

# **PERSPECTIVE OF INDUSTRY'S ENGAGEMENT WITH AFRICAN UNIVERSITIES**

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## TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY</b>	<b>5</b>
<b>CHAPTER 1: OVERVIEW</b>	<b>7</b>
1.1. INTRODUCTION	7
1.2. LITERATURE REVIEW	7
1.3. RESEARCH QUESTIONS	11
<b>CHAPTER 2: METHODS AND DATA</b>	<b>13</b>
2.1. RESEARCH PROCEDURES	13
2.2. DESCRIPTION OF THE SAMPLE	15
2.3. DATA ANALYSIS	16
<b>CHAPTER 3: FACTORS THAT INHIBIT UNIVERSITY-INDUSTRY LINKAGES</b>	<b>17</b>
3.1. THE NATURE AND SIZE OF NATIONAL ECONOMIES AND RESEARCH INFRASTRUCTURES	17
3.2. CULTURAL DIFFERENCES BETWEEN HIGHER EDUCATION AND THE PRIVATE SECTOR	18
3.3. LACK OF CONFIDENCE IN UNIVERSITIES	19
3.4. WEAK INSTITUTIONAL CAPACITY	20
3.5. ABSENCE OF STRONG LEADERSHIP FOR UNIVERSITY-INDUSTRY LINKAGES	21
3.6. GOVERNANCE ISSUES	22
3.7. POLICY FRAMEWORK TO PROMOTE UNIVERSITY INDUSTRY PARTNERSHIPS	23
<b>CHAPTER 4: FACTORS THAT STRENGTHEN UNIVERSITY-INDUSTRY PARTNERSHIPS</b>	<b>25</b>
4.1. GOVERNMENT SUPPORT	25
4.2. DEVELOPMENT OF INSTITUTIONAL CAPACITY	26
4.3. RELEVANT RESEARCH AND TRAINING	27
4.4. ENHANCE COMMUNICATION BETWEEN UNIVERSITIES AND INDUSTRY	28
<b>CHAPTER 6: OPPORTUNITIES FOR UNIVERSITY-INDUSTRY LINKAGES AND BENEFITS TO BE DERIVED</b>	<b>30</b>
6.1. POTENTIAL MUTUAL BENEFITS OF UNIVERSITY-INDUSTRY LINKAGES	30
6.2. AREAS FOR FUTURE UNIVERSITY-INDUSTRY PARTNERSHIPS	31
6.3. A FOCUS ON SUSTAINABLE DEVELOPMENT	32
6.4. THE ROLE OF INTERNATIONAL ORGANIZATIONS	33
6.5. EXAMPLES OF UNIVERSITY-INDUSTRY PARTNERSHIPS	34
6.5.1. <i>Education Partnership in Africa (EPA)</i>	34
6.5.2. <i>Corporate Graduate Link (CoGL) at the University of Zambia</i>	34
6.5.3. <i>Annual Civic Camps (“Camps Citoyens”) at the Université Cheikh Anta Diop de Dakar (UCAD), Senegal</i>	35
6.5.4. <i>Incubator INNODEV at the Polytechnic Dakar, Senegal</i>	36
6.5.5. <i>Kenyatta University-Equity Bank</i>	36
<b>CHAPTER 7: CONCLUSIONS</b>	<b>37</b>
7.1. MAIN FINDINGS	37

7.2. IMPLICATIONS AND RECOMMENDATIONS	38
7.2.1. <i>Government</i>	38
7.2.2. <i>Universities</i>	40
7.2.3. <i>Industry</i>	41
<b>REFERENCES</b>	<b>43</b>

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## LIST OF TABLES

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TABLE 1. NATIONAL ORIGIN OF INFORMANTS IN THE SAMPLE .....	15
TABLE 2. PROFESSIONAL ROLES OF EXPERT INFORMANTS .....	16

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# INDUSTRY'S ENGAGEMENT WITH AFRICAN UNIVERSITIES

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## Executive Summary

The purpose of this study was to examine the relationships between industry and universities in Africa. The overall size of African economies and the performance of their industries may limit private companies engagement with university. However there is increase recognition by national governments and international organization of the crucial role university-industry partnerships can play in the development of Africa. In the current context of pressure on higher education institutions for more relevance to economic and social needs, collaborating with industry is one of the ways through which universities can support regional and national economies. This study explores the nature of these partnerships.

In general, little is known about the relationships between universities and industry in Africa. So far, empirical studies of university-industry linkages have mainly focused their attention on technologically developed countries. Because these linkages usually involve sophisticated research and innovation, universities in developing countries, and Africa in particular, are thought to lack the ability to engage more actively with firms.

To understand the present state of relationships between university and industry in Africa, this study has proceeded to interview key informants across relevant sectors. The analysis draws on in-depth qualitative data obtained through 32 elite interviews with key informants from higher education, business, government, and international aid agencies. Participants were recruited in multiple countries spread across all major geographical regions of the continent, in order to capture the view of a broader and diverse number of stakeholders who are involved in university-industry partnerships. The study includes the view of informants from 13 linguistically and culturally diverse countries in Africa.

The analysis has revealed the factors that facilitate or inhibit stronger university-industry partnerships, as well as the potential opportunities for future partnerships. Informants from university and industry acknowledge the cultural divide between both sectors, which generates a lack of confidence on the part of industry on universities as potential partners. In addition, past economic crisis have lead to significant reductions in state funding to higher education, which has affected their research capacity and infrastructure. The development of a robust research mission in African universities remains

constrained by a number of governance and funding issues. In many cases there has been an absence of clear policies to encourage linkages between universities and industry. All of these issues contribute to the underdevelopment of the ability of universities to respond to industry needs.

Informants from higher education, industry and government do not seem to have high expectations when it comes to the benefits of university-industry partnerships. They do not believe that these partnerships can contribute to a globally competitive knowledge production and innovation. Lack of reliance on domestic innovation in Africa creates a context where actors are oriented towards imported technology and do not consider local universities as primary sources of input into the innovation process. Rather, informants call for more localized and contextualized university-industry partnerships that would benefit local communities.

Nevertheless, informants speak of the need to create interfaces to bridge the gap between the business and academic sectors. Many believe that the state has a central role to play in this process, acting as a facilitator and provider of funding and incentives to develop and encourage university-industry partnerships. Furthermore, there is some optimism among interviewees about the potential for enhancing such activity. The recent improvement in the economic situation of several countries in the continent opens the door for the development of infrastructures inside universities to better respond to industry needs. Already, some successful examples of partnerships exist, as discussed in the report. The study also reveals the role played by international aid agencies in these successful partnerships. Finally, informants recognized the contribution of university-partnerships to sustainable development. They believe that an approach that integrates economic concerns and social considerations in university-industry partnerships will help ensure sustainable economic and social development.

# Chapter 1: Overview

## 1.1. Introduction

Over the last forty years, governments around the world have stimulated linkages between academia and industry. In recent years this trend has gained ground (Dill and Van Vught, 2010). Stimulating technical advance in industry is viewed as a necessity to promote economic growth. Policy makers across continents seek to stimulate universities to become more entrepreneurial, engaging more actively with the productive sector.

As universities become more involved in promoting economic development, there is a push from various governments for more relevant research and training. One way to address this call for relevance is by encouraging more linkages between higher education institutions and the business sector. Such linkages are particularly relevant in Africa as the majority of universities were created with a mission to contribute to nation building. Initially focused on training the workforce for the newly independent countries, higher education institutions are now asked to contribute to national economic development.

The aim of this study was to have a better understanding of university linkages with the economic sector in Africa. Indeed, the literature on university-industry partnerships remains concentrated on advanced industrial economies, while very little appears to be known about university-industry linkages in Africa.

## 1.2. Literature Review

There is a large literature on university-industry relationships focusing on Western countries, particularly in North America. Universities can contribute to technological innovation in several ways, including: conducting research in technological fields relevant to industry, providing technical assistance to local firms, educating well trained professionals, and supporting faculty to engage in consulting and commercialization activities (Geiger and Sá, 2009). In the corporate sector, there is a trend in high technology industries towards more and closer linkages with university research. Firms' readiness to seek out multiple sources of knowledge is viewed as critical for their success in fiercely competitive markets (Chesbrough, 2003). This drives large companies to establish more partnerships with research institutions.

Typologies have been developed to categorize the types of partnerships existing between universities and industry. Cohen, Nelson, and Walsh's (2002) typology includes several type of activities through which academic research interacts with industrial R&D. Perkmann and Walsh (2007) suggest a narrower typology that focuses on the kinds of direct interactions between universities and firms. While these typologies have been used to describe partnerships in more advanced industrial economies, there appears to be very little work available as they apply to African countries. One of the objectives of the present study is to identify the types of partnerships that exist in Africa, and highlight some of the elements specific to the African context.

Considering this literature, universities' research productivity appears to be crucial in determining the level of linkages with industry. In terms of factors that facilitate university-industry partnerships, the organizational structure of universities has been identified as an important dimension in their technology transfer performance (Bercovitz and al., 2001). Others have examined the role played by geographical proximity in the development of partnerships between university and industry. Although geographical proximity can have a motivating factor, the literature suggests that the quality of higher education institutions is the most important determinant factor for industries to engage with universities in their region (Vedovello, 1997; Laursen & al. 2011).

In the African context, university research capacity appears to be very limited, even taken into account regional and country variations. Research capacity, defined by Volmink (2005), as "comprising the institutional and regulatory frameworks, infrastructure, investment, and sufficiently skilled people to conduct and publish research", varies greatly across the continent. Indeed, a study by the RAND Corporation revealed that, with the exception of South Africa, Egypt, Mauritius, and Benin, African countries were part of a group of scientific laggards (Rand Corporation, 2001). Furthermore, a 2007 report recognized that African higher education lacks capacity not only at the system and institutional levels, but also at the level of individual academics (Jones, Bailey, Lyytikäinen, 2007).

The literature has also often described the limited research capacity of universities in developing countries, including in the African continent (Altbach, 2002, 2006). At the institutional level, universities in Africa have long been facing funding difficulties due to limited state resources. Universities face constraints in building research programs in relevant fields of science and technology that would be of interest to industry. Generally weak research capacity and insufficient R&D funding inhibit a more sustained research role (Atuahene, 2011). These structural issues prevent universities from training a larger number of scientists and retain productive researchers. With limited funding and support to their research mission, universities are usually hard-pressed to initiate and sustain programs of research (Mohamedbhai, 2008; Mouton et al, 2008).

Individual academics in Africa appear to have been particularly hard-hit even by constraining working conditions, although these challenges are not unique to Africa (e.g. Enders & Teichler, 1997, Welch, 2005). First, academic staff in African universities have very limited resources, leading to lower motivation. They do not have the necessary resources to play the role of mentors, training graduate students, and to contribute to knowledge production and dissemination. They are faced with low remuneration and overcrowded institutions. Moreover, the position of African academics at the “periphery” (Altbach, 2002) of knowledge production makes it difficult for them to substantially contribute to innovation, because they are reliant on academic research performed in developed countries. Hence, university faculty in Africa face many challenges in contributing to innovation.

Current studies on university-partnerships in Africa mostly consist of grey literature in the form of reports and conference publications of various national, regional and international organizations (UNESCO, 2000; AAU, 2000, 2012; Massaquoi, 2002; Kruss & al. 2009; The World Bank, 2009; 2010). Even in the existing literature, university-industry partnerships are addressed from the perspective of higher education institutions. For instance, some studies assess the existence of institutional capacity in universities to handle business linkages (Martin, 2000; AAU & AUCC, 2012), and others explore these partnerships at the national level (Jansen, 2002; Adeoji, 2009, Munyoki & al. 2011) or make a cross-country comparison of university-industry partnerships (Kruss & al., 2012). This gap in the literature on university linkages with industry is particularly concerning as many international donors have also acknowledged the importance and contribution of higher education to economic development (Koehn, 2012; Yusuf, Saint, Nabeshima, 2009).

A recent report on the state of university-industry linkages in Africa revealed relevant findings that serve as a cautionary warning (AAU & AUCC 2012):

- University research output is limited by the low percentage of academic staff with PhD training and qualifications, and brain drain of qualified scientists;
- Many African universities have attempted to foster linkages with firms through the creation of offices and staff positions in charge of such affairs. However, such offices lack the material resources and expertise to handle industry partnerships and technology transfer effectively;
- There is a low number of science parks and technology incubators in academic institutions. Only a small percentage of universities surveyed reported being involved in managing science parks and engaging in technology transfer;
- The study suggests that support for establishing and managing business incubators and science parks would respond to the needs and priorities of African universities.

Furthermore, the nature of industry in Africa also relates to the potential for university partnerships. Generally speaking, African economies are dominated by the informal sector, which employs between 50-75% of the workforce (African Union, 2008). It even represents the dominant share in sectors such as manufacturing, commerce, and mining (Sparks & Barnett, 2010). The remaining formal and structured sector only represents a fraction of the overall economy in terms of employment. Moreover, African industries are mainly extractive and natural resources-based. Most of these industries are populated by branches of multinational corporations with headquarters in more economically advanced countries, where they perform their research and development activities. Therefore, the technology used by multinational companies in Africa is imported. This situation has the consequence of removing a potential area of collaboration between local universities and industry that may have the capacity to engage in partnerships with higher education institutions. Also, this contributes to the overreliance of the continent on imported technology, preventing the development of local innovations.

Another recent study focusing on science parks and business incubators provides a context of the organizational structures in place that may support university-industry linkages, although as seen above, not all forms of partnerships would depend on those structures. The study showed that science parks and business incubators are an emergent phenomenon in Africa, concentrated on a few regions (AAU 2012). Key findings include:

- There is evidence of a growing interest in the creation and support of university-related Science Parks and Business Incubators in recent years.
- There are multiple organizational models being experimented with. Universities have established their own units, usually in partnership with other stakeholders, and have also collaborated with ventures created in their regions by other government and industry.
- University researchers and students are an important audience for science parks and business incubators, some of which mostly serving these groups.
- A focus on technology-based firms was common among the parks and incubators identified, particularly in sectors such as ICT, biomedical sciences, and engineering.
- Most units identified were small, and had fewer than 10 tenants. However, most science parks were operating under capacity, and as relatively new ventures, had room to grow.
- Consistent with previous studies, multiple barriers remain to facilitating university-industry R&D collaborations. The most important issues identified include: ambivalent academic culture, lack of funding/financial incentives for R&D partnerships, lack of industry interest in university partnerships, lack of

industry R&D capacity, and mismatch between university research strengths and regional industry sectors.

- Reflecting the somewhat incipient nature of many of the parks and incubators identified, most experienced difficulties related to the overall environment for business development, as well as with sustaining their budgets.
- Despite these difficulties, the units displayed goals and sought to provide services similar to their peers internationally. This suggests that given the availability of appropriate resources, such activities could be expanded.

The literature on these partnerships in Africa often stresses the one-way transfer of knowledge from university to industry. The following quote illustrates the view that the benefits of these sorts of linkages are overwhelmingly on the side of industry: “The ideas of technology transfer and university-industry linkage are related in the sense that the former deals with the transfer of ideas and skills between those who have them and those who need them, while the latter addresses the issue of the bond between generators of ideas and users of the ideas.” (Munyoki, Kibera & Ogutu, 2011). Rarely is the conversation about the contribution of industry to universities. This study has attempted to balance that point of view by looking at different angles on the issue.

### 1.3. Research Questions

The aim of this study was to have a better understanding of university-industry linkages in Africa. The following research questions were addressed:

- What are the factors that inhibit successful university-industry linkages?
- Which factors strengthen partnerships between industry and universities?
- What are some opportunities for future partnerships?
- What benefits can be derived by both sides from successful linkages?

In this report, *university* refers to higher education institutions including some institutional types that are relevant in some African countries such as polytechnics and stand-alone professional schools.

In contextualizing *industry*, it is important to highlight the small size of African economies, where most companies are of a relatively modest scale. Indeed, in 2009 Africa had 2.4% of the world GDP, and the share of the industrial sector represented 18% of Africa’s GDP (OECD, 2010). As mentioned above, 50-

70% of employment in Africa is in the informal sector, which suggests that the industry only absorbs a small percentage of the workforce (African Union, 2008). Overall, data show that the current size of African economies is modest.

## Chapter 2: Methods and Data

### 2.1. Research procedures

Informants from higher education institutions, industry, and government were targeted. The key criterion for selection was their direct knowledge of university-industry partnerships in Africa. Snowball sampling was utilized to identify experts throughout the study. During the interview stage, informants from development and donor agencies were added to the sample, because this group plays an important role in university-industry partnerships in Africa. Following grounded theory methods, the project gathered in-depth qualitative data from these key informants in order to obtain detailed accounts of their experiences. As usual in this methodological approach, the focus is on obtaining maximum insight from uniquely positioned individuals who can clarify the phenomenon under investigation.

The first step was to establish initial contact with potential informants. They were approached through email invitations and/or telephone calls. The recruitment of some informants posed a number of challenges. It took longer to recruit participants from industry and government, partly because the public unavailability of their contact information. Busy schedules also made it time-consuming to schedule interviews. Once recruited, informants were given the option to participate in a telephone interview or to reply through a web-based questionnaire. Most respondents chose to participate in the interview.

The interview protocol was pilot-tested with 6 volunteers before interviews took place. Piloting allowed for refining the phrasing of the questions and their order, to maximize understanding and facilitate the logic flow of themes in the interviews. The questionnaire is described below.

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#### **Interview Questionnaire**

This study aims at understanding university-industry partnerships in Africa.

We would like to understand the factors that facilitate or inhibit university-industry partnerships, and also your suggestions on how to improve them. We are also interested in promising examples, including benefits and potential opportunities for future partnerships. We believe that your professional experience will provide a valuable perspective on these issues. Do you have any question related to this project or this interview?

1. I understand you are [position] at [organization]. Can you please describe in a nutshell what your responsibilities are?
  2. How long have you been working at your current position?
  3. What types of partnerships exist between at [organization] and industries/universities?
  4. What role do you play in facilitating university-industry partnerships?
  5. What factors support university-industry partnerships in [region/country]?
  6. What are the challenges that prevent stronger university-industry partnerships in [region/country]?
  7. How has [organization] benefited from university-industry partnerships?
  8. What are potential opportunities for future university-industry partnerships in [country/region/organization]?
  9. In your experience, how have university-industry partnerships contributed to sustainable development? Please mention any relevant examples.
  10. Do you have any additional comments not covered by the previous questions?
  11. Can you recommend me any person who has in-depth knowledge of university-industry partnerships?
-

## 2.2. Description of the sample

The research plan for this project was to identify and interview expert informants through snowball sampling until saturation was reached, which typically occurs in the range of 25-30 individuals. The total sample for this study was 32, as informants from international donor agencies were added to provide an additional perspective on the problem under study.

Informants came from 15 countries, including 2 who are originally from non-African countries. The 13 African countries are geographically distributed to include every geographical/political region of the continent (see Table 1.). There was an effort to have a distribution of countries from every geographical region of the continent, from Tunisia in the north, to Ghana in the West, Tanzania in the east, Cameroon in in the centre, and Zimbabwe in the south. For each country, attempts were made to interview at least one person each, from the private sector, university, and government. As mentioned above, two representatives from international aid and donor agencies were also interviewed, considering the importance of such entities for university-industry partnerships in Africa.

**Table 1. National origin of informants in the sample.**

<i>Region</i>	<i>Northern Africa</i>	<i>Western Africa</i>	<i>Central Africa</i>	<i>Eastern Africa</i>	<i>Southern Africa</i>	<i>International</i>
<i>Country</i>	Egypt	B. Faso	Cameroon	Kenya	Namibia	France
	Tunisia	Ghana		Tanzania	S. Africa	Canada
		Nigeria			Zambia	
		Senegal			Zimbabwe	

**Table 2. Professional roles of expert informants.**

<i>Sector</i>	<i>Role</i>	<b>Tot al</b>
<i>University</i>	Senior administrator	5
	Department Head	3
	Administrators supporting industry links	6
	Faculty Member	7
<i>Industry</i>	R&D-related Managers	5
	CEO/President	2
<i>Government</i>	Academic Affairs/Funding	2
<i>International Aid</i>	Official/ Consultant	2
<b>Total</b>		<b>32</b>

Twenty informants came from the university sector, 8 from industry, 2 from government (see Table 2). In addition, two interviewees represented international aid organizations (Canadian International Development Agency and The Institut de Recherche pour le Développement). Within the university sector, informants came from a variety of positions. The sample included senior administrators and administrative staff involved in university-industry partnerships. The industry informants came diverse sectors including the chemical industry, banking, agribusiness, ICT and engineering for instance. Out of a total of 32 people interviewed, 2 were female.

### 2.3. Data Analysis

Standard qualitative data analysis techniques were employed to organize, code, and analyze the data (Miles and Huberman, 1994). The first step entailed the open coding of interview data, generating a list of initial categories emerged. The second step involved axial coding, where those categories were merged into fewer groups, forming a coding paradigm. These new categories reflect themes involving the key factors and issues involved in university-industry linkages. Finally, the selective coding approach was used to integrate the categories, interpret data and present the research findings.

## **Chapter 3: Factors that inhibit university-industry linkages**

The findings of this study show that university-industry partnerships in Africa suffer from a number of factors, among which is what some actors identify as a cultural difference between academia and the business sector. In addition, there is a lack of confidence of the population in general and industry in particular, in the ability for university to contribute to economic development. This lack of confidence seems to have been exacerbated by weak investments in research infrastructures, and the prevalence of poor governance practices. Related to this is that many interviewees view university administrators as lacking strong leadership capabilities. On the side of industry it appears to have limited financial capacity to partner with university, mainly because of the size and nature of African economies

### **3.1. The nature and size of national economies and research infrastructures**

The nature and scope of African economies is a major structural factor that limits the development of university-industry linkages. In 2009 Africa's exports and imports represented only 3% of global trade, corresponding roughly to the equivalent in global GDP (OECD, 2009).

With the notable exception of South Africa, the overwhelming majority of the large corporations in Africa are branch offices of multinational companies. Decisions on where to invest in R&D and establish university cooperation are made at the headquarters. Hence, partnerships are rarely made with local universities. In this context, the outcomes of industrial research and development activities are more commonly imported into Africa.

In addition to the role played by multinational companies in the African continent, most national economies are based on extraction and natural resource industries. Overall, the mining industry represents 18% of the African GDP (OECD, 2009) second only behind the services industry (56%). These types of industries rarely establish sustained university linkages. This is confirmed by interviews with informants from the mining sector, who acknowledge that the main contacts they have with universities are through the provision of internship for students and the sponsoring of various cultural activities. Both industry and university interviewees depict links with extraction industries as usually a one-way investment on the part of the partner on discrete activities and events, as opposed to joint projects.

This situation reinforces a persisting lack of trust in local innovation informants alluded to. A South African university official argued that a lot of companies in Africa are still in essence “colonial”, with a branch office in place as opposed to having the core business activities in the continent. As a result it is quite difficult for African universities to engage with major corporations. Multinational companies, he argues, are not going to spend money on research in Africa. The assumption still is that to access good research, firms would need to seek partners in Europe or North America. He claims that in South Africa, academics have to constantly battle that perception. Such perceptions seem to converge with the lack of trust of business in African research institutions (discussed below).

All informants recognize the long-term impact that the economic crises of the 1980s and 1990s had on higher systems in their respective countries. They also hope that the recent economic growth of their national economies, as well as the improvement of state finances will give a boost to the relationships between higher education and the economy.

Indeed, many African countries have posted high rates of GDP growth. During the first decade of the 21<sup>st</sup> century, six of the world’s ten fastest growing GDPs were in Africa, with Angola (11%), Nigeria (8.9%) and Ethiopia (8.4%) leading the way (The Economist, 2011). And the trend is projected to continue with countries such as Ghana, Congo, and Zambia expected to crack the top ten. More broadly, the World Bank estimated that in the last decade, 22 African countries have achieved middle-income status, while 10 more are expected to reach that status by the end of 2025 (The World Bank, 2012). Overall, these indicators show that the economic situation in Africa is improving, and informants hope this could translate into more investment in higher education and research.

### **3.2. Cultural differences between higher education and the private sector**

The view that universities behave as Ivory Towers is common across African countries. Interviewees referred to the university in Africa using terms such as “academic empire” or “exclusive community”. A private sector informant from Tanzania argues that there is an attitude among some in the university that there is nothing to learn from industry. He argues that university professors make themselves hard to get in touch with, which inhibits contacts from external stakeholders.

On the other hand, the business sector has little awareness of academia as well. Some indicate that many business owners lack university training and

knowledge to understand the context and culture of universities. As an industry informant from Tanzania put it, it is within universities' mandate to provide the resources that industry needs, "after all they receive money from the taxes we pay." However, this is not a widely held perception. Universities in Africa are not broadly conceived as reservoirs of codified knowledge and expertise to be tapped by other organizations in society.

As part of these cultural differences, informants shared the usual view that academia and industry have different goals and priorities. While the private sector is concerned with the bottom-line and relatively short-term goals, too often the impact of higher education activities can only be measured in the long-term. University officials and academic staff seem to prioritize long-term partnerships. As an industry informant from South Africa put it, "academics like to theorize, which takes time." Academics have the tendency to look at multiple angles of an issue, while industry is concerned with solving specific problems with commercial implications. This sentiment is echoed by an official of a national funding agency who laments the fact that most university-industry partnerships are contractually bound and short-term, with very little room for basic research or more creative types of investigation. State companies have partnerships intended to build capacity, and think more long-term, in the informant's view.

These views show the divide that exists between academics and people in the business community. Some academics believe that industry does not have an intellectual understanding of university structures and activities. As discussed below in more detail, industry informants do not trust academics either.

### **3.3. Lack of confidence in universities**

Apart from the cultural differences between the sectors, interviewees described a specific lack of trust and confidence on the part of businesses in higher education institutions as potential partners. This lack of trust appears to have multiple causes. First, there is a cultural reliance on foreign technologies and some suspicion of local innovations. Universities are therefore not viewed as sources of useful information and expertise. Second, the lack of experience of firms in dealing with universities prevents a more informed understanding of potential avenues for cooperation.

Interviews suggest that the cultural reliance on foreign innovation and technologies is an impediment to the development of university-industry partnerships in Africa. Illustrating this view, an informant from Namibia argues that the general population in Africa tends to prefer "imported goods and ideas" at the expense of local products and innovations. Also supporting this view is a Ghanaian research development officer who regrets the case of an

innovator in her country struggling to get the attention of the public and industry. She believes that one reason for this lack of trust in local products is that innovations in Africa are not very sophisticated, even though they are aimed at solving basic but essential problems.

Industry seems reluctant to enter in long-term relationships with universities, not only because of the costs involved, but also because of a lack of confidence in the ability of universities to deliver relevant outputs. They complain about what they perceive as an excessively theoretical emphasis of university activities. There are very few cases of successful innovations and contribution of academics to the economy. As a result, businesses are hesitant to engage in what they perceive as costly experiments. An industry informant from the agribusiness/dairy sector believes that it is up to university to gain the trust of the private sector by showing its potential in small-scale partnerships and commercialization. Also, an officer at a Ghanaian technical university believes a good way to gain the confidence of industry would be for academic innovators to build prototypes to be presented to potential industry partners.

The lack of confidence affects university-industry partnership, because it is motivated by the suspicion about the ability of university to make relevant contributions to real-world problems. The low number of examples of successful partnership also contributes to this situation, as there is not a “demonstration effect” of positive examples.

### **3.4. Weak institutional capacity**

Another major barrier to the development of partnerships relates to universities’ institutional capacity. Informants indicate that universities do not have the structures and personnel to engage productively with industry. Specifically, this lack of capacity includes limited human resources and poor infrastructures. Informants from universities, the private sector and government all recognize the lack of expertise inside universities. They believe that universities do not have enough qualified academic and management staff to engage with productively with industry.

Illustrating these views, a South African informant acknowledged that the country (the leading economy in Africa) needs more PhD graduates in order to compete with countries from other regions of the world. Indeed, the University of São Paulo in Brazil alone produces more PhDs than the whole South African higher education system. In 2010, the university graduate 2400 PhDs, while South Africa produced 1420 (Badsha and Cloete, 2011). To train more students to earn advanced degrees, African universities need to bolster their on PhD-trained academic staff. To illustrate the issue by resorting to the same comparison above: at the University of Cape Town, South Africa’s leading

university, 57% of the faculty have doctorates, while at the University of São Paulo 98% do. In South Africa as a whole, only about 35% of university faculty have earned a PhD degree.

This absence of expertise affects not only academic professionals, but also the staff who are unable to deal with all aspects related to relationships between the university and the outside world. When asked about their support staff, informants revealed that some institutions have established positions similar to that of a research officer to deal with matters related to intellectual property and commercialization of research, while others do not yet have a university-wide office in charge of industry liaison or technology transfer. An informant in Tunisia lamented that in many instances, industry representatives were open for partnerships, but because his laboratory lacked the required expertise in contract negotiations, the contracts were not signed.

In addition to this lack of expertise, there is an acknowledgement that higher education institutions are not equipped with the necessary infrastructure to meet the demand of the private sector and the community. University officials interviewed complained about the chronic underfunding of research and physical infrastructures necessary to appropriately train their students. They admit that the concerns of the industry and government are legitimate. However, they believe that they are not provided the financial and physical resources to address these problems.

Overall, university informants think that their institutions are not equipped to fulfill the missions the society has assigned to them. A persisting lack of internal structures and human resources to engage with the productive sector inhibits the expansion of university-industry ties. This is a bottleneck for the expansion of partnerships. Trained staff that can support such interactions are critical components for universities seeking to contribute more intently to innovation.

### **3.5. Absence of strong leadership for university-industry linkages**

Interviewees commonly referred to the lack of appropriate leadership at many institutions to initiate, guide and support university-industry linkages. Some faculty members interviewed believe that university senior administrators do not see their role to facilitate the establishment of partnerships with the industry. They suggest a lack of “champions” for this kind of activity on campuses, which could not only signal to their desirability, but also provide systematic administrative support to them. Without such leadership, industry engagements are often viewed as peripheral activities conducted at the sole initiative of a few individuals.

Many believe that the role of university administrators is also to find ways to increase the human and financial resources of their institution, rather than to simply manage limited resources. A government informant in Cameroon argues further that while supportive policies and legal frameworks are already in place, and university officials still need to take advantage of these opportunities by engaging with private and international partners. He believed that opportunities are there for university administrators to seize, through establishing collaboration with industry and marketing the achievements and potential of their institutions.

The governance model of higher education in Africa can partly explain this reported lack of initiative on the part of university administrators. In almost all countries in the region, universities were created as an extension of the state, with strong public financial support and the appointment of academic administrators serving as civil servants at a division of the ministry of (higher) education (Coleman, 1986; Sawyerr, 2004). Because higher education institutions were extensions of the state and staff were civil servants, administrators may not have seen as part of their roles to take on more entrepreneurial initiatives on behalf of their institutions.

On the other hand, five informants attributed this absence of initiatives from university administrators to a lack of clear national policy on science, technology and innovation. They believe such a policy would make obvious the connections between every sector, by clearly detailing the responsibilities of each type of institution, stakeholders, and actors. Ultimately, the role of the university senior administrators would emerge and become clearer.

### **3.6. Governance Issues**

Informants also raised the issue of bad governance and corruption at many institutions. The African continent has had a reputation of having some of the most corrupt countries in the world. Unfortunately, this corruption appears to also have made its way into higher education, as argued in the recent Transparency International's (2013) Global Report on Corruption in Education. This report has confirmed many of the issues previously addressed in the literature concerning the climate of corruption that exists in many African countries.

In this context, according to a few informants, bad governance in higher education relates to corruption and non-enforcement of administrative procedures. Three informants alluded directly or indirectly to corruption as a factor in preventing the development of university-industry partnerships. A Namibian informant lamented the negative reputation for corruption has had on her institution, which according to her is not corrupt. She argues that this

has negatively affected her ability to establish more contacts with international and local partners. She recognizes there is work to be done in (re)gaining the trust of potential partners, who have had to face corruption in the past.

Another aspect of bad governance and corruption concerns the competence and interests of individuals in senior positions in higher education. A Cameroonian informant complained about senior university administrators who are focused on engaging politically with the government for personal as opposed to institutional interests. He argues further that they are not concerned about taking meaningful steps to develop their institutions, which might include a more active role in industry partnerships.

Bad governance has had a double impact on university-industry partnerships. First, resources are poorly managed and there are cases of misappropriation of public funds for personal gain, particularly by people in positions of responsibility. This creates a sentiment of mistrust towards the university as an institution. Second, bad governance taints the reputation of higher education institutions as a whole, affecting the likelihood of industry to be willing to engage in partnerships.

### **3.7. Policy framework to promote university industry partnerships**

Although many informants acknowledged the existence of national policies related to university-industry partnerships, two thirds of interviewees point to the lack of such policies in their respective countries. Whether they are from the university or the private sector, they all argue for a need to set a clear and unambiguous role for the university in the society, including its contribution to national development.

Furthermore one informant argues that the absence of a national policy stems from failed political leadership and the society's lack of understanding of the role of the university. Another informant adds, "if there is a policy [on university-industry partnerships], people can get involved with the knowledge that the government will support them." They all advocate for a legislative framework and a national innovation system linking higher education and the community.

There is also an emphasis on the need to implement the policies once they are developed. Very often policies are developed without any effort to follow up with their implementation and monitoring. Informants have mentioned that the issue is that actors at Higher education institutions and industries do not operationalize policies. Besides, laws are passed by the parliament, but their decrees of implementation are never passed. Some informants believe that governments should be lobbied not only to create the conditions for successful

partnerships, but also to maintain research and innovation issues on government agenda.

## Chapter 4: Factors that strengthen university-industry partnerships

During the interviews, informants have identified some of the elements they believe contribute to the development or the strengthening of university industry partnerships. These factors are drawn both from the successful experiences some of the informants have had, as well as from their convictions on what they view as the necessary conditions for productive partnerships. All informants agreed on the central role the state should play in encouraging university-partnerships, through policy and funding mechanisms. Also, the recognize that institutions should continue to build capacities, particularly by improving their human resources, training and recruiting qualified academic staff. Also, every category of informants seem to agreed that university should communicate more with the outside world and engage in more economically relevant activities, both to improve graduates employment and raise their appeal to the productive sector.

### 4.1. Government support

When it comes to the role of the government, the data suggest that the absence of a national policy addressing university-industry partnerships is of great consequences. Informants argue that policies should be developed so that stakeholders have a frame to work with. They call for a “national policy on innovation” or a “national research policy”. Regardless of the framing, such a policy would define in specific terms the role of the public universities and how they relate to other sector of the society, deemed important for national development.

On the other hand, some informants acknowledge that their respective countries already have policies on research and innovation, on which university-industry partnerships can be built upon. In that sense, they rather lay the blame on limited institutional capacity. Two informants from Cameroon remarked that their country already have enough policies with regard to innovation. They say it is now up to universities and the private sector to take advantage of what the legislation offers.

In addition of having a national framework for research and innovation, informants argue that the state should also develop different mechanisms to encourage the private sector to partner with universities. Many informants advocate for the introduction of incentives to motivate industry. They argue

that fiscal or financial incentives could help initiate first contacts between firms and universities. As one informant from Namibia said:

*We are in a legalistic context. Businesses respond to laws, not to appeal for good corporate citizenship. [...] It doesn't matter what the motivation for partnership is. Take the partnership and run away with it!*

Two other informants also advocated for direct funding to universities or alternatively the development of infrastructures (laboratories, equipment, etc.).

At the international level, the data suggest that informants, particularly from university and international organizations, want more involvement of the state in setting up international partnerships. Informants whose institution have been involved in an international partnership insist on the need for governments, through appropriate ministries, to support institutions in their application for international partnership proposals. Many examples of successful partnerships between university and the productive sector have been achieved with the support of international aid agencies. Establishing these international relationships requires involvement at the ministerial and state level, as well as the expertise and commitment of the state apparatus.

## 4.2. Development of institutional capacity

While absence of national policy on research and innovation is not shared by all countries considered in this study, the issue of institutional capacity appears to be a major factor, according to our informants. Whether there is a national policy on higher education and the private sector, our informants believe that a strong institutional capacity is necessary to successfully implement university-industry partnerships.

Informants believe that a strong institutional leadership at the university level is necessary to start, create an environment, and support partnerships with the private sector. An informant who works at a flagship university and at the ministry of higher education of a central African country declared:

*We are not short of policies! They are there and clear. The problem is their operationalization at the institutional level.*

There seems to be recognition not only from the higher education sector, but also from the private sector, that the initiative for partnership should come from university.

The aim of the initiative from university is that institutional and industry leaders would create a culture of cooperation by ensuring continuity and enabling their

staff through trust and shared responsibilities. At the initial phase, academics can also play an important role through the establishment of informal contact with international partners, local industries and the community: A Kenyan informant maintained:

*Sometimes it takes the action of an individual to motivate the rest of the group. There should be a willingness to get out there and know people.*

Others argue that there have been isolated initiatives, but these often weaken as soon as the person who has initiated and supported it is no longer there. Therefore, an institutionalization of partnerships is crucial to ensure the continuity, maintenance and leverage existing partnerships.

Inside higher education institutions, there is a need, according to some informants, to develop a dedicated, flexible administrative expertise (industry liaison, technology transfer, intellectual property). This should also be extended to academic expertise that ought to mirror national economic and industrial sectors. For instance, an informant in a northern African country laments the absence of relevant academic expertise in his laboratory, when it comes to negotiate partnerships contract with the water industry. This creates a lack of trust in academia from the industry. Administrative and academic expertise should also be brought together, which would translate in a stronger collaboration between academic and administrative units. For instance, in practice, individual academics should be able to work in collaboration with a central or departmental technology transfer officer, instead of taking the initiative alone all the way. So far three out of five industry informants believe that universities should take the lead in initiating partnerships, because they believe it is up to academics to provide evidence of what they can deliver.

### **4.3. Relevant research and training**

In this study, the issue of relevance constitutes one of the major themes of concerns from participants. All informants have expressed their hope that higher education should be more relevant to the society and the economy in particular. Concerns about relevance of university touched upon two aspects: the need for university to produce graduates that are job-ready and the necessity for more applied research and teaching.

First of all, industry informants, but also some participants inside university, insist that university graduates should receive training to prepare them for the jobs they will perform. Two industry informants believe that so far, universities have not done enough in their contribution to human resources for national development. However many university informants complain about the difficulty in finding adequate internships and industry placements for their

students. Two informants from Tanzania mention the new approach used by their universities to obtain internships. In the past students were sent to look for internships on their own; this proved to be unsuccessful for many students. Recently, the university have started looking for internships on behalf of its students. For far, there is an increase in the number of students on industry placement. By providing more internship experience to their students, universities believe that they can respond to one of the most important needs of the industry.

The second aspect regarding relevance is complain by industry, of the lack of relevance of research and teaching activities conducted inside university. University informants recognize that successful partnership with industry requires applied, relevant, demand-driven research. A research officer at a Ghanaian university mentioned an initiative by her institution to encourage researchers to develop prototypes in order to increase visibility and gain the trust of industry. Another informant from a southern Zimbabwe advocated for localized, contextualized research and development initiatives with the small and Medium Enterprises (SME), because there is not enough expertise in his country to attract the interest of multinational companies.

This need for contextual research is also echoed by another informant in eastern Africa who argued for a holistic approach to industry problems, that would include multidisciplinary teams of students, academics, and industry representatives to solve local problems, whether economic or social. As mentioned earlier, there appears to be a sentiment that partnerships with industry should include the community at large. What emerged from interviews with informants is that targeted research aimed at solving specific industrial problems has limited impact on communities and regional development. They articulate a view of university-industry partnerships that contribute to broader economic and social development.

#### **4.4. Enhance communication between universities and industry**

One of the recurring themes that came out of the data is the claim that the university is not open enough to its community and private sector. According to informants from the university and the private sector alike, this openness of universities can take many forms. The first aspect is opening university governance to industry participation. An informant who has experience as a university president of a flagship university in a West African country, talked about the initiative he brought forward of welcoming private sector representative to the governing boards and faculty councils. According to him this initiative is about to be “enforced” in all other public universities in the country, where it will also be required that academics not have the majority of seats on university governing boards.

Also, the contribution of the private sector could take the form guest lecturers and teaching, particularly in professional program. Also, industry can participate in the development of curriculum. For instance, the Polytechnic of Namibia has mandated every new program across the institution to have inputs from the respective industry sectors. This particular institution offers a wide range of programs in engineering, tourism, accounting, and health, among others. During the process of developing new programs, each faculty at the institution is required to consult with the specific industries that could potentially hire graduates of the program. Industry representatives provide input in the development of the curriculum.

Beside the above two examples of direct involvement of industry in university, informants also address the necessity of universities to reach out to the outside world. For almost all informants, this would be a significant transformation and would require a change of mindset not only from university, but also from industry. On that respect, an informant, who is a CEO argues:

*Without engaging knowledge institutions, there is very little chance of making accelerated economic development.*

Others suggest setting up platforms of discussion to create awareness and share mutual interests that might hold potential for new partnerships.

A second component of opening up universities and industry is through the better communication of university research achievements. Two informants insist on the need to keep a presence in the media by regularly communicating research findings to the public. In particular, one Ghanaian university informant calls for academics to communicate research in a language easily comprehensible by the public. Too often, she argues, academics that are looking to engage with private sector partners use technical and academic jargon not necessarily understood by their potential partners. More importantly, beyond the use of academic vocabulary, the communication approach of academics is too often not comprehensible the industry.

## **Chapter 6: Opportunities for university-industry linkages and benefits to be derived**

Interviewees believe that opportunities for partnerships are limitless if there is long-term planning, coordination and organization. They argue that at the system level, there is a need to have clear partnership policies integrated into broader national development strategies. At the institutional level, administrators need to take the lead and engage industry by demonstrating the capacity of universities to also answer to the business sector priorities. Already, many opportunities can be identified in the sectors of agriculture, engineering, and telecommunications.

### **6.1. Potential mutual benefits of university-industry linkages**

The benefits that universities and firms can derive from partnerships are well documented in the literature. Universities benefit from additional funding for research, graduate training, facilities and equipment. University researchers and their students also benefit from the opportunity to work on real-world problems faced by industry, presenting researchers with ideas that may stimulate their research agendas, and students with valuable experience. Moreover, students gain experience and build contacts that can be valuable upon graduation. For industry, university partnerships provide the opportunity to access specialized expertise, the latest knowledge in relevant disciplines, and potential future employees (students). Firms also benefit from the outputs of such partnerships, in the form of additional knowledge that feeds into their own innovative processes, improved products and processes, and from technical solutions for their problems. To what extent have businesses and universities in Africa been able to experience these benefits documented in the international experience?

Interviews reveal that informants from all sectors are sceptical. In general, they do not believe that university-industry partnerships are organized around high-value added products and processes, or internationally competitive research and innovation. Rather, informants indicate that most partnerships involved more localized demands that involve the application of knowledge to problem-solving relatively basic issues. The overarching low R&D intensity in both industry and higher education translates into a context where the kinds of knowledge-intensive, sustained research activities reported in the international literature as sustaining the benefits described above cannot be assumed.

As a result, it is necessary to re-frame the goals and expectations around university-industry partnership in Africa. Below, some areas holding potential for university-industry partnerships are described, and relevant examples discussed.

## 6.2. Areas for future university-industry partnerships

As the some informants have argued, universities in Africa cannot presently compete on equal footing for research and development investments from multinational corporations with institution in other parts of the world. Instead, a local focus to innovation would likely be beneficial to universities and local communities.

Many examples of initiatives have been developed between academics and the agribusiness sector. Despite the fact that the population remains to be persuaded of the value of indigenous technologies, many innovative projects try to tackle more localized, contextualized agricultural issues. These partnerships between academics and the agricultural sector do not necessarily involve sophisticated technologies and the formal economic sector. Instead, already available scientific knowledge is transferred to farmers in remote locations. Informants in Nigeria, Kenya, and Tanzania confirmed that agriculture partnerships they form with the outside world rarely involves big agricultural companies. It is usually geared toward helping local farmers and subsistence agriculture. This appears to be a realistic and tangible orientation for universities to contribute to local economies.

In engineering, partnerships appear to continue to be geared toward solving local technological problems with already existing knowledge. For instance, a technology incubator in Senegal has helped develop a bio-fertilizer with an existing technology that was not yet available in western Africa. Whether it is agricultural technology for local food processing in Tanzania, or the treatment of salt water in Tunisia, the university sector is already providing solutions to some of the pressing needs of the industry and the society in general.

African universities have the potential to develop unique solution based on first-hand knowledge of local problems. For example, an informant in North Africa has already seen international potential for his ongoing partnerships with industry. His laboratory is planning to export its expertise on water supply processing to other African countries where water supply is a major challenge.

At the institutional level some initiatives are taking shape. At a Ghanaian university, there are plans to sign ten memoranda of understanding (MOUs) with industry that will guarantee affiliations and internships to at least 200

students. These MOUs will also include a provision to undertake specific research to address the needs of industry. Similarly, many technical and professional institutions in eastern Africa have taken the same approach, by trying to partner with the industry in order to provide internship opportunities to their students.

Moreover, institutions of higher education are starting to professionalize administrative staff who are support industry linkages. These staff are responsible for every essential aspect related to partnership with the private sector. The emphasis on professional/administrative expertise alongside academic expertise is soon to be translated into the development of professional positions (IP experts, technology transfer officers, research officers, etc.). SARIMA (Southern Africa Research and Innovation Management Association) is about to develop a professional program to train research managers for universities and other institutions of knowledge production

However, because of limited institutional capacity, there is still going to be more individual initiatives between industry and academics rather than large-scale partnerships. Many informants believe that the ongoing reliance on personal and individual initiatives between academics and the industry will very likely persist. They believe that academics should continue to build personal connections with industry and reach out to them to establish relationships.

### 6.3. A focus on sustainable development

There was a quasi-unanimous agreement among interviewees on the necessity to redefine the idea of *industry partnerships*. They propose to include not only the businesses and the economic sector, but also the community-based organization, governments, and civil society. The roles of universities have always been, from the time of their inception, to contribute to national development. This national development was never meant to include only the economy. Instead, for newly independent countries, developing the nation included the economy, the society and the state. Thus, many informants felt the need to further clarify the role of university and academics. They believe that beside teaching and research, the third stream of academic work is community outreach. This outreach includes service to the community as well as collaboration with local industries for regional development.

University informants raised the need for a holistic approach in partnering with industry. They believe that their role is not just to solve specific economic problem. Instead, they hope that by engaging with industry alongside actors in

regional development, it serves a much broader purpose of national development. For instance, a director of research and development at a flagship South African university mentioned the necessity to “bring broader knowledge to specific problems, because industry tends to be specialized and don’t see the big picture”. Multidisciplinary research teams and partnerships involving the private sector, university, local communities, and government can also contribute to this holistic approach.

Another informant from Zambia mentioned that the school of mines at his university tries to address mining in a multifaceted way to include social issues as well. This includes making students and industry partners aware of potential social, legal and environmental consequences of the extracting industry. A dean of a faculty of agriculture at a southern African university goes further by arguing that academics can play an advocacy role for environmental protection because “most of the time the private sector is only concerned about the bottom-line.” This concern about the environment is critical as the informant is from a very arid country where land sharing has been a contentious issue.

Finally, a Nigerian faculty member who has experience in the dissemination of technology to farmers believes that there is a balance to be found in partnering with industry, in order “to provide for now and the future generations”. He believes that despite the size of its population, the country has the potential to preserve the environment while trying to improve the live of the population. Overall, these examples show a real concern on the part of the university when engaging with industry.

#### **6.4. The role of international organizations**

The second major theme that has emerged from the interviews is the important role played by international cooperation and aid agencies (DAAD, IRD, USAID, CIDA, AFD). Indeed almost every successful examples identified by informants include one or more of these entities as a partner.

There seems to be a shift in focus of international aid toward capacity development and linking higher education institutions with industry. For example, many developed countries have very similar development policies when it comes to helping the higher education sector. Canada’s AUCC recent capacity building program mirrors that of UK’s Education Partnership in Africa and Germany’s Corporate Graduate Link. They all have in common the aim to strengthen higher education institutions capacity building to partner with the private sector. And from what emerged from the present analysis, they appear

to be an important factor contributing to the success of the three partnerships above.

Overall, in addition to the expected findings, this study has revealed the above themes that emerged from the analysis. In general, informants have a broader understanding of what industry engagement means, involving not only the private sector, but also the community; in addition university informants expect the impact of partnerships with industry to go beyond the economic sector, to include the improvement of the living conditions of the population.

## **6.5. Examples of university-industry partnerships.**

### **6.5.1. Education Partnership in Africa (EPA)**

EPA was a three-year program (2008-2011) funded by the UK government to help African universities improve entrepreneurship, social enterprise, and enhance graduate employability. The program, which was managed by the British Council, and funded by the UK Department for Business, Innovation and Skills, involved a three-way partnership between institutions of higher education in the UK and Africa and local African industries.

The objective of this program is to build institutional capacity and quality, ensure the employability of students upon graduation. For instance a partnership between Ho Polytechnic in Ghana and the City College Brighton and Hove have managed to improve the matching up of engineering graduates with the modern workplace. Previously, graduates from that institution had a lot of difficulties finding work, presumably because they were trained at an institution equipped with out-dated infrastructure and equipment. In total, the program has facilitated linkages between 55 higher education institutions in the UK and 85 higher education institutions in Africa on 72 projects.

### **6.5.2. Corporate Graduate Link (CoGL) at the University of Zambia**

The Corporate Graduate Link was recently launched with the aim of bridging the gap between the university graduates qualification and the needs of the industry. It is a program funded by the German Federal Ministry for Economic Cooperation and Development and managed by a consortium of DAAD (German Academic Exchange Service), universities in Germany and Zambia, Chambers of Commerce from both countries, as well as mining companies in Zambia. Some of the objectives of the program are:

- To develop post-graduate curricula approved by Industry (e.g. Chambers of Commerce and Industry) in order to produce graduates that satisfy the requirements of the Private Sector Job market and counteract the "brain drain" effect.
- To identify and strengthen existing post-graduate courses through input from Industry where students are attached to work on issues affecting the Industry, making them responsive to private sector job market.
- To develop faculty - chambers research agendas that answer to Industry's research development and innovation.
- Building corporate image of the universities by establishing relations with government, by answering to government's development plans, policies, strategies and Vision 2030.
- To develop faculty – public research agendas that answer to Zambia and regional development plans
- To identify public service opportunities through building of dialogue networks, research and business incubation centres in universities, as one stop centres to attract Chambers partners

### 6.5.3. Annual Civic Camps (“Camps Citoyens”) at the Université Cheikh Anta Diop de Dakar (UCAD), Senegal

Unlike the other examples of successful partnerships mentioned in this report, the Camps Citoyens objective is not primarily to cater to the need of industry. Instead, it was designed to improve the live of communities across Senegal though strategic partnerships to promote sustainable development.

This program has allowed local and visiting students to be sent to rural areas across the country to help communities in matters of health, reforestation, alphabetization, and initiation to ICT. The “Camps Citoyens” were originally developed to call upon the society at large to contribute to the financing and development of higher education (Sall, 2012). The belief was that even though the state should continue to be the main sponsor of higher education, other stakeholders had the responsibility to contribute. It was developed by UCAD, and its partners include a number of Senegalese ministries (e.g. higher education, health), local and multinational industries (e.g. Arcelor Mittal, Sanofis Aventis), and international development aid organizations (e.g. IRD, the Turkish International Cooperation Agency). No figures are available, but according to the informant who initiated the program, it has been a success so far.

#### 6.5.4. Incubator INNODEV at the Polytechnic Dakar, Senegal

INNODEV is an incubator initiated by five Senegalese universities and two agricultural institutes, with the support of the French Research Institute for Development (IRD) and the French Embassy. Created in 2009, the aim of INNODEV incubator is the valorization of innovative research results through the identification and creation of enterprises. The incubator has partnered with many local industries on activities that include:

- Create awareness and train research and student in the creation of enterprises
- Evaluate and select promising ideas
- Mobilize potential funders to support the creation of new companies

So far, the incubator has had many realizations in the areas of agribusiness, new technologies, and renewable energy. For instance, the incubator has helped create a service that offers energy efficiency consultation to building managers.

#### 6.5.5. Kenyatta University-Equity Bank

Kenyatta University's Community Outreach and Extension Program established a long-term partnership with Equity Bank in 2008, focused on providing community service opportunities for students. The university reports that 3,000 students participate each year, working on several communities across Kenya.

There are two main benefits from the program. First, students benefit from training provided in advance of their community placements, which get them prepared for the issues they will experience in the field. Once service starts, they apply what they have learned in a real-world setting. Second, the communities served by the program gain from the knowledge that students bring, and pass on to the community. The relationship between students and community members is seen as a way to acquaint students with the settings where they will eventually work upon graduation. A second main benefit from the program concerns the collaboration between the university, the Equity Bank, and the community partners. This collaboration is seen as a way to alter internal and external view of the university as an Ivory Tower, isolated from society. Students report multiple benefits from the experience for their professional development, social connections, and the ability to address community needs (see Tumuti, Wanderi, Lang'at-Thoruwa, 2013).

## Chapter 7: Conclusions

### 7.1. Main findings

This report identified the factors that positively or negatively influence the development of university-industry linkages in Africa. Informants emphasize the persistent cultural divide that exists between the academic context and the business world in African countries. These divide appear to be exacerbated by the lack of confidence of industry in the ability of universities to meet their needs. Governance issues and policy frameworks are also seen as presently insufficient to ensure a sustained effort towards partnering with universities. In addition, informants from universities do not have very high expectations around industry engagement, partly because of the size of African economies. Moreover, many informants have blamed past economic crisis for the lack of adequate infrastructures, weak institutional capacity and bad governance at many African universities.

However, most informants remain optimistic, particularly with the recent improvement of the economic situation in Africa. They believe that there are enough resources to boost infrastructure development and implement the policies to stimulate innovation. The literature often associates university-industry relationships to contribution to economic growth. However, the present study reveals a distinction between contribution to economic growth as generally understood in the international literature, and the development needs in Africa as understood by the majority of informants of this study. While the general discourse on the contribution of university to economic growth relates to global competitiveness, in Africa it means establishing links to the community in order to improve people's standard of living, and contribute to national development.

Informants, whether from higher education institutions, industry or government have somewhat modest expectations when it comes to the benefits of university-industry partnerships. They do not believe that these partnerships can contribute to a globally competitive knowledge production. Instead, these informants are in favour of more localized, and contextualized science and technology university-industry partnerships.

Many reasons appear to explain this situation. Because the nature of African economies is heavily influenced by the extractive and raw material industries, the potential for technological innovation appears very limited. These industries are essentially local branches of multinationals, whose investment and significant partnerships are done with Higher education institutions of their countries of origin. This appears to confirm what Munyoki & al. (2011) found,

that “multinational firms rely more on imported technology than the indigenous firms, which supports the hypothesis that manufacturing firms rely more on imported technology than indigenous firms.” Also, because there is little support from the state, there is a reliance on western development agencies (DAAD, IRD, GTZ, etc.) and international donors (UNESCO, World Bank, etc.) to develop meaningful partnerships between Higher education institutions and the productive sector.

The data confirm the need for improve universities’ institutional capacities to develop and support partnerships with the industry. Better academic leadership and human resources at higher education institutions are two of the most prominent aspects that need attention. Informants lament the absence of strong and committed leadership to initiate and create greater awareness of the opportunities and potential of partnerships with industry. Further, there is acknowledgement that more professional competence is needed to deal and appropriately market knowledge produced by university faculty and students. There seems to be the realization that institutions need qualified staff to manage and support partnerships with industry.

There are a number of regional and national initiatives to address these needs. For instance, the creation of technology transfer offices is already a trend in many of the countries considered for this study, and related professional associations spread across the continent. One of them, SARIMA (Southern African Research and Innovation Management Association) already offers training on research and intellectual property management, and is currently developing a professional degree for research, technology, and intellectual property officers. At the national level, informants from Ghana and Zimbabwe report some signs that support positions are being created in universities.

## **7.2. Implications and Recommendations**

### **7.2.1. Government**

There is not shortcut to promoting strong university-industry linkages without strengthening the academic and managerial capacity of universities. African universities need a larger base of continuing, long-range academic research programs in areas that interface with national, regional, and local economic and social contexts. University research cannot be expected to deliver prompt solutions to immediate problems. Rather, it is through sustained research and education efforts that expertise is built in disciplinary and interdisciplinary fields. Such expertise, if aligned with the knowledge needs and demands of national and local industry, can have a meaningful impact in economic activity.

To harness the potential of university research and education to industry, universities also need to be supported and funded in such way as to allow them to build the administrative capacity for industry and community engagements. Well-trained, knowledgeable staff in areas ranging from industry liaison, community outreach, and technology transfer are important enablers and facilitators of industry connections. Academic staff cannot be expected to fulfill these roles in a systematic way, without distracting them from core academic functions.

If universities in Africa are to contribute more actively to innovation, there is a need to support closer interactions among governments, universities, industry, and other relevant social actors. In the few cases where there is no clear national policy on research and innovation that encourage university-industry partnerships, developing a supportive policy framework would be helpful. A policy framework is not in itself sufficient, but it provides incentives and helps clarify the role of each stakeholder in advancing innovation.

Governments also should address the governance of higher education institutions. If industry linkages are to happen, universities need to have the autonomy and transparency to be able to pursue their own partners. These cannot be mandated or directed from Ministries or government agencies. The appropriate role for government agencies is to set up and enforce favourable policy frameworks that enable R&D partnerships to flourish. Universities that are proactive and successful in developing industry ties should be rewarded for their efforts. Demonstration projects can be sponsored, where strong proposals for university-industry partnerships addressing local innovation needs are sponsored on a merit basis, and their results are widely communicated. Such projects might contribute to instilling the view among relevant stakeholders that partnership with universities are feasible, possible, and potentially rewarding.

For partnerships to take root, it is not enough to call for greater interaction across the sectors or establish vague national goals. Careful implementation of policy instruments aimed at stimulating university-industry linkages is essential. The multiple actors involved have specialized and disparate needs. Higher education institutions need to build and strengthen their research and education infrastructures. Firms need greater R&D capacity and incentives to invest in partnerships with universities. Greater awareness across the sectors of their needs and capabilities is also needed. Fundamentally, governments need to establish predictable funding mechanisms for university research, business R&D, and specifically for partnerships involving the two sectors. Uncertainty as to the availability of resources in relatively short time horizons mitigate against productive university-industry engagements.

### 7.2.2. Universities

For universities, there are many actions that could be taken to improve the development of partnerships with industry. Fundamentally, universities have to better define and frame their potential contribution to national economic development for internal and external audiences. Too often, university and industry informants could not find a common ground on what the role of each other should be in promoting innovation and supporting regional economies.

Once universities can identify their place and potential contribution to national development, senior officials might engage with local industry from a clearer position on how to advance the university mission. The quality of university outputs (e.g. graduates, research findings, teaching) is a strong determinant in the success of university-industry linkages. Furthermore, better communication among universities and firms would be helpful. Universities have to be able to provide more evidence on the expertise and projects, which might increase industry awareness and interest to invest in partnerships.

Strong leadership is critical in higher education. Senior administrators need to make industry-university partnerships a priority within their institutions. The goals and benefits of university-industry links need to be clearly communicated to researchers, as well as the principles guiding them for mutual benefit. Moreover, larger and longer-term partnerships need senior leadership encouragement and support. Academics need a favorable incentive and reward structure for engaging with industry in a constructive way. The aim should be to generate mutual benefit for the partners, and also for local communities and society at large.

If it is to have an impact in industry, some university research programs in relevant disciplines (e.g. agriculture, engineering, materials science, computer science) needs to be oriented towards issues that impact local economies and industries. For that to happen, greater interaction with external stakeholders might be facilitated through events, associations, and networking initiatives. In addition, researchers with industry experience can be invaluable in this process.

Within universities, stimulating interactions across teams of researchers with complementary expertise should be encouraged, regardless of their disciplinary or departmental affiliation. Innovation in industry does not happen within disciplinary silos. Multidisciplinary teams of experts are better positioned to address complex problem by bringing together theories, knowledge, skills and methods from various fields and applying them to generate solutions. Interdisciplinary research programs that include industry partners should be

encouraged in universities. Those programs might be housed in dedicated research centers including business representatives in their Advisory Boards.

Universities should take advantage of their position as public institutions to exercise the role of public spaces for open-ended debate on local economic, social, and technological challenges. Universities may organize and host events bringing together academics and industrial representatives, along with other relevant stakeholders. Informal social interactions can also be helpful in sparking dialogue and working relationships. Purposefully using university facility for events and social engagements can facilitate such interactions.

### 7.2.3. Industry

Africa's industry could better tap the skills and knowledge available inside higher education institutions, even though there appears to be reasons for doubting their potential. Several steps might be taken to discover what higher education institutions have to offer and tap into that potential.

As universities in Africa are mostly public, industry should tap into the public knowledge and know-how that they make available to society.

Industry should also work with higher education institutions to improve their research and training capacity. This can be done in multiple ways. For example, businesses may provide internship positions for students, and make their staff available for guest lectures, bringing their expertise to universities. More sustained forms of engagement can also be pursued. Individual firms, or even business associations, may work together with higher education to establish educational standards to inform the curriculum and educational experience of students in relevant fields. Such initiatives might contribute to addressing the perceived irrelevance of university education to the business sector. Finally, following the example of their peers internationally, industry can also be a supportive partner in the creation, support, and staffing of research laboratories through gifts, donations, and research funding. Through these kinds of practices, industry can be a stronger partner in the process of strengthening the academic quality and relevance of African universities.

Choosing to innovate locally is also a choice that African industry needs to make. It might make more sense in the short term to resort to imported technologies or business solutions. In the long run, however, this preference has the cumulative effect of not creating endogenous capacity to innovate. Taking steps to create the competencies within firms and in partner institutions such as universities might seem costly, but the benefits of such investments need to be assessed within a long-term horizon that includes capacity building for sustained problem-solving and innovation.

Future research would further explore the partnerships that exist by including more industry and government informants, in order to capture their view on the issue. So far, most of the literature on the partnerships in Africa has been initiated by academics, and to some extent by governments. Finally, the role of international donors and development agencies in the development of university-industry partnerships in Africa needs to be better understood. This study reveals that they play a crucial role, which is highly regarded by stakeholders. There is a need to better understanding the support they offer in the development of university-industry partnerships in Africa.

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