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Mobilizing university resources to create and support firms.

The case of University of Zambia's Computer Centre and Technology Development and Advisory Unit

Abstract

Universities could serve as engines of economic growth by supplying skilled human resource needed to manage increasingly sophisticated systems, and developing new knowledge that stimulate industrial growth. However, the ability of African universities to incubate and support firms is possibly weak. African universities are generally under funded, poorly staffed, small in size, ill equipped and relatively young although they are the only institutions in many African countries likely to have a concentration of expertise. Turning these universities into vibrant centres capable of generating and diffusing new technologies as well as creating firms that meet the development aspirations of their people remains a challenge.

This paper uses the case of the University of Zambia (UNZA) to highlight possible ways of mobilizing university resources - man power, national and international links, and close cooperation with partners - to create and support businesses, through specialized units. It highlights the important role of "linker units", such as UNZA's Technology Development and Advisory Unit (TDAU) to utilize university expertise to support small and emerging entrepreneurs. It also uses the Computer Centre to demonstrate the ability of African universities to incubate and commercialize firms and provide premier network support provider to industry government and donor.

Although UNZA cannot be described as an entrepreneurial university by the standards of universities in some advanced developing economies, it exhibits entrepreneurship traits that, if harnessed, could help deliver services to industry and the community at large. It presents an interesting model of how universities could mobilize their intellectual and social capital to create and support businesses, as well as contribute to development even with meagre resources.

Introduction

The domestic knowledge base of a country is often composed of research and development, financial, manufacturing, professional and regulatory institutions, among others, that influence the generation, dissemination, use and marketing of new knowledge products and services. These institutions, among others, make up what has been termed national system of innovation [1, 2; 3].

In order to accelerate technology development and diffusion, countries have developed specialized institutions often termed centres of excellence. Although there is no single agreed definition, centres of excellence are supposed to be well-established institutions with a critical mass of skilled personnel, stable and adequate funding base, highly motivated staff and state-of-the-art facilities. In addition, it has a clear objective and mandate as well as good links with its clients and other specialized centres, in and outside the country, and act as technology generators and transferors. [4, 5]

Universities generally have a high concentration of qualified and skilled individuals in diverse areas of interest, a clear mandate, well-equipped facilities and a stable funding base. Industries, especially in developing countries, are unlikely to pool enough skills in any one area of technology to provide sufficient innovations to remain competitive in emerging interdisciplinary fields. It is for this reason that the relationship between industry, university and government has changed [6]. Universities have become partners to industry by producing new innovations that have become the basis of new firms and industrial competitiveness.

There are at least three different types of universities: teaching, research and entrepreneurial universities. These generalized classifications are based on the nature and scope of university programs, staff time allocation and weight attached to research and teaching activities, and the objectives and relationship of the university with industry and government. These characteristics, among others, affect how the university operates, is managed, and how it responds to the needs of its clientele.

Teaching universities are generally designed to produce (train) manpower for the private and public sectors and their programs place more emphasis on teaching rather than research. By contrast, research universities place nearly as much emphasis on research as on teaching. In general, faculty is expected to undertake research activities, compete for research grants, publish original peer-reviewed articles, supervise post-graduate and post-doctoral students and, in some cases, participate in outreach programs. Research excellence is squarely at the heart of the university mission and substantial resources are committed to research activities.

Entrepreneurial universities expand the roles of research universities by undertaking roles that promote contract research, commercialization of research outputs and incubation of firms. In a way, it enables departments and/or members of staff to organize themselves and form research teams that exist almost as “quasi-firms”[7]. These universities view knowledge they generate as potential economic and social assets. They may have technology transfer managers that screen research products to identify those that can be patented, published and commercialized.

Therefore, it may not seem possible for African universities to serve as centres of excellence or to develop and support firms. Staff, at many African universities, is often demoralized by the lack of basic teaching and research tools, support from

management, red tape and poor salaries, and overwhelmed by the large numbers of students. Sometimes, they do not have research teams or research facilities likely to produce technologies of interest. It seems impossible and perhaps misconceived to assume such universities could play the same role as their equivalents in developed and advanced developing countries.

It may also be possible that the comparison of universities using the same indicators (e.g. numbers of patents, publications and post-doctoral students) does not take into account the differences in economic, social and political realities. In poor countries a university that helps communities improve their living standards and marginalized individuals become entrepreneurs or create jobs may be just as entrepreneurial as those inspiring the development high technology products and firms.

2 The University of Zambia's entrepreneurial activities.

University of Zambia (UNZA) has a longstanding tradition of working with industry and public institutions. The School of Mines and the former Zambia Consolidated Copper Mines (ZCCM) cooperated on training and research in the mining sector. The Mines supported most of the students in the School of Mines and some students in the School of Engineering that wished to work for them after graduation with tuition fees and attachments. Similarly, the School of Agriculture and the Zambia Seed Company have worked together on many projects.

The University also runs several business ventures such as farms, bookshop (leased to bookworld), guesthouse and clinic. For instance, UNZA owns about 49.9 % of the share of York Farms, Zambia's second largest horticultural producer and exporter, with an annual turnover of about \$13.5 million and brings the UNZA roughly \$1 million in dividends a year (2000 estimates).

York Farms was conceived by Mr. Charlie Youngson in the early 1970s who later sold it University of Zambia as a teaching and experimental farm on high-value products. The University got a loan from the Ministry of Finance to purchase the Farm. The UNZA was also developing the UNZA horticulture nursery (often called UNZA Nursery) and UNZA farm. The firm got financial support from the CDC Capital Group and started export of high-value/low volume agricultural produce in 1989. Today, it is Zambia's second largest exporter of fresh vegetables, baby corn, sugar-beans, flowers and onions to Europe, South Africa, Australia and New Zealand.

York Farms covers about 1,800 hectares of which 600 hectares of irrigated land for production of vegetable and 110 hectares is certified organic land. The farm employs about 3,300 workers, all of who receive on-the-job training and some participate in formal training courses in Zambia and overseas. The Farm has gained accreditation with EUREPGAP and Tesco's 'NATURES CHOICE GOLD' certification.

In 2001, CDC sold its 50.1% shares in a Management Buy Out Team (MBOT) schemes named the "Lattice management consortium". UNZA did exercise its pre-emptive rights over the CDC shares which permitted the sale of CDC shares.

The Department of Physics is spearheading a project to fabricate sophisticated laboratory equipment (such spectrophotometers) for research purposes and materials for home solar systems. One of its recent products is the microprocessor-based charge

controllers for home solar systems (See ATDF Journal). The team includes staff from the departments of chemistry, computer sciences and engineering.

This project was necessitated by the lack of investment in laboratory equipment needed to perform scientific experiments by students and researchers. In addition to the engineering expertise in the School of Engineering, the Department of Physics has workshops for electrical, metalwork and woodwork repairs and maintenance, and the Department of Chemistry has a glass blowing and equipment maintenance. This project was designed to combine the expertise within the University to meet the need for laboratory equipment.

UNZA is also structured to operate with minimal skilled professionals by encouraging interdisciplinary and interdepartmental interaction. Few schools at UNZA, if any, could operate independently. For examples, students admitted to the Schools of Engineering, Agriculture, Medicine, Mining and Veterinary Medicine spend a year or more taking courses in the School of Natural Sciences. Many lecturers also teach in more than one school or department as part of their normal duties. The contracting department is generally required to place a written request, where the course is not normally offered by the contracted department. This enables staff and students to interact across schools and departments.

These characteristics are important in understanding why interdisciplinary teams seem to form without formal agreements by the units and why UNZA has good working relation with the Government and the private sector, even though it is often seen as a purely teaching university. Although it does not have an established technology or business incubator, the university plays an important role in technology adaptation and transfer.

3. The case of the Technology Development and Advisory Unit (TDAU)

3.1 Background

TDAU was set up in 1975 as an intermediate technology development and consultancy unit within the School of Engineering. Its main objective is to help small-scale producers in the urban and rural areas access skills and technologies that can help them generate wealth and jobs. TDAU adapts advanced mature technologies to develop effective but simpler products that use locally available resources, skills and knowledge.

TDAU was originally established to promote agricultural and industrial development by serving as a channel through which the School of Engineering could provide its services to the local community. Its main objectives are to help:

- "a) Promote use of technologies by entrepreneurs and/or enterprises to generate income and create employment in the private sector;
- b) Serve as a centre for the manufacture of business equipment and small scale goods for emerging entrepreneurs in Zambia;

- c) Provide consultancy services in the fields of appropriate technologies and its areas of competence." ¹

Most of the projects of TDAU fall in three broad categories: 1. Design and fabrication, 2. Consultancy and advice, and 3. Training. Although it addresses a broad range of areas, it has a bias for technologies used in agriculture, food processing, energy, construction (housing), water and sanitation, and rural transportations.

Following changes in the university management in the 1990s, TDAU became a semi-autonomous unit. At the time, and for financial reasons, the university was shedding a number of "non-core" units as "self-sustaining" units. These included the UNZA bookshop, nursery (horticulture), farm and the Institute for Economic and Social Research, among others. In a nutshell, these units were expected to meet their operational expenses, and where possible, share any benefits accrued with the university.

3.2 Nature of projects and partners.

TDAU does not invest in development and production of new or advanced technologies but rather adapts mature and freely available technologies to meet local operational conditions. For instance, UNIDO and COMESA requested TDAU to adapt a seed-treating machine for use in rural areas without electricity to improve the quality of seeds served by farmers. TDAU developed a machine that could be used to treat seed, food grains and pulses with preservatives before storages.

Most of its projects are demand-driven. In general, an interested party - e.g. government/donor agency, private firm, research institute or NGO - may request TDAU to undertake or participate in a project. In other cases, TDAU may bid for advertised projects just like other service providers. Therefore, TDAU does not develop products that are not requested by an interested party.

Although most of its projects are donor-funded, TDAU has good working relations with several private and public institutions. For instance, the National Institute for Scientific and Industrial Research (NISIR) contracted TDAU to develop a fruit pulping machine for wine production, a team of investors hired TDAU to investigate the commercial feasibility of introducing a private airline in Zambia, a bank requested TDAU to look at the design and potential of paint-mixing for their client, and two church organizations contracted TDAU to design, fabricate, install mini-hydropower stations as well as train local people to manage them.

3.3 TDAU as a linker and marketing unit of UNZA

Although the unit represents a very small fraction of the University, it is better known outside the UNZA community than larger departments. Its advertisements have been on television, newspapers and billboards, and it participates in national trade fairs and exhibitions.

TDAU cannot afford to hire a large pool of full-time or part-time staff skilled in its areas of interest to serve industry, donors and government effectively. Its location in the school of engineering is ideal in enabling it to design, fabricate and market

¹ UNZA (1999) *Strategy to improve the operations of the university*, Chapter 5 see <http://www.unza.zm/news/IOTA/UNZAStrategy.htm>

products that require engineering knowledge. However, a number of consultancy projects may require knowledge of other professionals outside the School of Engineering.

For instance, TDAU is investigating options for producing affordable agricultural lime for farmers. In this project, it is working with colleagues from School of Agricultural Sciences, School of Mines, Mount Makulu (Agricultural) Research Station and the British Geological Society. The project, sponsored by United Kingdom's Department for International Development (DFID), is an example of TDAU acting as a link between different UNZA departments and with other key players outside the university community.

The units benefits from other university departments to meet the needs of its clientele and enhance its reputation. In return, university departments get the chance to contribute to national development and benefit from monetary gains associated with the projects (e.g. as consultants). By so doing, TDAU brings the University closer to society and society closer to the University.

3.4 Why TDAU seems to be successful.

TDAU is not unique. For example, the University of Dar-es-Salaam (Tanzania) formed the Institute of Production Innovation (IPI) in 1981. Although the objectives were similar, IPI was supply-driven, largely as a channel to deliver new products/technologies to industry. When it was perceived to have failed, the School of Engineering formed another unit called the Bureau for Industrial Cooperation (BIC). The two bodies competed for the same clients with varying degrees of successes but remained supply-driven.

By contrast, when TDAU became semi-autonomous, it abandoned the supply-driven strategy partly because its products, like those of IPI in Tanzania, were not of interest to major industrial players but rather small and emerging firms. This strategy made it a natural partner for donor agencies, international organizations, NGOs and government agencies that target marginalized groups and small firms.

Based on the memorandum of understanding (MOU) it signed with UNZA, TDAU is required to repay the university the salaries it draws each year, where possible. In return, it is allowed to declared bonuses for its members of staff, spend and invest any money it generates to meet its objectives. Such financial freedom and regulatory incentives (ability to recruit staff outside the university and operate without express approval from the university) may have played a catalytic role in making the unit successful.

As its reputation and confidence has increased and marketing capabilities improve, its products and consultancy services are increasing in sophistication. It has moved from simple solar dryers, manual block presses and oil presses to more sophisticated projects such as incubators for the poultry industry and consultancy for the larger firms. It is, therefore, conceivable that in the near future, its involvement in technologically demanding projects is going to increase.

TDAU is not viewed as a competitor by firms but rather as a facilitator. It seeks industrial partners to take up the developed products as it does not have the facilities and resources for mass production of any products. For example, the manual oil press, designed and produced on the request of AfriCare and sponsored by USAID, is now produced by an industrial partner and hundreds of units have been sold to clients.

TDAU had to change management and recruit people with skills in its core areas of interest – obtaining and negotiating contracts, outreach and public relations, design and engineering and management. It employed people from the private sector and those familiar with government and donor operations. This mixture of skills, expertise and experiences has perhaps been the driving force behind its success.

3.5 TDAU as a model

There are many who rightly believe that university staff in Africa is already too overburdened by their teaching obligations to take on extra duties. In some cases, departments may not even have dedicated research and experimental development laboratories, or funds to sustain projects likely to develop or support firms. In addition, many professional are preoccupied by personal ventures that supplement their meager salaries.

As TDAU demonstrates, a small non-teaching unit could help bring in official contracts that put to good use the diversity of skill and experiences associated with universities. It could help researchers develop vital links with industry and other partners as well as a financial reward associated with such projects. More importantly, it does not interrupt or affect normal operations of the universities as experts may be hired on their personal or departmental basis.

TDAU has helped the development of several small income generation ventures. A similar model could focus on emerging firms seeking to establish themselves in poorer countries on limited budgets. In this case, it could offer design, administrative and management skills, either implemented at premises of the client as is done currently or, incubated by TDAU within university corridors (just like development of prototypes).

TDAU's model of facilitation as well as being demand-driven is perhaps key to limiting losses or huge marketing costs. Rather than focus on simplifying technology, it could start to address the needs of firm in new and emerging fields such as information and communication technologies, biotechnology and material sciences. For instance, members of staff from the departments of Physics, Computer Sciences, Chemistry and School of Engineering are collaborating in a project to design and produce reliable but cheap version of expensive laboratory equipment. There may be a potential need for measuring and monitoring tools for industry as well. If TDAU was to focus on both low and high technology products and services, it will attract and serve a wider base of the Zambian industry, and perhaps the emergence of a machine tool industry.

The question is not whether it is wise for universities to promote units that serve industries and the community but rather whether it is wise to remain indifferent to the economic realities of their people and industries. Universities that depend largely on patronage are unlikely to be seen as relevant or attract research funding from government, industry and donors. TDAU demonstrates that it is possible even in the poor countries for universities to serve industry and the community.

4. The case of the Computer Centre in the development of Zamnet.

4.1 Background.

In 1990, the Director of the Computer Centre (CC) at University of Zambia, Mark Bennett, connected a few personal computers that could exchange emails within the institution, and with Rhodes University in South Africa, and from there to the rest of

the world. By 1994, most Schools had at least one email point available to all members of staff. The University network was serving health institutions, NGOs, governmental, and development and aid organizations, with a total of at least 270 email points [8].

The Computer Centre (CC) was managing, on behalf of several parties, at least three projects: 1. The HealthNet project funded by SatelLife, covering Africa, Asia and Latin America, 2. The ESANET (Eastern and Southern African Network), funded by IDRC, promoting connectivity among universities in the region and 3. ZangoNet (Zambian NGO network), was designed to connect local NGOs to their parental or sister NGOs within the country and abroad. Due to limited skilled and experienced manpower in networking, the projects were housed and co-developed at the University of Zambia (UNZA) Computer Centre. This created a culture of mutual understanding, trust and interest.

4.2 Combining resources to achieve depth

ESANET provided the first microcomputer and modem which served as a host for the first University email system, while the link between Lusaka and Rhodes University was paid for by UNINET due to their interest in interuniversity connectivity. Suggestions to separate the three projects were abandoned, due to scarce qualified human resources.

The collaborative spirit within the university community was also important in the development of the networks. For example, the School of Engineering manufactured a unit, according to Bennett, *“a device that allows the central PC to be connected to both internal and external phone systems and answering whichever calls first”* [9]. The most skilled people in computing at the time were in electrical engineering department of the School of Engineering.

4.3 Sourcing funds for commercialization

The connectivity projects were enthusiastically supported by Government, donors and regulators. However, all donors refused to fund direct internet connection as of 1993. The high level of interest in information technology may have deceived UNZA management to assume that support for the Internet connection will be obtained easily. Mark Bernett summed it up as follows:

" By 1993, we had decided that we wanted “the real thing”: we wanted full Internet access, .. There were plenty of people who said that Africa had other priorities - after all, wasn't Fidonet working (e-mail) -or that Africa needed its own systems of communication...but with the relevant bits of string and sticky tape (and hopes that it didn't rain too often and cut off the phone lines), ..The continent has gone from Zambia being one of the only countries with a connection to no country being without" [10].

Early in 1994, UNZA decided to establish a campus-based company called Zamnet (Zamnet Communication Systems Limited) to link the institution to the Internet and provide service to commercial customers. The UNZA provided space, management and most of the manpower for Zamnet while the World Bank provided \$122,000 loan through the Institutional Development Fund in 1994 - covering 80% of the cost of the first year.

The Director of Computer Centre became the first managing director of Zamnet while the Vice Chancellor and the Deputy Vice Chancellor together with the Registrar were

board members and held shares on behalf of the University. The number of commercial accounts grew from 5 to 165 between January and June 1995. Seven months before the end of the World Bank loan, Zamnet was making enough money to buy new equipment [¹¹].

4.4 Importance of good and effective relations with government

The University of Zambia did not experience the problems other universities faced in establishment of ESANET (Eastern and Southern Africa Network; included Universities of Nairobi, Zimbabwe, Dar-es salaam and Mozambique). For example, University of Nairobi in Kenya was initially denied a license to operate the radio link to the satellite [¹²]. In Zambia, the government was interested in HealthNet and represented at a high level (deputy minister). For example, HealthNet was inaugurated by the Republican President of Zambia.

The goodwill that government showed towards HealthNet benefited other projects and the development of Zamnet. For example, the Computer Centre operated the radio-link to the satellite (picking and dropping emails) without a license but with Government knowledge. Zamnet was the first firm to be allowed to operate private satellite links for data transfers, cutting off the national telecommunication operator. Mobile phones and other telecommunications service providers that followed much later had a tough time convincing government they needed to operate independent satellite links. Therefore, good working relations with government are possibly one of the university's main assets and advantages.

4.5 The role of partners

Other institutions also helped the young project 'learn to stand'. According to Mark Bennett "Rhodes University, on behalf of UNINET ², ..generously offered to bear the cost of sufficient polls each day to allow picking up and dropping of mail.....effectively providing a free e-mail service to UNZA" [13]. This support allowed UNZA a learning and experimentation period.

It was evident that most projects entered and exited the CC through the intersection sets of the three parties: University, Government and Partners. ZangoNet entered through the ³*Partner*-University intersection while HealthNet entered through the *Government*-Partner intersection. The government interests were high (represented by the Deputy Minister of Health). Lastly, UNZANET entered through the **University**-government intersection. The initiatives produced no losers as the different teams were at CC to meet their needs.

Once the projects were completed, HealthNet exited from Computer Center to be based at the Medical School, ZangoNet exited to be managed by a network of NGOs, and UNZANET remained the main networking unit of the University of Zambia community and the country. However, the Computer Centre remained the main gateway for the three networks.

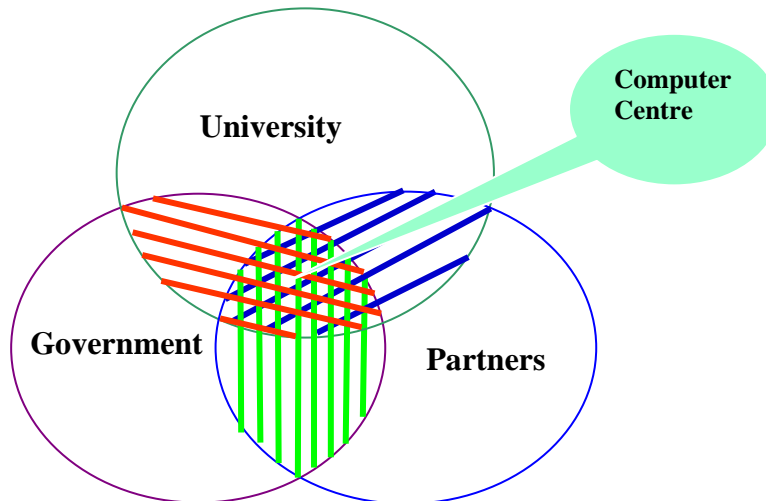
Each of the project it coordinated or participated in brought new challenges and opportunities as well as partners and technologies and resources. For instance, UNZA implemented a project termed Computers for Administrative, Management and Academic Support (CAMAS) that laid fibre optic cables throughout the university

² UNINET is a South African Universities Network funded by the Foundation for Research and Development (FRD)

³ In block letters is the main beneficiary

and provide every office with a digital telephone line and internet point, and each department with computers, a scanner and printer (1994-1996). This project gave birth to the Consultancy and Training Unit at CC.

Figure 1. The relations between the different partners



3.6 The demonstrative impact of Zamnet commercialization.

The commercialization of Zamnet demonstrated that provision of Internet services was good business even in poor countries. Other institutions soon followed the example of Zamnet. CopperNet, formerly a networking unit of the Zambia Consolidate Copper Mines (ZCCM), and the national regulator, Zambia Telecommunication Corporation, developed Internet services.

The computer Centre too, following the successful commercialization of Zamnet, turned the vacated room - which once served as a lecture room - into "The Consultancy and Training Unit" (CTU). The CTU was initially formed to train and support university staff and departments with IT services. Once that was achieved, it opened its doors to the wider public. It has carried out training for organizations such as Common Market for Eastern and Southern Africa (COMESA), Chilanga Cement PLC, Zambia Sugar PLC, Zambia Telecommunication Cooperation and Caltex, and software systems support to a number of organisations, such as Micro Banker's Trust (MBT) and the Dutch embassy.

To meet its development goal, the CTU, through support from the International Telecommunications Union, has been running free basic computer courses to people from impoverished communities, who could not go beyond their basic primary education. Such initiatives make the units unique in supporting the performance of private firms while still meeting the University's developmental objectives.

5. Concluding remarks

It is important to emphasise that the existence of specialized and well-funded research centres is only the first step in enabling universities develop and support existing firms. Other factors equally play an important role in enabling university provide support to existing firms or help the emergence of new enterprises.

According to Burton, there are at least five main characteristics of entrepreneurial universities: ¹⁴

- independent, strong and efficient managerial systems,
- interdepartmental cooperation and increased collaboration with the outside,
- A wider funding resource base,
- A stimulated and strengthened academic units , and
- An integrated entrepreneurial culture throughout the university.

Of these, few apply to the University of Zambia. Its leadership is appointed by Government and is not described by staff as “efficient”, its funding base is very narrow and cannot be described as having “an integrated entrepreneurial culture throughout the university”. At first glance these characteristics do not apply to UNZA.

However, a careful examination reveals that these characteristics are associated with the units that support private firms. It is these units that undertake entrepreneurial activities and have all the characteristics associated with entrepreneurial universities. In many ways, they exist almost as private firms within the university. For example, TDAU is headed by a Manager supported by two Project Engineers, a Business Advisor, an Information Officer and a Chief Technician. It is a hierarchy that mirrors those of private engineer units rather than a university department.

Therefore, a few key characteristics are important at the university level:

- Ability of staff to work across schools, especially when supported by regulations,
- Efficient utilization of existing, and/or developing, relationships with government and industry, and
- Existence of units dedicated to support enterprise development.

The existence of units, whether incubators or consultancy centres, should serve as channels through which the rest of the university community could potentially contribute to national development. Universities whose regulations promote teaching and research across schools/department may facilitate participation and involvement of a wider range of university professionals in projects that specialized units may undertake.

It is also important to have clear guidelines on commercialization of university developed technologies and firms. Neil Robinson, an IT consultant at UNZA wrote (in 1995):

“[Zamnet] has been set up as a campus company by the University of Zambia, The establishment of a company itself has both legal and financial implications and we have involved accounting and legal advisors to assist us.”

For example, the Vice Chancellor was alleged to have owned shares in Zamnet and also held the University shares in trust. Such shares, including those of the University

Bursar at the time, were returned to the University following the Supreme Court of Zambia ruling. The lack of clear regulations on commercialization and incentives for entrepreneurial individuals may represent a major challenge. Although UNZA owns firms, its staff do not own shares in such ventures. Some have left to set up their own private firms based on their experience at UNZA. As a consequence, the university loses out on expertise and revenue.

All business and investment ventures currently fall under the Deputy Vice-Chancellor, as overseer, assisted by the strategic planning manager who may advise on issues related to investment and business. The Manager reports directly to the DVC. There are proposals to develop the office of the Business Venture Controller.

However, this does not address the core issues that could enable the University act as a catalyst for entrepreneurship and firm formation. To achieve these goals, the university may wish to develop: 1. the proposed office of the Business Venture Controller to include identification of emerging initiatives, 2. Clear mechanisms and regulation for accelerating the development and commercialization of new ventures and technologies 3. freedom of operation of the business or technology manager(s) to invest or seek investors interested in University initiatives and 4. provide awards for entrepreneurial individuals, especially students.

Another options is to request Department to designate an interested individual to act as a technology transfer officer. Each officer will then identify and encourage emerging activities that could be considered for funding or award of recognition based on technical and economic feasibility or development dimension impact. Such awards could be considered favourably when considering staff promotion and funding of departments

The University could also consider developing mini-consulting centres where students provide consulting services to established and emerging firms. It could help trainees create crucial social network and learn real business challenges or opportunities in Zambia. It also helps students learn how to set up their own companies in future and work in multidisciplinary teams.

While developed countries debate whether universities should spend so much effort in promoting technology and developing firms, most African universities may as well help create jobs for the thousands of graduates they channel out each year- many of who may not find jobs or the right jobs. Above all, if vocational colleges are equipping their students with skills needed to manage firms, universities may not choose to be indifferent to the prevailing socio-economic situation. They may have to equip all their students, irrespective of profession, with basic skills to, at least, write a business proposal, register a firm, attract funding and collaborate with others in development and marketing of their ideas/concepts. This could easily be achieved through a forum or an entrepreneurship clinic that bring business experts, government units (e.g. tax and business registration authorities) and business consultants in a non-credit earning session that could be run once or twice a week.

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