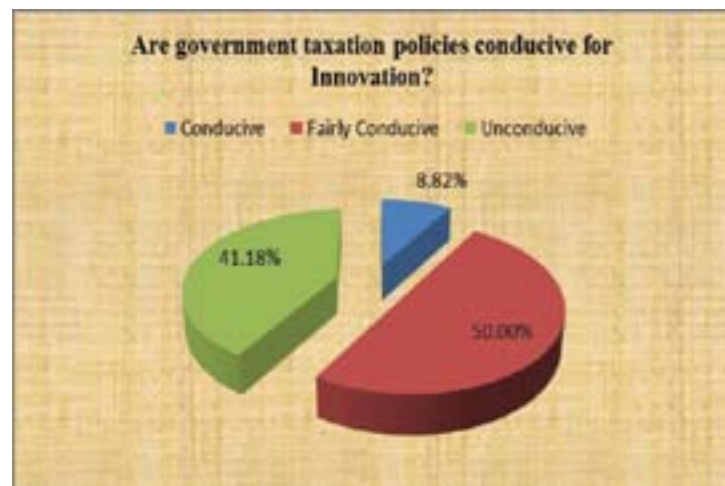


Figure 3: Effect of government taxation on innovation

In the survey, the respondents were asked to classify the market reception of their products on a scale ranging from very good to very poor. Majority of the innovators rated the market reception of their products positively, with 36% classifying it as very good, 36% as good, 16% as moderate and 12% classified it as poor.

Private sector support and education curriculum

The private sector and education curriculum also has a significant role to play in the uptake of innovations. This survey sought to establish if the innovators have engaged with the private sector and if they received any support from this group of actors.

Private sector was found to be moderately supportive to the local innovations as almost three quarters of the respondents i.e. 70.6% rated it as moderately supportive, 5.9% as very supportive and 23.5% rated it as unsupportive as shown in the figure 4 below.

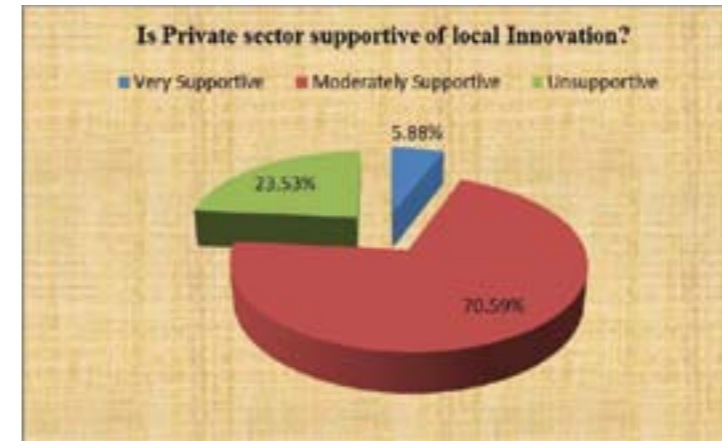


Figure 4: Private sector support for local innovation

The education system can be described as one of the key pillars that have a fundamental influence on the innovation capacity. On relevance of the education system in Kenya, only 14.71% of the respondents record that the education curriculum very well prepares the students for innovation and employment creation, with 23.53% considering the curriculum as very poor. The figure 5 below shows the views of the respondents on whether the Kenya's education curriculum prepares students for innovation and employment creation.

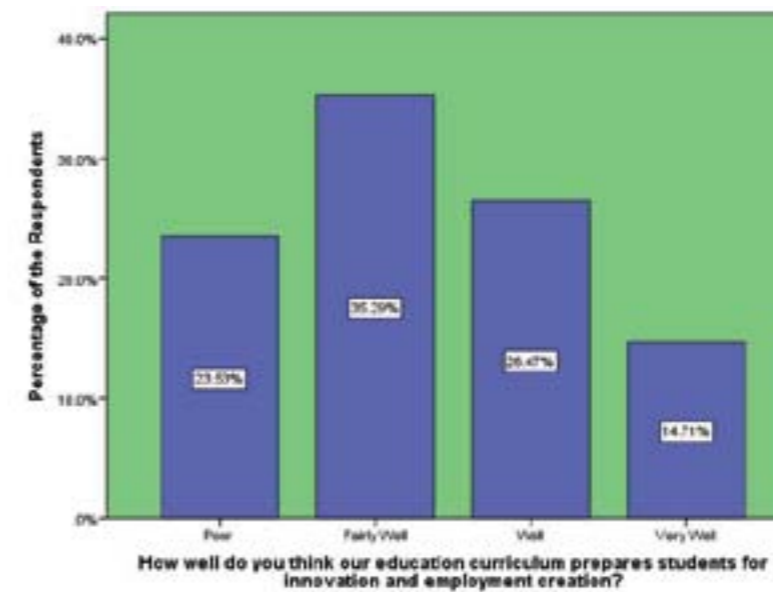


Figure 5: Relevance of education curriculum in employment

Intellectual property rights

The level of awareness of IP is quite low amongst the innovators with more than half of the innovators (53%) rating level of awareness as low, 17.6% rated it as very low, 26.5% rated it as high, and only 2.9% of the innovators rated it as very high as shown in the figure 6 below.

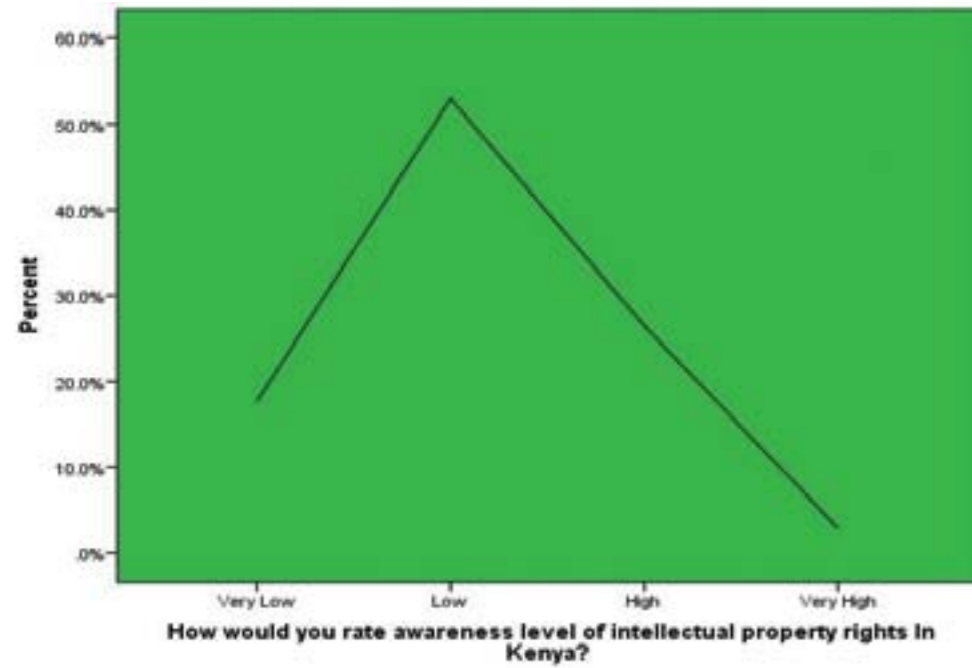


Figure 6: Level of awareness on intellectual property rights

The survey shows that 64.7% of innovators have not protected their innovations, 26.5% have applied for protection through patents; 5.9% have applied for protection through utility models and only 2.9% have applied for protection under industrial designs as shown in the figure 7 below.

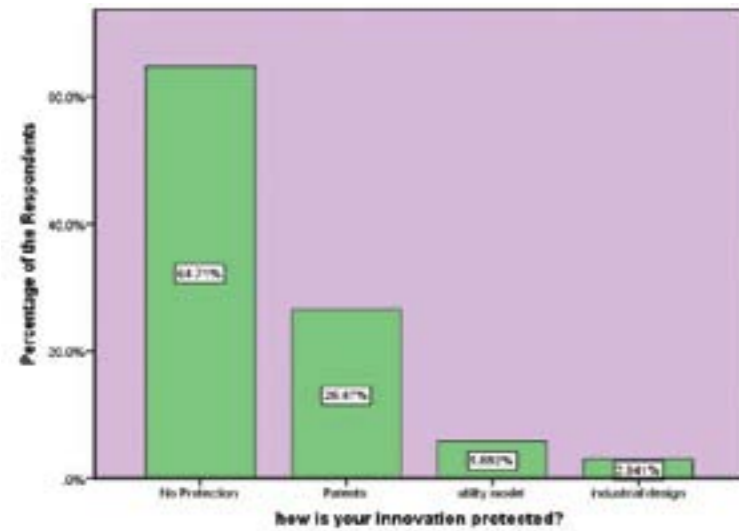


Figure 7: level of innovation protection

Ease of obtaining intellectual property rights protection was also seen to vary, with 44.12% of the respondents indicated that it is hard to attain IP protection in Kenya; 32.35% rated it as moderately easy to acquire, 17.65% rated it as very hard to acquire and only 5.88% said they are very easy to acquire as shown in figure 8 and table 4 below

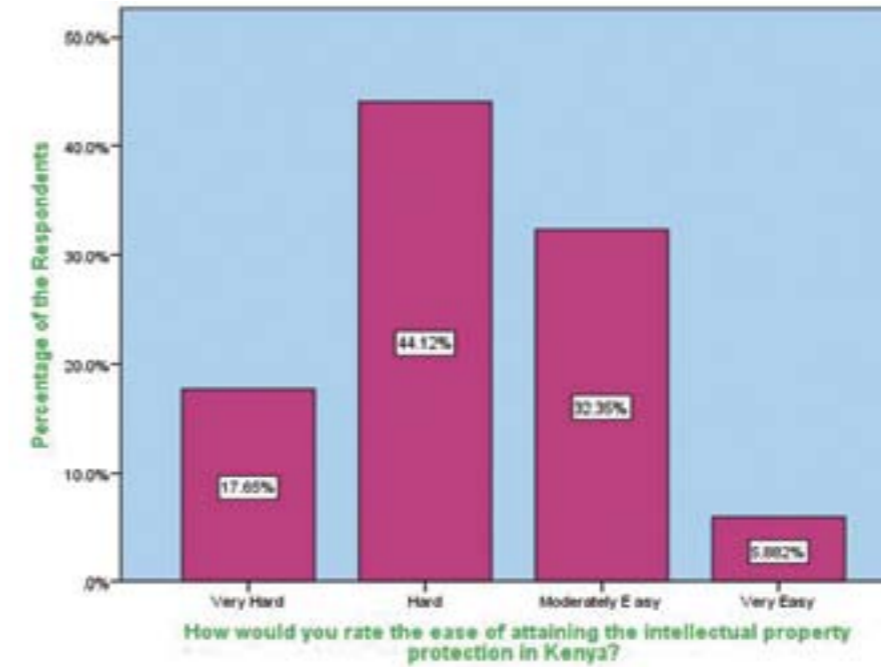


Figure 8: Ease of attaining intellectual property rights



Photo credit: ILRI

Table 4: Participants' comments on intellectual property rights

Issue	Comments
Awareness	<p>“There is little awareness on IP”</p> <p>“We are not aware of organizations that assist innovators to acquire the IPR”</p> <p>“Without awareness, it is not easy for a person in the rural areas to know what is to be done and again it should be decentralized for ease of access”</p> <p>“If property protection is done, even the innovators be recognized/identified with the product.”</p>
Procedures and processes	<p>“Too much bureaucracies in the application process; attaining intellectual property is procedural and time consuming”</p> <p>“It takes time for your projects to be vetted and proved to be an invention”</p> <p>“The procedures are long and take a while”</p> <p>“It is very expensive, takes a lot of time and follows a lot of procedures”</p> <p>“The procedure involved is very demanding”</p> <p>“Having been exposed to basic explanation by NACOSTI, the procedure appears to be less cumbersome”</p> <p>“The application process is self-explanatory, accessible and easy to use” [contrast with bureaucracy above]</p> <p>“Patent drafting is a challenge to most innovators”</p> <p>“It was not hard to access the patent of my project due to better communication”</p>
Costs	<p>“IP protection requires money which most people don't have”</p> <p>“Most IPR is thought/perceived to be involving and expensive to most Kenyans”</p> <p>“Cost of patent is high and the process is very long”</p> <p>“So many requirements are needed but the payments are relatively lower which is encouraging for starters”</p> <p>“The amount payable to the bodies is increasingly high and the public is not fully informed”</p>
Lack of support	<p>“Most officials are not ready to support new ideas, instead they take it up and discourage”</p> <p>“Limited number of IP advisors”</p>

Discussion

Access to credit and financing for innovation

This remains a major bottleneck for those attempting to move their products into the market. Over 50 % of the respondents viewed this as a key impediment as they lack the financial resources to fine-tune their products to produce in sufficient quantities that will make business sense and to finance any distribution and marketing of the products and services.

However, in recent years, we have witnessed the financial sector opening up with banks and other financial institutions coming up with products targeting innovations in the agricultural and industrial sectors e.g Chase bank supports technology entrepreneurship through Pivot East 2014, an innovative start-ups competition geared towards nurturing the growing ICT talent in East Africa (Pivot East 2014). Equity Bank has several products including agricultural loans such as *Kilimo Biashara*, a small scale loan that targets small scale commercial food crop farmers to help them purchase farm inputs such as certified seeds, fertilizers, chemicals, machinery hiring, labor and harvesting costs as well as *Kilimo Biashara Agri-business Loan* which assists the value chain players in the business of manufacturing, stocking, importing, exporting, and selling agricultural inputs and equipment to access credit facility to facilitate agribusiness enterprises to finance business working capital and operational needs (Equity Bank 2014). Similarly, the government has continuously attempted to bridge the financing gap for innovations with funds targeted mainly at the youth, women and other disadvantaged groups.



Photo credit: ILRI

To this end, the government has recently launched three initiatives which include the UWEZO ,Youth Development and Enterprise and the Women Enterprise Funds (Republic of Kenya, 2014). In addition, the government has increased the preferential quota in government procurement devoted to youth, women and other vulnerable groups to 30% from the previous 10%. While all these efforts should be lauded, there have been concerns raised on the accessibility of these funds to the targeted beneficiaries. While some have argued that the processes are tedious, some have faulted the eligibility requirements

for accessing these funds. From the standpoint of this study, the key concern would be whether these funds as currently designed would support innovation and entrepreneurship in the country.

This concern arises out of two major areas: First, while most of the innovators are individuals, the funds are designed to be accessible mainly to groups, using a group lending model that requires co-guarantorship. This model seems inconsistent with the nature of innovation (which is largely driven by individuals rather than groups). Secondly, most of these funds are to be accessed as loans with low interest rates. Investing in innovation is a gamble that is fraught with uncertainties. There's no knowing upfront which innovations will succeed in the market and which ones will flop. Subjecting these uncertainties to a loan facility that requires regular payments is not conducive to the innovation process. It is instructive to note that none of the respondents had accessed any of these government loans.

Training and mentorship in innovation-enabling skills

Training and mentorship will help upcoming innovators cross the valley to markets. The survey shows that most of the innovators are highly equipped with technical skills in their respective areas –76.5% of the respondents attest to this. However, only about 9% of the respondents had training/skills in marketing and another 9% had skills in business management. It would appear that the soft, innovation-enabling skills are the limiting factor to successful commercialization of inventions. From the survey, respondents decried the low level of private sector support for upcoming local innovators. It is increasingly emerging that some actors have identified this deficiency, as exemplified by the recent efforts by [Kenya Private Sector Alliance \(KEPSA\) with support from the World Bank](#) among other stakeholders, who have established the youth empowerment program aimed at providing disadvantaged unemployed youth with training, apprenticeships and short term jobs that will improve their long term employability and transform them into productive members of the society (World Bank, 2014). Similarly, the recently launched [Keroche Foundation](#) has also taken it up to support entrepreneurship and mentorship in the country by setting aside Kshs. 50 million to boost businesses of young entrepreneurs in manufacturing and service sectors (Nation Media, 2014).

Infrastructure to support innovation

There is a lot to be learnt when different people, working on different projects but facing similar challenges come together to share ideas, facilities, tools and platforms. This is what incubation centers provide for young and upcoming entrepreneurs. Although Kenya has witnessed an upward surge in incubation centers being developed in nearly all the major institutions of higher learning, only 8.8% of the respondents in this survey have received support in form of incubation facilities. The [Chandaria Business and Incubation Centre](#) (Kenyatta University, 2014) at Kenyatta University is probably the most high-flying at the moment but other universities have their own, supported by either private philanthropists or donors, or a mixture of funders. The University of [Nairobi's Fablab](#), based at the school of engineering is a glaring example of such an incubation facility (UoNFabLab, 2014). It entails a collection of tools and equipment that leverage the power of Digital Fabrication Techniques. The private sector has not been left behind: [iHub](#) (iHub, 2014) [Nairobi Incubation Lab](#) (Nailab, 2014) and the Kenya Kountry Business Incubation ([KEKOBI](#)) are examples of privately driven incubation centers (KEKOBI, 2014). Nailab for example is a startup accelerator that offers a 3 - 6 month entrepreneurship program with focus on growing innovative technology driven ideas.

Need for a cultural and mind set change

Most of the innovators have decried the low levels of market receptivity to local innovations, with a majority of Kenyans preferring to buy imported products, even when they are priced much higher. In certain cases there are defensible reasons for this preference, for example, in an interview with one of

Kenya's renowned professors, he argues that one of the reasons for this is that it is very difficult to get refined and uniform products from the *jua kali* sector. The professor further notes that for example, if you want to buy 100 wheelbarrows and you tried to procure these from the *Kamukunji Jua Kali* sheds in Nairobi, chances are high that you will get 100 wheelbarrows with different specifications. They will have bigger wheels, some with different gauges of metal used, some will have long handles and some will have even lesser capacities. This lack of consistency and quality assurance drives away local public institutions that are subject to strict and elaborate public procurement procedures. On the contrary, the professor argues, if you ordered 100 wheelbarrows from China, the cost will not only be cheaper, but the specifications and quality will be uniform. The professor emphasises that our local innovators and supporting organisations need to "pull up their socks" and enhance the quality of the products they supply to the market. His emphasis is on the fact that competition is global and the Kenyan *Jua Kali* sector must strive to meet the consumers' demands and play by the rules that govern the markets they seek to exploit. At the same time, it is important that Kenyans believe in and support their own, home-made products as a way of encouraging local innovations and employment creation.

Sensitization and support for intellectual property rights protection

From the survey, nearly two-thirds of the respondents (65%) had not protected their innovations. The reasons given for this (non-protection) varied from lack of awareness, the associated costs; the perceived bureaucratic nature of the process, lack of knowledge on how to apply for IP protection while some just do not pay attention to this. Lack of IP protection exposes our local innovators to unscrupulous innovation scavengers who prey on the ideas presented during such exhibitions and other public forums; interview the innovators (who are always eager to talk about their genius innovations) and proceed to benefit from the innovations without breaking a sweat. Several cases have been reported in the Kenyan media about claims by the local innovators of stolen IP. However, in the absence of any protection, or documentary evidence, it is nearly impossible to seek legal redress over such claims. Moreover, by discussing their innovations in these exhibitions and public fora, the innovators reduce substantially any chances of getting protection by making the technical details of the innovation public. Box 2 highlights some concluding thoughts from the respondents.



Photo credit: CCAFS

Box 2: Final thoughts from the respondents

“It is high time we learnt to appreciate local innovation since it is the real meaning of independence”

“Make the research facilities and resources available and accessible”

“The Youth with creative ideas should be well financed so as to be able to come up with products they can take into the market to enable them earn a living”

“Help people do the IP protection”

“Innovation and Commercial laws need to be synchronized so there are a few hurdles to implementation of complete (developed) innovation.”

“Government should help innovators by creating grants like NACOSTI does and make patenting process fairly easy.”

“Assist in meet ups for financiers and innovators”

“The ministry of youth affairs or education should support young innovators through sponsorship and patenting of their projects”



Photo credit: CCAFS

Recommendations

Based on the findings of this survey the following recommendations emerge:

1. The government should enhance/fast-track the development of the venture capital funds to support innovations and provide tax credits for investments in R&D. While government has established various low interest schemes such as the UWEZO fund, the Youth Enterprise and Development Fund and the Women Enterprise Fund, it is instructive that none of the respondents had accessed any of these government loans. Even though targeted at the youth, women and other disadvantaged groups, this is a pointer that attempts at financing innovation and start-ups through loans is impractical given the inherent challenges of the innovation process. NACOSTI has over the years supported innovations through its Innovation Fund under the general STI Grants Scheme. The government should invest more resources in this fund and popularize it to ensure more innovators benefit from it. In addition, these grants should be accompanied by training for skills development especially on topics such as financial literacy, business plan development; marketing and business management which have been shown to be the limiting step towards commercialisation. Coupled with networking and mentorship from well-established private sector players, this will go a long way in ushering new entrepreneurs into the market.
2. The government through its procurement policies should support local innovators through preferential purchasing of locally manufactured/developed products. This should be accompanied by sensitization and civic education towards achieving a cultural and mind-set shift at two levels: from the local innovators to always yearn for better and strive to provide better quality goods that can compete globally; and from the government and Kenyan consumers to give local innovations a chance and support the growth of local industries. This will harness the innovators' ability to improve on the quality and standards of their goods and services.
3. Entrench technology and business incubation in all technical training facilities. It has recently been reported that the government plans to construct [60 new technical training institutes \(TTIs\)](#) (Standard media, 2014) across the country. It is paramount that all these TTIs house an incubation facility so that products and services that emerge out of the training can be nurtured into viable businesses. Such facilities should be more than just physical spaces, but include other attendant services such as legal advice, business development services, marketing skills and consultancies. The government could easily partner with the private sector to offer some of these services at subsidized costs. Depending on their level, incubatees could also be charged minimal fees for maintenance of these facilities
4. Enhance awareness and sensitization on intellectual property rights protection. Key players in the IP arena, including the Kenya Industrial Property Institute (KIPI) should upscale their awareness and outreach programs to help educate the general public on IP matters. Particularly, it should partner with learning institutions to target innovators and researchers to ensure that more innovators protect their ideas and earn from it. While most of the issues raised by the innovators e.g. the bureaucracy and associated costs are valid and will take concerted efforts by different actors to resolve public education and awareness would help unravel some of the issues such as lack of knowledge on IP application procedures and the general ignorance/lack of awareness.

Appendix I: Innovators' Details

No	Name	Location		Innovation description	Motivation/Problem to be solved	Target Market
		County	Constituency			
1	Makumba Billy	Uasin Gishu	Kesses	Extraction of a natural dye for cellulose-based and synthetic fabrics and fibres	The presence of RIVATEX- a subsidiary of Moi University. "We would be able to produce our own dye rather than importing."	Primarily RIVATEX and other textile companies. Secondary market is everyone who wears clothes and uses fabrics and fibres
2	HabibahVchan& Sonya Sabanga	Kisumu	Kisumu Central	Bioremediation of grey water using microbes (diatom algae and aerobic bacteria).	We visited some residence in Kisumu (Obunga and Kalo- leni) and realized that there was so much stagnating water. After research, we realized that many of them caused waterborne diseases such as malaria	Households with poor sewerage systems and wish to recycle water for use and so that we can conserve water and control waterborne diseases caused by stagnating waste water from the kitchen and bathroom.
3	Minyaru Community Based Organisation	Kiambu	Thika	Enhanced methods of teaching and training in automotive engineering	Background training at the Kenya Technical Teachers College (KTTC). Noticed that automotive students are taught theory and only later do they actually get to see the car. It just does not equip them with the in-depth knowledge of cars.	1. Tertiary colleges. 2. Youth polytechnics. 3. Technical Universities
4	Kenya Technical Teachers College (KTTC)	Nairobi	Westlands	Light control system which regulates the amount of time lights will be on	The cost of electricity is too high and some customers cannot pay the bill in time. This is to help in power saving	Domestic electricity users
5	David Munyiri	Nairobi	Nairobi	Mobile overhead shower irrigation system	The lack of affordable and convenient/functional irrigation system in Kenya	Small and medium scale farmers with approximately 2ha
6	Devon Ondego	Kisii	Nyaribari Chache	A test-tube washing machine made from local materials.	Currently, there are no machines of the same kind in the market and cleaning of tubes is tiresome. This machine washes a total 40 test-tubes in a minute.	1. Schools with science laboratories 2. Research institutions 3. Medical institutions.
7	Eric Orenge and Silvery Otieno	Nairobi	Lang'ata	A networked security system	The prevailing security crisis in the country and the need to help our country solve the problems and help save lives	The government; security companies and organizations in the country
8	Computer Animation	Busia	Funyula	The use of PowerPoint to run slides in quick succession to produce an animated effect	After a computer lesson in school and a physics lesson of persistence of vision	Teachers and students who need to understand abstract content e.g. Industrial processes
9	George Maina	Nairobi	Starehe	A bicycle powered pump that uses the friction force to drive the impeller - 1	The energy shortage in my locality and also the time spent to ferry water from one point to the other	1. Farmers. 2. Construction companies. 3. Home owners
10	Joseph MachariaKuria	Nairobi	Starehe	Groundnut sheller- This is a simple manually operated sheller that utilizes a wheel rotated by a handle to aggregate the groundnut against a wire mesh	The need to produce small-scale machine that can help processing of the nuts in villages	Small-scale farmers
11	Morris Mukiri	Tharaka Nithi	Chuka- Igamba Ng'ombe	A security system that uses a simple webcam to detect motion and notify people as well as sound alarms	The increasing insecurity and the high cost of installing security systems at home or small premise	1. Small and medium enterprises. 2. Homes
12	Wire Secondary school	Homabay	Kasipul	Making beads out of waste paper and designing them to different items	Reduce pollution	Fashion industry

Stuck on the road to the market: Why Kenya suffers from stunted innovations

References

Commission for Africa. (2010). Still our common interest: Commission for Africa Report 2010. Commission for Africa.

Equity Bank. (2014). Agriculture loans. Retrieved from Equity Bank: <http://www.equitybank.co.ke/loans/agriculture-loans>

iHub. (2014). Home. Retrieved from iHub: Technology, Innovation, Community: <http://www.ihub.co.ke/>

KEKOBI. (2014). Home. Retrieved from Kenya Kountry Business Incubator; helping you grow: <http://www.kekobi.or.ke/>

Kenyatta University. (2014). Chandaria Business Innovation and Incubation Centre. Retrieved from Kenyatta University: Chandaria Business Innovation and Incubation Centre "from job seekers to job creators": <http://www.ku.ac.ke/chandaria-biic/>

Nailab. (2014). Nailab. Retrieved from Nailab: <http://www.nailab.co.ke/>

Nation Media. (2014). Corporate news. Retrieved from Business Daily: <http://www.businessdailyafrica.com/Corporate-News/Keroche-to-fund-young-businesses/-/539550/2328448/-/gfmm9h/-/index.html>

Pivot East. (2014). Blog. Retrieved from Pivot East: <http://www.pivoteast.com/chase-bank-kenya-gold-sponsor-pivot-east-2014/>

Republic of Kenya. (2007). Kenya Vision 2030. Nairobi: Government Printers.

Republic of Kenya. (2008). Science, Technology and Innovation Policy and Strategy. Nairobi: Government Printers.

Republic of Kenya. (2013). SPECIAL ISSUE: Kenya Gazette Supplement No. 43 (Acts No. 28). Nairobi: Government Printers.

Republic of Kenya. (2014). About us. Retrieved from Ministry of Devolution and Planning: <http://www.devolutionplanning.go.ke/AboutUs.html>

Tidd, J. (2001). Innovation management in context: environment, organization and performance. International Journal of Management Reviews, 3 (3), 169-183

UNESCO. (2010). UNESCO Science Report 2010: The current status of science around the world. Paris, France: UNESCO publishing.

UoN FabLab . (2014). About. Retrieved from UoN FabLab: <http://uonfablab.wordpress.com/about/>

WorldBank. (2014). News & Events. Retrieved from The World Bank: <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/0,,contentMDK:22570436~menuPK:2246551~pagePK:2865106~piPK:2865128~theSitePK:258644,00.htm>

13	Kevin Kimutai and Louis Bahati	Nairobi	Makadara	An improved and modified means of grain storage	Present state of food insecurity as many regions in the country experience food shortage due to poor storage facilities	Local farmers
14	Mercy Wakhungu	Tharaka Nithi	Chuka-Igamba Ng'ombe	Biogas production from polythene bags through thermal decomposition of polythene bags at 240°C to produce methane, ethane, and butane. All these gases are flammable and thus used as fuel to enhance environment cleaning and industrialisation	1. The pollution by polythene bags that destroy the beauty of our country. 2. A need to replace use of wood as a fuel that leads to deforestation among others	The locals in villages who use wood for fuel
15	Shicheyi Samuel	Kericho	Belgut	Water harvesting for: 1. Landscape checker-board crop production. 2. Greenhouse vegetable production (revitalized)	Food insecurity in Kenya and the world overall	Communities in Kenya stricken by pangs of hunger
16	Rodgers otieno Ochieng'	Kisumu	Nyando	Maize sheller: Mechanism consists of threshing drum, spikes and driving system. When rotating clockwise unbreakable maize, dusts and cobs separates	To provide an easier method of separating maize from cobs	Farmers
17	Kennedy Gaya and Ryan Owino	Nairobi	Embakasi West	A simple but effective solar heater which can be used both internally and externally	The amount of money that is put into use when heating water using firewood and electricity made us opt for something cheaper.	1. Hospitals. 2. Factories. 3. Residential home owners
18	Takawiri Initiative	Kisumu	Kisumu	Handmade stationery and crafts using water hyacinth weed.	1. To create a job for myself and the community at large. 2. To participate in environmental protection. 3. To offer sustainable solution to eradicate water hyacinth.	1. Local citizens. 2. Learning Institutions. 3. Tourists
19	Darshil Brahmabhat & Arjun Panwar	Kisumu	Kisumu Central	Machine/methods of dehydrating eggs for preserving them for a minimum of 10 years without altering the nutritional value	We save shopkeepers suffering loss in business due to egg breakages	All the people who consume eggs
20	Kenya Technical Teachers Training Institute	Nairobi	Westlands	Electronic GPRS Alarm system. It is an alarm system	Constant theft in our premises	1. Homes. 2. Schools. 3. Premises
21	Preetesh V. Keraia and Rushal Patel	Nairobi	Lang'ata	Method of extracting ethanol from fruits	In the market, we have seen so many fruits rotting and smelling bad. So we have come up with a way to reduce this pollution, hence we produce ethanol.	Ethanol is used as fuel in cars It is used in manufacture of beer and hard drugs It is used in paint manufacturing
22	Joseph O. Aloo	Nairobi	Starehe	Production of omega-3 fatty acids rich oil from Nile Perch processing waste	1. Processing waste is likely to cause pollution. 2. Processing fish waste needs value addition to improve revenue for processors and other dealers	Local Market
23	Rodgers Gacheru	Nyandarua	North Kinangop	Solar powered wheelchair	1. To save the cost of electricity and fuel and use green energy revolution	The disabled people in our society
24	TUK MECH GROUP	Nairobi	Starehe	Engine Block Lifting jack machine. It is used for easy handling of heat engine blocks during maintenance.	The motivation was moving from hard manual labour to using a simple machine.	Automotive Engineering services industry
25	Jalaram Academy	Kisumu	Kisumu Town	A simple electrolysis system to obtain chlorine gas and Hydrogen gas alongside caustic soda	The need to come up with cheap water sterilizers that can be affordable to the public.	My target market is everybody who wants to consume safe water
26	Joseph	Nairobi	Starehe	It is a mobile budgeting and shopping application	The troubles and inconveniences people go through while shopping	Everyone with a smartphone

27	Kingori Paul Chande	Tharaka Nithi	Chuka-Igamba Ng'ombe	Bio-decomposition of organic waste and refining it to be used as a fuel.	The cost of fuel increases day by day and the world is looking for an alternative way to replace the fossil fuel and traditional biomass thus reduction of environmental pollution.	Whole of the country since fuel is a key need to everyone and especially those living below the poverty line
28	Osinya Victor Oundo	Kericho	Belgut	Household water purification using tree seeds ²	Water supply is becoming a problem worldwide. The turnover number remains the same. We need alternative as population quadruples.	The community (Kenyans)
29	David Wainaina	Kericho	Belgut	Economical shoe polish	Reduce cost of shoe polish in the market	School students and the working class
30	Richard Ondiek	Nairobi	Lang'ata	Iko phone is a smart payphone that aims at bridging the access gaps in telecommunication through provision of points of interconnections for SIM card users across all the Mobile Operator Networks (MONs)	1. Potential of SIM cards as a medium for communication. 2. Challenges in Mobile phone ownership or access	1. All GSM-CDMA SIM card Holders. 2. Mobile Operator Networks
31	Applied Science Department (Kisumu Polytechnic)	Kisumu	Kisumu Central	Mosquito repellent coil and cakes made from local materials such as neem leaf, <i>Lantana camara</i> and wastes like bagasse and sawdust	We stay in the lake basin region which has a lot of mosquitoes leading to rampant spread of malaria especially among children under 5 years and pregnant women	Common mwananchi who can't afford chemical repellents in the sugar belt region or in places with high mosquitoes
32	SPENNK INDUSTRIES	Nairobi	Kasarani	Potty Cleaner/Disinfectant	To produce a disinfectant that is gentle on the baby's skin; and to reduce diarrhea infections in children	Parents with children at the potty using stage
33	Poonam Kerai and Bhavisha Senghani	Nairobi	Lang'ata	Home-made mosquito trap	Since there are high malaria cases in Kenya and malaria is one of the 3 killer diseases	Areas with mosquitoes and the general public
34	Percy Ptoo Lemtukei and Emily Mureithi	Migori	Rongo	Traffic rules compliant e-revenue collection and immobilization system.	To solve the incidences of accidents, corruption, cost efficiency and accountability in the transport sector	The government and organizations

¹An impeller is a rotor used to increase (or decrease in case of turbines) the pressure and flow of a fluid.

²The innovator declined to disclose further information about the source of the seeds and how they work during the interview. It therefore remains unclear how this works



www.scinnovent.org