

The Role of Universities in Research and Technology Transfer to Improve Livelihoods in Southern Africa

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ABSTRACT

Every country in Southern Africa has well-regarded universities where expert researchers work in a wide array of disciplines. Yet, not far from these campuses rural poor might be living whose lives could be dramatically transformed if the universities used some of its expertise to develop and transfer appropriate technology to such communities. Since the gap in knowledge of modern science and technology between experts in universities and the poor communities is so vast, a programme of developing and transferring appropriate technology could be a game changer for rural communities. Areas of need could be identified by forming multidisciplinary teams comprising specialists in adult education, social scientists, engineers, architects, agriculturists, community medicine specialists, environmental scientists and public health experts among others. Some areas where appropriate technology transfer may be relevant depending on the community and the available expertise are solar energy, biogas, water harvesting and conservation, communications, animal husbandry, arid agriculture and horticulture, tourism, housing and cottage industry. Some of this work is already taking place, but we emphasize a multi-disciplinary approach where social scientists, educationists, financial experts and marketing specialists (for cottage industry) work side by side with scientists and technologists.

Key words: Multidisciplinary, technology transfer, research, livelihoods, rural communities, extension.

INTRODUCTION

There is a growing realization in most universities in Africa of the necessity to put their expertise in the service of the communities and population in general in areas lying nearer or around such universities. Different stake holders and overall population expect the universities to play a role in improving the lives of people. Each country in the region has one or more publicly supported university, and the public would rightly expect them to play a part in the development of communities. A factor not emphasized sufficiently is the excellent expertise available in African universities. Decades of higher education and training programmes of many countries have produced academics of a high caliber. These academics were trained in reputable universities in many countries and continue to be productive in scholarship and research. This concentration of talent in these seats of higher learning should be used for the improvement of livelihoods in countries that made it possible for them to them to acquire these qualifications and expertise.

Role of universities in transfer of knowledge

Many African universities have community outreach programs either in the form of separate units within the institution or as student training in projects. These include the University of Botswana's CESRIKI (Centre of Scientific Research, Indigenous Knowledge and Innovation), and Centre for Study of HIV and AIDS (UBCSHA). The former is concerned with cataloging indigenous knowledge and innovation and putting it to use. The latter, as the name implies, carries out research in the realm of HIV and AIDS. There are other projects being carried out by departments and individual staff members. For example, Chemistry Department of the University of Botswana does research on natural products, and investigating cosmetics made from donkey milk.

While there have been instances where these efforts have had success, many fail because of a lack of coordination or ignorance of local conditions.

In recent years or times more than ever before it is possible for universities to make a difference in wellbeing and lives of people in rural communities. New opportunities have been created by extensive mobile telephony penetration in African communities including remote rural areas.

Contemporary knowledge landscape in Africa is characterized by a huge knowledge gap between universities - as centers of learning and scientific research- and rural African communities who in most cases are lagging behind in matters relating to science and technology. This situation is succinctly captured by Escobar, as quoted in Chilisa and Preece (2005) when the authors state that; can check APA to establish what the manual prescribes about quotes

“Development has relied exclusively on one knowledge systems, namely the modern western one. The dominance of this knowledge system has dictated the marginalization and disqualification of the non-Western knowledge. In this latter knowledge system... researchers and activist might find rationalities to guide social action away from economistic and reductionist ways of thinking” (p. 20).

The central message in this quotation is that African communities have, since time immemorial possesses a wealth of knowledge that helped them to explain and interact with the environment in a sustainable manner. Indigenous knowledge systems were used over a long time to explain natural phenomena such the nature and dynamics of weather patterns and origins of the universe. It was through the continual development and application of indigenous knowledge systems that African communities became highly successful farmers, the farming sector was supported by iron ore mining and manufacturing of farming implements. However, this rich source of knowledge was dealt a heavy blow by the arrival of Europeans, who interest in Africa was partly its rich natural resources, common with colonizers everywhere. In order to have unlimited access to the natural resources in the continent of Africa, the colonial masters had to come up with an ideology that portrayed the western culture as superior to the African way of life. Its purpose was to create an asymmetrical distribution of power that benefitted the Europeans and transformed them into good Samaritans who were sent by some divine powers to save the “dark continent” and its unfortunate souls from perishing. An acceptance of the superiority narrative by the African communities gave the Europeans unlimited access to the natural resources in the continent. However, the colonial masters were aware of Africa's intellectual as well as economic potential. This is exemplified by the fact that instead of using only their “soft” power, the colonizers were at all times supported by the military superiority that was always ready to obliterate any resistance from the Africans. This historical perspective is still prevailing today. The continued

marginalization of African indigenous knowledge at the expense of the western powers is reflected in a statement recently made by Khudu and Chilisa when they asserted that:

No matter what academic discipline one pursues there is a concept, a theme, a topic, a subject from the history, culture, experiences, and indigenous knowledge systems of the formally colonized that has been excluded from mainstream discourses either because they did not fit in the academic codes and classifications or because they were considered superstitious, irrelevant, and of no use to human development (p. 1)

The suppression and marginalization of indigenous knowledge in the contemporary world has resulted in a situation where modern day scholars or researchers who are often found in universities and poor African communities who possess a wealth of indigenous knowledge often exist in close proximities. The challenge for the universities then is to come up with strategies that would bring these two groups together so that a cross pollination of ideas can be realized. This calls for strong and sustained collaboration between universities research institutions and the communities.

Some universities in the world are working hard collaborating with their students to close the gap where rural communities are struggling with knowledge, skills and machinery to benefit from the natural resources at their disposal. It is professionally fulfilling, to know how the School of Engineering Design, Technology and Professional Programs (SEDTAPP), in Pennsylvania State University is doing to assist rural communities. They travel to Tanzania, Africa every Semester with their students who are enrolled in an undergraduate minor, Engineering Leadership Development (ELD).

The course ENGR 496 enables students to design machines that meet the needs of the locals in Tanzania and teach them how to operate the machine. The machine is designed in a way that it “separates the baobab seeds and pulp so both can be used for different products”.

<http://setapp.psu.edu/news/Su16/eld-baobab-su16.aspx> (p. 4).

The “pulp” has special nutrition for food and medicine. The baobab seeds can be used for cosmetics industry. The people in Tanzania are reported to be impressed with the students’ work as well as the gift of the machine, and the skills they are taught by students. It is indeed a true example of technology transfer to improve the livelihoods of rural community who do not have unique skills and cannot even make technology themselves

In this article, a proposal is made to approach the issue of transfer of technology from an interdisciplinary perspective. Universities can use their expertise, not only in science and technology, computers, medicine, public health and sanitation, nutrition, and agriculture, but also in business, entrepreneurship, sociology, social work, psychology, and adult education.

Some efforts at technology transfer fail because the approach is not complete and leaves out many aspects, which otherwise might make the technology more acceptable and adaptable. Frequently transfer of technology in one area can be leveraged by another area.

Examples are health and medicine helped by information technology and technology transfer to subsistence farmers helped by the university marketing and business professionals.

Cooperation between experts on information technology and one of several other fields has great potential to improve the lives of people, especially in rural areas. In many rural areas in Africa, there is a dearth of basic health clinics, let alone medical specialists. That is where the

use of telemedicine becomes crucial. Not sufficient effort has been made to introduce telemedicine in most sub-Saharan counties.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3709418/>. Universities can incorporate the use of telemedicine among their functions. Medical schools can team up with the information technology units and computer science departments of universities to introduce telemedicine in communities where there is an acute need. Telemedicine can form part of the curriculum of medical degree and the ICT (information and communication technology) part of the programme can be a requirement for the undergraduate student project of computer science departments. In addition to providing such a useful service to rural communities, such programmes can also be highly useful for students and researchers of the university, and provide aspirant medical doctors and ICT professional with valuable experience. An example of this would be a nurse or a general practitioner in a clinic in a far flung village of Botswana taking advice from a specialist in the School of Medicine, in the University of Botswana, taking about the treatment of a patient.

Another example of possible collaboration can be between ICT professionals of a university with their academic staff with expertise in marketing, biology and agriculture. In communities that depend on subsistence agriculture, marketing whatever surplus they have of their agricultural produce can often make a big difference in peoples' conditions of living. This surplus can be efficiently marketed using knowledge of market conditions. Post-harvest losses can be minimized by using the knowledge and expertise of agriculturists and life-science experts. The government of South Korea took many initiatives using their world-class information highway to advertise agricultural products and establish e-marketing at village level. They used their systems to educate farmers about modern methods of production and increasing yields of their crops. Similar steps can be taken in Africa using mobile phones.

Several universities in Africa have academic programmes relating to adult education as well as social work. Some universities include extension work as part of the curriculum of these subjects. Universities can play a greater role in proactively pursuing adult education in communities. The programmes need to take a broad definition of adult education, not restricting it to adult literacy, important as it is. Adult education programmes should result in empowerment of the populace. That can happen if the programme is rooted in the local tradition. It has been argued that adult education programmes in Africa have failed because they not did not take into consideration the local social and cultural conditions, and were in fact transplants

from Western societies. <http://newprairiepress.org/cgi/viewcontent.cgi?article=2357&context=aerc>

This is where an inter-disciplinary approach can do wonders. The available expertise in the universities in indigenous studies, African languages and sociology can be used cooperatively to create programmes that are in tune with people's aspirations and traditions.

Livestock is central to economies of many rural communities in Africa. The use of cattle manure to produce biogas can give these economies a boost. Technology for the purpose was developed decades ago, and universities have the know-how to be able to advise farmers to become self-sufficient in energy.

Other areas where the expertise normally available in a university is land and water management, environment, food safety, pesticide information, mental health, public health, drug and alcohol abuse, and small business development.

Research reveals the importance of technology transfer

A study by, Nduna, and Marais, (2015) on breastfeeding mothers in rural Zimbabwe provides another example of how crucial transfer of knowledge can be. Their work was related to malnutrition and resultant high infant mortality in Zimbabwe. Exclusive Breast Feeding (EFB) which should be maintained for the first 6 to 11 months provides the infant with sufficient nutrients to support good health, growth and development (p. 2.) The mothers who participated in the study had poor knowledge in relation to EFB and were characterised by conflicts between traditional and modern knowledge systems and recent scientific information about breast feeding. Most respondents in the study were reported to be giving their infants water and breast milk and convincing themselves that they have “exclusively breast fed”. This is an example of knowledge that a university can provide to members of a rural community about crucial matters.

Rural communities in Nigeria use products obtained from Shea trees. The plant is used for different roles, for example, the wood is used for making tools, roots and barks for medicine and pesticide. Its sweet juice is used as source of energy and butter is extracted from the kernels and is highly esteemed as a product of Shea. Butter is also used as cooking oil, lightning, soap or skin moisturizer and medicine. Hall, Aebischer., & Eosei (as cited in Jamala et. al 2013). The participants earn a living by picking Shea fruits daily.

They study findings above reported the following: Lack of processing equipment, technical skills, low inputs and capital. 90% reported they do not get assistance from government or non- governmental organization. Still 90% of the participants wanted the government to “provide the input, equipment and also provide modern training to enhance local skills. There is a gap, where rural communities look up to the government for support in relation to their livelihoods and the government is not filling the gap.

Knowledge transfer: A two-way process

Of course this interaction between universities and communities need not be one-sided. African indigenous knowledge, which was gathered over centuries, is vast and quite under-utilized. It is the duty of African universities to gather this knowledge and preserve it for future generations. Otherwise with many young people leaving their communities and not having strong bonds to their traditions, this knowledge is in danger of being lost.

An interesting example of collaborative work between university researchers and the African communities involving knowledge of indigenous medicine has been presented by Chilisa and Preece (2005). San, the indigenous people of the Kgalagadi desert have extensive knowledge of the different plants that are found in the desert. They have been able to discover the medicinal properties of some of the plants and this knowledge has been handed from generation to generation. The San have discovered that the Hoodia cactus plant when consumed in some quantities is able to inhibit the feeling of hunger. This property of the Hoodia plant was essential for the San as they often had to travel long distances during their hunting expeditions. Though the San were aware of the medicinal properties of the hoodia plant, they did not possess the scientific knowledge that could have allowed them to analyze the plant in order to identify the active ingredients that are responsible for suppressing hunger symptoms. This part of the research was done by western scientists. It is noted that “...Phytopharm- a United Kingdom based company working with the South African Council for Scientific and Industrial Research- isolated the active ingredient in the cactus that enabled the San to go on long hunting trips without eating.” (Chilisa & Preece, 2005, p. 21). The experiment was so successful that the scientists were able to use the extracted ingredients to produce slimming pills.

Africa has vast sources of natural products. It is estimated that less than 10 % of naturally occurring substances of plant origin have been investigated for their biological activity. Many of the products have been used in African traditional medicine for generations. Universities can learn from traditional herbalists about these properties and catalog them to preserve them and scientifically investigate these properties.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3901206/>

CONCLUSION

African universities owe it to their communities to bring benefit to them through transfer of knowledge and technology. This can be done effectively to use all the expertise in the various fields available in these institutions and keeping local traditions and sensibilities. This can be done by collaboration with experts who are usually part of a university staff. There are several successful examples of technology transfer that can be used as a guide to any future programmes. The interaction between universities and rural communities can be a profitable two-way exercise. Technology can benefit rural population and universities can play a role in preserving indigenous knowledge whose loss will be a great tragedy.

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