

# The Relevance of Science, Technology and Innovation Studies: Linking Academia and Industry

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This Briefing Note is based on a public lecture given by Dr. Rebecca Hanlin (Consultant Innovation and Development specialist, AfricaLics) during a seminar “*The Relevance of Science, Technology and Innovation Studies: Linking Academia and Industry*” in February 2020. The seminar discussed the need for increased academic study of innovation processes and their impact on development by African scholars in collaboration with industry. This collaborative study is important to ensure start-up firms in the informal and formal sector reach maturity and that established firms maintain their position in a globalized market place.

## Key messages

Innovation does not only include product development, it also involves the introduction of a new process/ business model/ organizational change into a new environment or context.

The informal sector (and the largest source of employment in Kenya) is overlooked in most discussions on linking academia to industry. It is crucial that it is included in these discussions.

There are very few academic, higher education or post-graduate courses in Africa focused on the intersection between society, science, technology and innovation i.e. research *on* science, technology and innovation. Most focus is on research *in* science, technology and innovation.

Academic research can contribute towards policy formulation and can inform change in policies in STI.

Firms are often more interested in internal knowledge generation than receiving external knowledge from universities/ research institutions. This is a major contributing factor towards the weak link between industry and academia.

Science, technology and innovation studies (STIS) research is a key type of research that helps (a) understand how to increase university-industry interactions but also will help industry formulate improved arguments for policy makers.

## Recommendations

Priority must be given to social sciences, and in particular the study of how society interacts with, and society’s actors react to new inventions, applications and knowledge. This includes but is not limited to:

- Increasing the number of courses and programmes at universities focused on science, technology and innovation studies or research *on STI* instead of just research in STI.
- Increase the amount of research being undertaken by TVET centres and build up more understanding of the STI occurring in the informal sector.
- Enhance research in emerging technologies and issues including 4<sup>th</sup> Industrial Revolution, Transformative thinking and Global Value Chains.

In so doing, universities must become more proactive to find ways of highlighting their ability to provide useful social science research and policy support – one way is to focus on key areas of national interest such as how research findings relate to development goals.



## Background

Innovation has become a buzzword that is commonly heard in any tech hub, start-up or even many established firms on the African continent. However, the study of innovation – how innovation can be promoted in firms and by governments and why it is important for economic and social development – is less well discussed in many African countries. Kenya for example, does not currently have any full time dedicated university courses for those who are interested in studying the academic social science fields of ‘innovation studies’ or ‘science and technology studies’; two academic fields that are established in many other parts of the world.

These fields are linked to, but move beyond, the innovation courses that are available in many African cities through incubator hubs or similar entrepreneurship schemes. Such courses often focus on provision of practical skills to budding business women and men on topics such as how to commercialize a product, how to protect ideas from exploitation by others or how to encourage learning and knowledge sharing within a firm. These are important skills and knowledge for this continent. However, such courses do not sufficiently interrogate the barriers and opportunities to firms to become more innovative, neither do they provide sufficient recommendations for improved government policy.

### What is innovation?

One of the reasons for this lack of focus on what might be termed ‘research on innovation’ as opposed to ‘research in innovation’ is that many people see innovation as synonymous with invention, research and development (R&D) and product development. In a traditional economic sense, it is often defined as the commercialization of a new product, process or business model. Innovation are these two things but it is also a more complex term than these two ways of thinking.

So, let’s perhaps start with what innovation isn’t. It isn’t invention or the initial creation of an idea or prototype. It also isn’t entrepreneurship. Entrepreneurship is the study of the promotion of business while innovation moves beyond setting up a business and looks at how a business can make value and continue to make value.

Thus, a broader definition of innovation understands innovation as the process by which a new or improved thing is introduced into a new environment. The ‘thing’ could be a product but it could also be a process, business model or an organizational change. It does not have to be new to the world but may in fact be an innovation in the sense that it’s the first time that a family, firm, organisation, community or country have utilized it. It’s therefore more appropriate to talk about innovation as something that is ‘new to the context’.

This broader definition is used and promoted by the AfricaLics<sup>1</sup> network. A broader definition is important because the African context of economic and social development is not the same as that in Europe or the US where most innovation thinking developed from.

Innovation is also a collective activity done by various groups or actors over time. It often occurs slowly and incrementally. Radical, new to the world innovation, like M-Pesa – the often cited African mobile money transfer service that has now spread to many countries around the world – is actually pretty rare.

Fundamentally, successful innovation processes are linked to learning: particularly learning through ‘doing, using and interacting’. This sometimes draws on more formal science knowledge (science, technology and innovation or STI). According to Lundvall (2016) and Von Hippel (2005) innovation is a result of interactions between technical opportunity and the needs of users. Development of innovation requires ample knowledge in user needs and technical opportunities.

Therefore, innovation – for a firm - is about how you can keep your business one step ahead, staying competitive in your field, making sure that you know what’s happening with your consumers (what your consumers need), how the market is changing. On the other hand, innovation - for policy makers – is about how the innovation that these firms or communities or others undertake and the degree to which it can create – and is creating – sustainable and inclusive industrial development.


### Direction of innovation

Innovation in conjunction with technical progress is essential to ensure provision of solutions to challenges that society faces e.g. food insecurity, climate change, poverty and inequality. In this context, innovation is considered as a means to development as opposed to an output of development (Fu et al, 2014). As such, innovation must be seen as a process where existing and new knowledge merge to meet needs and solve societal problems and challenges.

Thus the direction of innovation is a matter of increasing direction by scholars in this field. They ask the questions, ‘who benefits from innovation and how do they benefit from innovation?’ But they also ask ‘who doesn’t benefit and why don’t they benefit and how can we change this?’ Such questions and resulting discussions are located within a broader debate about which development path an economy should take.

Economists and policymakers around the world see innovation as the key to economic growth. People often refer to experiences in South Korea, India, China, Taiwan in Asia and ask “how can we develop in the same way that they have? How and why did they use innovation to develop?” There’s a lot of discussion about how

<sup>1</sup> AfricaLics is an African regional network for researchers involved in innovation and development research with a specific interest in promoting learning, innovation and competence building systems approaches. The network aims to provide a platform for collaboration between researchers, policy-makers and practitioners in all parts of Africa as well as with partners in the South more generally and with partners in the North.



innovation can be used to contribute towards (sustainable and inclusive) economic growth.

However, many argue that innovation creates more growth when it is focused in the high-productivity boosting manufacturing arena. It is then when innovation spurs industrialization processes. But with an increasing amount of hybrid industrialization paths and a rise of service industries in African countries, the jury is out as to where innovation should be focused.

### Kenya as a case study

One of the main ways in which a country measures its level of innovation is to compare its Gross Domestic Expenditure in Research and Development (or GERD) against those of other countries. The latest statistics show that Kenya's GERD as a percentage of the country's Gross Domestic Product (GDP) is 0.98%. This is higher than South Africa (at 0.82%) and Ethiopia (0.62%) but below the African Union target of 1%. The private sector contributes less than 10% to this figure (AUDA-NEPAD, 2019). This is perhaps unsurprising given that only 12-16% of firms saw interaction with research organisations as important for innovation. Instead, 65% of firms surveyed in the 2017 Kenyan National Innovation Indicators Survey said that they relied on internal sources of information to make innovation decisions. As such, only 2.7% of firms interviewed in the survey collaborated with universities or research institutions on implementation of product innovations. However, in many parts of the world universities and research institutions are seen as major catalysts for innovation and there is a strong emphasis placed on building strong university-industry linkages). Not surprisingly, in Kenya, a key issue over the years has been to convince industry to see the value of interaction with research organisations and/or universities in their innovation efforts.

There has been some recent efforts to change this. In Kenya the Linking Industry with Academia (LIWA) platform was set up in 2009 to encourage more collaboration between these two actor groups. It has successfully set up 15 partnerships between Kenyan universities and industry players including Huawei and Safaricom, two telecom giants (UNESCO, 2019). The Partnership for Skills in Applied Sciences, Engineering and Technology (PASET), a World Bank funded initiative highly active in Kenya and the smaller and Kenya specific project, Capacity Building for Information and Communication Technology Development (CB4ICTD), managed by the African Centre for Technology Studies (ACTS) and partners are two additional initiatives which are focused on building stronger university-industry linkages in Kenya.

These initiatives are focused predominately on the formal sector i.e. registered small, medium and large scale enterprises and universities. However, there are a lot of allied – and very valid – discussions about the need for more research within technical and vocational training centres and the fact that there is significant levels of innovation within the informal sector in Kenya; where the majority of Kenyans are employed.

The on-going East Africa Skills for Transformation and Regional Integration Project (EASTRIP) project which focuses on building TVET centres of excellence in East Africa, provides a perfect opportunity to move the discussion around the importance of research and industry into new arenas.

### How a broader focus on ST&I studies can assist?

One reason for the insufficient attention in the policy arena on the interaction between academia and industry is because of a lack of understanding on how these two groups currently work and short work together. This requires more attention to STI studies. The focus of attention has been on 'research in innovation' for too long and not on 'research on innovation' or even, more all-encompassing on 'research on STI'.

This latter field of study asks questions such as: how much does clustering of industries and their suppliers help improve business efficiency? How important are user-producer relations and interactions? What are the policy support mechanisms needed to increase industry-university interactions?

Unfortunately, there are few courses in Kenya/ East Africa in the area of innovation studies or science and technology studies. Most 'innovation courses' that do exist are assisted with incubator programmes/ entrepreneurship programmes (as discussed earlier) or single modules or courses within a wider (engineering, agriculture, business management etc.) degree programme.

However, things are starting to change. Work by AfricaLics and its members are beginning to see new courses and whole Masters and PhD programmes in this area. The AfricaLics network members have set up such courses in South Africa, Nigeria and in Tanzania. Kenya will see its first such courses start in September 2020 at Jaramogi Oginga Odinga University of Science and Technology (JOOST).

At the same time, there are pockets of researchers working in their 'home' disciplines of engineering, business management or agricultural economics (to name a few) who are researching *on* STI; trying to understand how industries can innovate more effectively and how research results from universities or other knowledge generators can be utilized by industry players in both the formal and informal sector. Africalics has gone from having 300 members in 2017 to 631 in 2020; many of whom are researchers *on* STI. One example of such research is the IREK project here in Kenya – a collaboration between AfricaLics scholars from ACTS, Moi University and Aalborg University in Denmark. This project has investigated how to build local capabilities for businesses in the renewable (solar/ wind) electrification sector. The project's findings on local content opportunities for companies involved in the building and operation of solar energy parks and wind energy farms in Kenya were presented during hearings that led to the revised Energy Act of 2019; which included local content elements.

## Conclusion

The linkage between academia and industry is essential. It has to be beyond simply thinking of product development. Industry would benefit from academic study in a broader range of areas to assist in policy change. In order to do this, the introduction of new courses and programmes at African universities and the development of science, technology and innovation studies scholarship in Kenya/ Africa must be further encouraged.

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## Recommendations

### ***Universities must become more proactive***

Statistics have shown that firms are more interested in internal knowledge generation than receiving external knowledge. This has made it difficult for universities in Kenya to get collaboration platforms with industry. One approach to encourage industry to collaborate with academia is for academia to showcase that it has the capacity to assist in influencing major challenges (such as the quest for renewable electrification) and influence government and policy decisions. This will encourage industry to engage more with academia. Academia can be the conduits of the data that is used to facilitate policymaking; as long as safeguards are put in place to ensure academic independence is retained.

### ***Natural science versus social science***

There is a need to demystify the role played by social science in science, technology and innovation. The issues that are discussed with regards to university-academia linkages and uptake of knowledge from the universities can't be properly addressed without the involvement of social science. For STI to be effectively taken up by society there is a need to understand how the public, policy makers and society more widely will interact with, and react to new inventions, applications and knowledge. Social science approaches are key to finding the gaps to, routes for, and implications of, introducing STI into society.

### ***Broader perceptions of STI research***

There is need to broaden the conversation around the STI research space in two ways. First, a recognition of STI within the informal sector and the need to recognize the quality of research that can be conducted through TVET centres. The second is to recognize that the nature of STI is changing and that this requires a set of understanding and skills about how society, science, technology and innovation interact. Only through this, we will be able to embrace emerging issues more effectively such as the 4<sup>th</sup> Industrial Revolution (4IR), globalization, global value chains, Sustainable Development Goals (SDGs) and transformation thinking.

AfricaLics Briefing Notes are a series of documents that focus on key messages related to Innovation and Development in Africa - a multi-disciplinary social science research area that includes elements of innovation studies and development studies. The Briefing Notes aim to provide insights useful for policy-makers, research, private sector actors and civil society on how science, technology and innovation can help solve real-life problems and promote long-term development in Africa.

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