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Academics' Role and Relevance in National Development

The Case of Engineers at Makerere University in Uganda

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Abstract

This thesis is a case study of engineers at Makerere University in Uganda. In a broad sense the thesis explores the relationship between scientific knowledge and development in a low-income, Sub-Saharan country, which is yet to be industrialised. There is a prevailing optimism towards the hard sciences, such as engineering, and its potential contributions to development and industrialization. Yet, we know from previous literature that there are many challenges for the sub-Saharan universities, related to funding, lack of facilities, brain drain but also related to their respective government. The aim of the study is to get a deeper understanding of the role of academics and scientific knowledge in the national development agenda. The research question for the thesis is 'how do the engineers at Makerere University perceive the relevance of their knowledge to national development and industrialisation of Uganda?'. To answer this research question, data was collected through semi-structured interviews with 20 academics affiliated to the School of Engineering, at Makerere University.

My findings show that there is a large variation among the engineering academics at Makerere University and how they understand and fulfil their role at the university. Where previous studies have tended to treat academics as a unanimous group, this study shows how a group of academics within the same college vary in motivations, aspirations and how this affects the work they do at the University and thus the relevance of their knowledge to national development. However, there are several challenges for the academics to contribute on the same level as their colleagues in other countries. The strong dependency on international donors of funding for research does not only limit the academics' ability to do research, but it also has consequences for the academics' ability to decide areas of research and thus define their own research questions. This makes it difficult for the academics to address issues of national concern, thus the national development agenda.

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Anja Benedicte Myrtveit
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List of Abbreviations

ACE	African Centre of Excellence
CAES	College of Agricultural and Environmental Sciences
CCCC	Chinese Communications Construction Company
CEB	China Exim Bank
CEDAT	College of Engineering, Design, Art and Technology
CREEC	Centre for Research in Energy and Energy Conservation
FoT	Faculty of Technology
HDI	Human Development Index
IGF	Internally Generated Funds
IMF	International Monetary Fund
MAPRONAO	Materials, Product Development and Nano Technology
MDG	Millennium Development Goals
MISR	Makerere Institute of Social Research
MoFPED	Ministry of Finance, Planning and Economic Development
MoSTI	Ministry of Science, Technology and Innovations
MTSIFA	Margaret Trowell School of Industrial Arts
NDP	National Development Plan
Norad	Norwegian Agency for Development Cooperation
NORHED	Norwegian Programme for Capacity Development in Higher Education
NRM	National Resistance Movement
PEAP	Poverty Eradication Action Plan
SDG	Sustainable Development Goals
SIDA	Swedish International Development Cooperation Agency
SME	Small and Medium Enterprises
SoE	School of Engineering
STI	Science, Technology and Innovation
UBOS	Uganda Bureau of Statistics
UIPE	Uganda Institution of Professional Engineers
UMA	Uganda Manufacturers Association
UNCHE	Uganda National Council for Higher Education
UNCST	Uganda National Council for Science and Technology
USAID	United States Agency for International Development
WB	World Bank

President of Uganda, Yoweri Museveni, testing the Kiira Electrical Vehicle at its launch at Makerere University (Kagolo 2011).

1. Introduction: Academic Engineers in National Development

Advances in engineering have been central to human progress ever since the invention of the wheel. In the past hundred and fifty years in particular, engineering and technology have transformed the world we live in, contributing to significantly longer life expectancy and enhanced quality of life for a large number of the world's population (UNESCO 2010:3). Still millions of people do not have access to clean drinking water, proper sanitation, safe housing, or adequate nutrition. The benefits of the advances in engineering have been highly unevenly distributed throughout the world and have particularly left the people in the global south behind (UNESCO 2010:3). The UN Sustainable Development Goals (SDGs) was unanimously adopted by the 193 UN member states, as the global development agenda towards year 2030 (UN 2015). The 17 goals and 169 targets seek to build on the Millennium Development Goals (MDGs) and complete what these did not achieve in terms of development. The then Secretary General of the UN Kofi Annan, declared that "Universities must become a primary tool for Africa's development" (quoted in Cloete et al. 2015:18). Universities can play a central actor in addressing and achieving these development goals, both through education of the new generation, and through research and new sustainable and green solutions. Without university-based knowledge, the goals will not be achieved in time (Halvorsen et al. 2017:29).

The World Bank (WB) also recognizes the importance of higher education as fundamental for development. After a decade of recommendations to African governments to privatize their higher education institutions, and rather put priority on primary education, a number of publications in the late 90s reflects a shift from the WB towards acknowledge the importance of university knowledge for development (WB 1999; WB 2000; WB 2002). In the report published in 2000 'Higher Education in Developing Countries: Peril and Promise', the WB stated that "higher education is no longer a luxury: it is essential to national, social and economic development" (WB 2000:14). The report further draws attention to the particular importance of science and technology, which can "have direct impact on society and that such impacts can translate directly into economic growth" (WB 2000:70).

Uganda, with an annual GDP per capita of 604 USD, is by the WB defined as a low-income country (WB 2017). As for many other low-income countries, the Ugandan economy is largely depending

on services, industry and agriculture, and the majority of the labour force are employed within agriculture and service sectors. The industrial sector in Uganda is dominated by small-scale firms with limited manufacturing value addition, while larger industries are predominantly foreign owned (Shinyekwa et al. 2016:192). Processing of agricultural products, mining and construction are the most important sectors of the industry. However, enterprises still depend heavily on imported machinery, spare parts and raw materials (Shinyekwa et al. 2016:201).

President of Uganda, Yoweri Museveni, and his Cabinet have in the long-term development plan for the country 'Uganda Vision 2040' set the targets for how Uganda shall achieve middle income status. The official national vision statement from the plan is "A Transformed Ugandan Society from a Peasant to a Modern and Prosperous Country within 30 years" (Uganda Vision 2010). The President has also stated his support to the science and technology disciplines and urged for students to pursue a higher education degree that can enable them to solve the challenges of the country, and not "useless courses" as he puts it, like arts, conflict resolution or development studies (Tumushabe 2013; Wandera 2014).

In 2016 the Museveni government established a new Ministry of Science, Technology and Innovations, with the mission to "provide leadership, an enabling environment and resources for scientific research and knowledge-based development for industrialization, competitiveness, and employment creation leading to a sustainable economy" (MoSTI 2017). Also, in the higher education sector, the government have prioritized the hard sciences, often referred to as the STEM disciplines[1], and have raised large scale loans from the WB in support for African Centres of Excellence. Recently a centre of excellence in Materials, Product Development and Nanotechnology (MAPRONAO) was established at the College of Engineering, Design, Art and Technology (CEDAT) at Uganda's larges university, Makerere (Makerere 2016).

The targets of the development plan Uganda Vision 2040 are closely related to advances in engineering. At Makerere University, the government have funded research projects through the Presidential Initiative for Science and Technology (PIST) to enhance the development of science and research in the country (Makerere 2013). CEDAT have been a major recipient of these funds,

[1] STEM is a term used to group what is often referred to as hard sciences; Science, Technology, Engineering and Mathematics

for strategic projects on technological innovations. One of these projects derives from the work of academics and students at CEDAT, is a prototype of an electric vehicle, the Kiira EV.[2] The car has received attention worldwide and have been covered in news medias like the Wall Street Journal, CNN, and the Guardian (Bariyo 2015; Said 2015; Kavuma 2011). The car has been on the cover of the Colleges´ as well as Makerere´s annual reports, and have become a symbol of national technological advancement, innovative capacity at the university, and as well a symbol of modernity as "the new face of Africa's transport" (Kiira n.d.).

1.1. Starting point: The Research Question

The strong political willingness to invest in the hard sciences reflects a great optimism towards the role of academics to play key actors in the national development agenda in Uganda. This thesis therefore seeks to explore the relationship between the academics and the society, with a particular focus on the role of the academics, thus the thesis will put emphasis on the academics´ own view on their role in national development. The research question this thesis therefore seeks to answer is *how do the engineers at Makerere University perceive the relevance of their knowledge to national development and industrialization of Uganda?*

This is a complex research question, which allows for various angles and perspectives. In this thesis I will apply an actor-oriented approach, where I aim to let the perspectives and arguments of the academics themselves constitute the analysis and inform the following discussion. The thesis is aiming at exploring and discover the conditions for the academics to perform their work both at the university and in relation to society, the challenges they meet, power relations and dynamics within the university, and will focus on the role of the academics in research and knowledge production.

To be able to answer this research question, it is necessary to operationalize the question to sub-questions. At first, to understand how the academics are expected to contribute to national development, a closely related question is how the academics themselves understand and perform their role at the university, both to actors within and outside the institution. This is important

[2] Kiira EV is pictured on p. VII.

because it can provide a deeper understanding of the variations among the academics. Another question which is of importance in this context is how the conditions are for doing research at Makerere, and what challenges the academics meet. Finally, in order to give answer to the research question, I will explore how the academics themselves understand the relevance of their knowledge in the society they work and live in. Is there a demand for their knowledge? These are all questions which are central to this thesis and will be guiding topics for the analysis and the following discussion.

Sub-Questions

1. How do the academic themselves understand their role as academics at the university?
2. What are the conditions for research and knowledge production at the School of Engineering?
3. How do the academics consider the relevance of their knowledge to society, and is there a demand for their knowledge?

1.2. Why the case of academic engineers?

A core activity for an academic at a public university is research. The strive for improved or new knowledge constitutes, is in addition (and ideally related) to education, the core mission of the public university (Enders 2007:6). Research can therefore be seen as a characteristic and distinctive activity for academics, and something that separates them from teachers disseminating knowledge at a lower educational level, or from a practitioner in the field applying knowledge. Therefore, research plays a distinctive feature for the academics and have been considered a defining purpose of the university during the past two centuries (Collini 2012:23).

This study looks at engineers for mainly two reasons. Firstly, engineers potentially can provide a decisive role in infrastructure and industrial development of a country. Secondly the academics engineers also provide an interesting case because the academic engineers are educating the new generation engineers, so the education, the knowledge, values and priorities of today´s engineers will have an impact on the engineers of tomorrow.

1.3. Previous Research

International studies on the academic profession have tended to focus on industrialised countries, in Europe and in the US (Altbach 1996; Enders and Teichler 1995, 1997). Teichler (1996) included Asia in the comparative analysis of the academic profession in western Europe, US and Japan (Teichler 1996). However, the literature on the academic profession at the African continent remains scarce, with a few exceptions. In his book, "The Decline of the Guru. The Academic Profession in Developing and Middle-Income Countries" (Altbach 2003) countries worldwide are covered, including Nigeria and South Africa. Also, in the "International Handbook of Higher Education" (Forest and Altbach 2007), covers chapters on both Kenya and South Africa.

In Uganda, Ssesanga and Gerrett (2005:37) have provided a study of academics at Makerere University, and their job-satisfaction. A series of books have also been written by Cloete et al. (1997; 2011; 2015), not about the academic profession per se/directly, but indirectly about the universities and higher education institutions in Africa and their role in economic development and in knowledge production. In line with Cloete, Bisaso (2017) have also written about Makerere University as a "flagship institution" and discussed the institution's capacity building for human resources and research productivity, in contribution to socioeconomic development, and policy development in Uganda (Bisaso 2017:425).

Still, most known is perhaps professor Mamdani, the current director of Makerere Institute of Social Research (MISR), and his critique of the university reforms at Makerere during the 90s. In his book "Scholars in the Marketplace" (2007). He argues that the reform-processes at Makerere in the 1990s has led to a deep-seated transformation, that not only involved the external relations between the university and the market, but also internal processes at the university; relations between the different academic units, and knowledge production, curricula orientation and student programs (Mamdani 2007:97).

Mittelman (2018), a previous graduate student at Makerere, has also written about the University. Focusing on the post-colonial experiences of Makerere, Mittelman provides a historical review on how the institution developed from the late 60s when Makerere won plaudits for its high educational quality. Mittelman describes Makerere as an institution where scholars from "near and

far scholars from near and far worked together, with a shared interest in the postcolonial condition" (Mittelman, 2018:169). During the 80s and 90s, Mittelman argues, the reform processes have led to "academics have appreciated the importance of a proactive stance lest their universities be takers rather than makers of global knowledge*"* (2018:191).

The literature about knowledge production at Makerere University seems to be focussing on the university as a whole, also as in Mittelman (2018) and Cloete et al. (1997; 2011; 2015), or more specifically at some colleges, as in Mamdani (2007;2018). A focus on the STEM disciplines however seems to lack in the literature, surprisingly given the political and financial support by the government and the donor community. As Garrett (1999, quoted in Ssekanga and Garrett 2005:36) has noted, the social context of academics, their attitudes and their working conditions are intimately related in a very complex way, and there is a need to understand them better. The academics at Makerere university provides an interesting unit of study, given the reform processes that has taken place the past 20 years. Makerere have been referred to as an "impressive example institutional reform that takes advantage of different expressions of market demands" (Court 1999:i).

To sum up, in general previous studies on the academic profession seems to be focusing on industrialized parts of the world, applying a quantitative approach, and compared across countries to discover broader trends within the profession. A qualitative study of the engineers at Makerere can provide insight into arguments and values of academics and thus deepen the understanding of their choices and priorities. This study can this way supplement the existing quantitative studies, as well as provide a base for further research on the profession and its relation to society.

1.4. Structure of Thesis

This thesis has seven chapters. This first chapter has provided an introduction and set the course for the thesis through the research questions, aim of study and a brief account of previous research. The following chapter will give a contextual background for the thesis and the case of engineers at Makerere University in Uganda. It will start with presenting the national development agenda in the country and introduce Makerere University as well as the engineering profession and education.

In chapter three I will clarify the conceptual framework for the thesis, namely the relationship between academics and societal development. This is done by introducing the notions of 'knowledge societies' and 'knowledge for development'. Here I will also introduce the much-debated concepts of knowledge production, the so-called mode 1 and mode 2, which will serve as ideal types of knowledge production in the discussion that follows. Then, in chapter three I will introduce the debate about knowledge production at African universities and the ideal of a 'development university'.

In chapter four, the underlying methodological choices and considerations for the thesis will be elaborated on. The chapter starts with the thesis´ methodological and ontological starting points and will further explain the development of the research design, the process of data collection and the analysis of data.

The following chapter five, Analysis, will introduce a typology of academics. This typology will be the first answer to the first sub-question for the thesis; how the academics understand their role at the university. This typology will be the starting point of the next chapter which discusses these findings. In that chapter the categories from the typology will be discussed, followed by a broader discussion about knowledge production and innovations, academic autonomy and relevance, and donor funding and accountability. In the final part of this chapter I will answer the two remaining sub-questions, namely the conditions for research and the demand for the academics' knowledge.

Finally, in the conclusion I will reflect on the main findings from the thesis, what implications this might have, as well as limitations in the research design. In conclusion I will also present ideas for further research based on my findings.

2. Background: The National Development Agenda and Engineers at Makerere University

In this chapter I will give a contextual background to the topic of the thesis. This is to give an understanding of the context of Uganda, a Sub-Saharan African country, with a relatively long history of higher education, and with a government that has developed a national policy and a development plan where the STEM disciplines are seen as central for the country's development.

The chapter 2.1 will start with explaining the current national development framework within the Science, Technology and Innovation (STI) sector in Uganda. The section will also provide a brief history of the development of the sector. Key policy documents will be outlined, and these will also be referred to in the following chapters. In 2.2 a brief history of Makerere University, the largest public university in Uganda, will be presented. That part will in particular focus on the reform process during the 90s, and how this affected the university to the way it is today. Finally, in 2.3. I will present the engineering discipline, a brief history of the development of engineering in academia and how the discipline emerged and has developed at Makerere University.

2.1. National Development and the Science, Technology and Innovation Sector

The Uganda Vision 2040 provides a normative development framework for Uganda and identifies specific objectives and criteria that the Cabinet seek to fulfil by 2040. The document provides a 30-year plan with over-all development targets and its implementation through 5-year National Development Plans (NDPs). The overall vision statement is outlined as "A Transformed Ugandan Society from a Peasant to a Modern and Prosperous Country within 30 years" (Uganda Vision 2010). As with most African countries, Uganda´s national vision is to attain status as a middle-income country within the next decades (Newman et al. 2016:5; Vision 2040 2010:iv). [3]

In Vision 2040, the table 'Baseline status and vision targets' presents measurements of the current status and the targets for 2040. These targets draw a picture of the desired development, and many

[3] WB classification of countries according to GNI per capita; low income (<1,005 USD), lower middle income (1,006-3,955 USD), upper middle income (3,956-12,235 USD) and high income (>12,235) (WB 2017a).

of the indicators are measures of an industrialization of the economy. An outline of the targets are presented in Table 1, and here one can see the desired outcomes in 2040; e.g. a vigorous reduction in the labour force in agriculture from 65.5% to 31% of the sectoral contribution, as well as a reduction in the agricultural sectoral composition of the GDP from 22.4% to 10.4%.

The overall mission is to attain status as a middle-income country, by raising GDP per capita from 506 USD to 9500 USD. In addition, there is a desire for a strong growth in manufactured exports from 4.5% to 50%, a growth in public expenditure on R&D from 0.1% to 2.5%, to increase the number of Ugandans with access to electricity from today's 11% to 80% of the population. Innovations are also expected to grow, measured in patents registered from 3 today to 6000 patents registered per year in 2040. To reach these targets, knowledge deriving from the STEM disciplines are of decisive importance (Uganda Vision 2010).

Table 1: Extract of 'Table 2.1, Baseline Status and Vision Targets' (Uganda Vision 2040 2010:13-15) [4]

Development Indicator		**Baseline Status 2010**	**Target 2040**
Per capita income		USD 506	USD 9500
Percentage of population below the poverty line		24.5%	5%
Sectoral composition of GDP (%)	Agriculture	22.4%	10.4%
	Industry	26.4%	31.4%
	Services	51.2%	58.2%
Labour force distribution in line with sectoral contribution (%)	Agriculture	65.6%	31%
	Industry	7.6%	26%
	Services	26.8%	43%
Manufactured exports as a percentage of total exports		4.2%	50%
Public expenditure as a percentage share of R&D to GDP		0.1%	2.5%
Percentage of population with access to electricity		11%	80%
Percentage of standard paved roads to total network		4%	80%
Innovations as measured by patents registered per year		3	6000

National Policy on Science, Technology and Innovation

Uganda National Council for Science and Technology (UNCST) was established by the Government in 1990 as the agency responsible for coordination of the science, technology and innovation (STI) systems in Uganda (MoFPED 2009:1). The Council initiated a policy formulation

[4] For complete table see Appendix 9.1: Uganda Vision 2040 Targets.

process in 1994 and conducted subsequent policy reviews in 2001 and 2006 as part of the strategic undertaking for integrating STI in the national development process. The first STI Policy was formally adopted in 2009. Before this policy came into existence, the sector was managed through a constellation of other policies, in particular the Poverty Eradication Action Plan (PEAP), which was the predecessor of the current Vision 2040 and the NDPs. An overview of key development documents is outlined in Table 2, consisting of both governmental national development plans, STI framework and key documents at Makerere university. The current STI Policy provides a platform for Uganda's transformation, in line with the Vision 2040, and prioritises strategic areas of action to attain status as a middle-income country. The goal of the policy is to strengthen national capacity to "generate, transfer and apply scientific knowledge, skills and technologies that ensure sustainable utilisation of natural resources for the realisation of Uganda's development objectives" (MoFPED 2009:13). Yet, the Policy of 2009 recognises that the level of STI-infrastructure is inadequate to facilitate STI-driven development in Uganda.

National Plan on Science, Technology and Innovation

Based on the Policy of 2009, a National STI Plan was developed in 2012 as an instrument of implementing the Policy, by translating it into strategies, actions and measurable results within a five-year period (MoFPED 2012). The STI Plan of 2012 was also formulated by the UNCST, in dialogue with various Ministries, Departments, Agencies, private sector, civil society and development partners. The Plan emphasises the promotion of science, technology and innovation as one of the four key priorities in the first NDP of 2010/11-2014/15. The purpose of the STI plan of 2012 is to facilitate the achievement of Uganda´s key development aspirations by

> "uplifting the population from an absolute poverty through provision of basic human needs, transformation of the economy from an agrarian to an industrial and knowledge-based economy and enhancing Uganda's participation in global trade and development processes" (MoFPED 2012:2).

Table 2: Key Development Policy Documents in Uganda

Key Development Policy Documents in Uganda		
National Development Policies	**National STI Framework**	**Makerere University**
Poverty Eradication Action Plans: • PEAP I (1997) • PEAP II (2000) • PEAP III (2004) Vision 2040 (2010) • National Development Plan I 2010/11-2014/15 (2010) • National Development Plan II 2015/16-2019/20 (2015)	• National STI Policy 2009 • National STI Plan 2012/13 – 2017/18. • Ministry of Science Technology and Innovations. Ministerial Policy Statement. Financial Year 2017/2018 (2017).	• Makerere University Strategic Plan 2008/09-2018/19 • CEDAT Strategic plan 2011-2018

In the current NDP II, science, technology and innovations are emphasised throughout all the five prioritised areas; (1) Agriculture, (2) Tourism, (3) Minerals, oil and gas, (4) Infrastructure development, and (5) Human Capital Development. Examples of this from the NDP II are technology adaption at the farm level, investment in tourism facilitating infrastructure (energy, water, and ICT), development of geological surveys, and construction of an oil and gas refinery (NDPII 2015:xxv). A significant shift from the NDPI to the NDPII is that engineering has been included within the STI framework, as science, technology, engineering and innovations (STEI) throughout the plan, which further underlines the recognition of the importance of this discipline.

The STI Plan of 2012 recommended the establishment of a ministry that could coordinate the STI sector in Uganda. The Plan states that: "STI cannot fully be integrated into the national development processes and programmes of any country without a properly functioning, strong and empowered ST coordinating agency, such as a (…) Ministry of Science and Technology." (MoFPED 2012:3). The Ministry was established four years later, in 2016, and is responsible for creating an enabling policy environment for STI and national development.

Higher Education Institutions and challenges

In the STI plan of 2012, universities are identified as key institutions in the STI infrastructure.
At the time, it was 34 universities in Uganda of which six offered science and engineering courses, 33 science-related vocational and technical institutes, 20 active R&D institutes and five private laboratories (MoFPED 2012:7).

Despite their key role in the STI infrastructure, the Policy of 2009 stressed that the current higher education system in Uganda places too much emphasis on theoretical academic work with little depth of applied science, engineering and technical skills which are central to technological innovation (MoFPED 2009:4). Research institutions are identified as having a weak financial and technical capacity to undertake applied research (MoFPED 2012:7), and scientific research mainly takes place in a small number of research institutes, which are supported mainly by foreign sources of funding (MoFPED 2012:27).

The plan of 2012 addresses this challenge and calls for a revised science education curriculum. The principles governing a revision of the science curricula should according to the Plan include active construction or practical learning within the existing environment, a learner-centred and enquiry-based teaching approach and an orientation towards finding solutions to the existing societal problems (MoFPED 2012:25). It is argued that the aim of these efforts will be to generate a workforce which is practical oriented and able to address the needs of a growing economy.

Universities and university-based knowledge are identified as key in this agenda and have received much political attention and support. The hard sciences in particular are considered to be of crucial importance to the development and technological advancement of the country. Out of the 34 universities identified in the STI Plan, Makerere University is the largest one, with the highest number of graduates.

2.2. Makerere University - A brief historical background

"The Oxford of Africa"

Makerere is the largest, and most prestigious university in Uganda. It is also often referred to one of the most prestigious universities at the African continent (Sicherman 2006). As is the case with some other African universities, Makerere is a colonial legacy and was established by the British administration of Uganda in 1922. It started out as a technical school, placed in Uganda's capital Kampala. The creation of the school was based on the needs of a middle cadre of civil servants beyond clerks, messengers and interpreters, and for the training of native Ugandans in artisan roles

such as carpentry, building, metal fabrication and mechanics (Musisi and Mwanga 2003:7). In the 1920s Makerere offered vocational training in medicine, agricultural- and veterinary courses and engineering (Sicherman 2006:10). The purpose was to train a tiny elite, who received full scholarships, including payed tuition fees, health insurance and transport (Cloete et al. 2015:6). The scholarship was offered on the basis of merit rather than need, and for a student who got the scholarship, the entry to Makerere was an extraordinary opportunity (Mamdani 2007:1). While some argues that Makerere was established partly to assure the world that the colonial government was concerned with the welfare and educational needs of its colony (Musisi and Muwanga 2003:7), others have argued that the implicit purpose of the establishment was to create a 'controlling education' to forestall the dangers of an independence movement (Sicherman 2008:13).

In 1949 Makerere attained status as a university college for the whole of East Africa, with students arriving all the way from Zambia, Kenya and Tanzania (Musisi and Mwanga 2003:7). Makerere could award external degrees of the University of London, with an ambition to become 'the Oxford of Africa' (Musisi and Mwanga, 2003:7).

Political Independence

After political independence from the colonial powers universities across Africa became oriented towards objectives of national development. In Uganda, after independence in 1962 there was a rise in anticolonial nationalism, and the university in this period became a symbol of political independence (Mittelman 2018:3). Makerere`s role became to educate functionaries for public service and assorted professionals to minister the economy (Mittelman 2018:173).

The University was at this point funded by the government (Mittelman 2018:173). The *developmental university* supported the goals of the state, as described by Sicherman:

> "Training individuals for national development and conducting research both of applied and pure nature, with emphasis on African content in course structures and a conscious fashioning of training and research to respond as sympathetically as possible to the expressed needs of government and national populations" (Sicherman, 2006, p.2).

In 1963 Makerere in Kampala, together with campuses in Nairobi and Dar es Salaam, became constituent colleges of the University of East Africa, and ending its collaboration with University of London (Mittelman 2018:7). With the establishment of the University of East Africa, the relationship with the University of London came to an end, and the new regional institution could

now award its own degrees. Linking with the neighbouring countries, this transnational university embodied the ideals of cultural and political pan-Africanism (Mittelman 2018). Mittelman (2018:8) argues that with decolonization it became clear that the university still had colonial-style hierarchies, and that the challenge was to refashion a post-colonial education system cognizant of development needs. During the post-colonial period, Makerere won plaudits for its high educational quality and during the 60s scholars from near and far worked together with a shared interest in the role of the post-colonial University, in Mittelman's words (2018:169).

> "our standards of success were the thrill of intellectual pleasure, a fascination with ideas, the launch of new journals, the vibrant debates that they triggered, attention from many centres of erudition to Makerere´s academic programs, and international conferences that drew all sorts of scholars and practitioners to the campus" (Mittelman, 2018:169).

On July 1st 1970, Makerere became nominally an independent national university, offering degree programmes at undergraduate and postgraduate levels as the *Education Act (1970)* was passed by parliament. By that time, Uganda's neighbouring countries had attained their independence and needed to establish their own universities, which resulted in the closure of the joint regional university and the establishment of the University of Nairobi, and the University of Dar es Salaam, alongside Makerere. Throughout the 1970s, Uganda experienced political turmoil with the coup by Idi Amin in 1971 that threatened the very existence of the university (Court 1999:3). This period resulted in ravaged infrastructure and academics fleeing to Europe and North America (Cloete et al. 2015:111). By the 80s, Makerere exhibited in extreme form the resource constraints facing the university, where no new physical structures had been built and no maintenance carried out for the past decade (Court 1999).

Economic Recovery Programs

It was not until the early 1980s that Makerere started to recover from the effects of the political instability and the university embarked on reforms to promote economic stability and liberalization (Magara 2009:70, quoted in Cloete, 2015:111). The reforms at Makerere was a part of a broader liberalization/market orientation of the Ugandan economy (Mutibwa 2016:434). Although the National Resistance Movement[5] (NRM) government initially did not want to embrace the

[5] NRM is the ruling political party in Uganda led by president Museveni, and the party has been in power since 1986 (Mutibwa 2016:387).

recommendations imposed by the Bretton Woods institutions (International Monetary Fund (IMF) and WB), the Ugandan government accepted the Economic Recovery Programme (also known as Structural Adjustment Programmes (SAPs)) in May 1987, which according to Mutibwa (2016:435) set the country on a new course from which it has not deviated since, and the Washington-based institutions became a compass for Uganda´s higher education policies (Mittelman 2018:173).

In summary, the economic programme that was finally agreed between Uganda, and IMF and the WB reflected heavily the IMF diagnosis and approach; the so-called "Washington Consensus". The IMF reforms were meant to reduce the power of the state, and provide an environment in which private firms, especially the long-suffering small and medium ones, could thrive. The reforms meant an economy run in the principle of market-orientation, determined by forces of supply and demand, independent of government command or control and oriented to the private sector. This meant deregulations, and privatization of state-run companies, moving away from government control in such areas as prices, interest rates for commercial banks and the liberalisation of the foreign exchange regime. In summary, it meant that the government had to let the private sector manage the economy (Mutibwa 2016:436). The programme caused a monetary discipline in the form of government budget deficit and monetary expansion (Mutibwa 2016:436).

Economic Recovery Programmes at Makerere

Higher education institutions were also affected by the policy recommendations form the Bretton Woods institutions. Providing universal primary education was understood as a key strategy for poverty reduction. Accordingly, the government prioritized primary education over the other education sectors (Samoff and Carrol, 2003:29). While Mamdani (2007) argue that this priority was enforced through the implementation of the economic recovery programmes, Samoff and Carrol (2003:30) argues that this initiative seems to have solid local roots, stemming from recommendations from the Ugandan Education Policy Review Commission. They further claim that, despite the similarities between WB policy recommendations and reforms implemented in Uganda, a direct causal link between the two are difficult to document (Samoff and Carrol 2003:30). This stands in stark contrast to Mamdani, who argues that the government, in line with World Bank recommendations, put a tight squeeze on funds for higher education because the WB was in a position to translate recommendations into conditionalities, reflecting an unequal power balance between the two (Mamdani 2007:11).

At Makerere the reduction in government funding translated into cost- sharing in the sense that the government reduced student allowances provided by the state and stimulated the enrolment of self-sponsored students (Court 1999). The mass entry of self-sponsored students took its toll not only on the infrastructure of the university, but also on the research activities of academic staff. With the increase in the teaching load, research became an impossible endeavour for many of Makerere´s academics (Musiige and Maassen 2015:110). Mamdani (2007:8) argues that these policies were deliberate decisions to devalue higher education as an object of public policy. In his book 'Scholars in the Marketplace', as the title implies, he criticises the reforms at the University, arguing that it eventually led to a commercialization of the University in which the market defines priorities in the functioning of the university. The various colleges adopted differently to the reforms, but Mamdani argues that the social sciences and humanities were affected by introduction of courses to meet market demands (Mamdani 2007:47). I will return to how the reforms affected the engineering units at the university below.

2.3. Engineering and Development

The UNESCO Report 'Engineering: Issues, Challenges and Opportunities for Development' (2010) is the first of its kind, focussing especially on the role of engineering in in the context of human, social, economic and cultural development with a particular focus on lower-income countries (UNESCO 2010:16). The report was developed based by an acknowledgement that engineering is not just a matter of economic development, but also social, and human development, and the particular importance of engineering in poverty reduction, sustainable development, climate change mitigation and adaption, and the importance of better communicating this to policy-makers, decision-takers and the wider public audience (UNESCO 2010:17). The Report points at the two major tasks confronting engineers in the twenty-first century as:

> 1. Engineering the world to avert an environmental crisis caused partly by earlier generations in terms of energy use, greenhouse gas emissions and their contributions to climate change, and
> 2. Engineering the large proportion of the worlds increasing population out of poverty, and the associated problems encapsulated by the UN MDGs (SDGs)." (Jowitt 2010:39)

History and Development of the Engineering Profession

The word 'engineer' was first used to describe a person who operated a military engine or machine; 'engine' derivers from the Latin *ingenium* for ingenuity or cleverness and invention (Marjoram 2010:135). However, the history of engineering as a profession, where payment is made for services, began with tool- and weapon-making over 150.000 years ago. Engineering encompasses a vast diversity of fields. It also encompasses a diversity of types and levels – from engineers in universities more concerned with research and teaching, what is sometimes described as the 'engineering sciences', to practicing, professional and consulting engineers, to engineering technologists and technicians (Watermayer 2010:27).

Engineering in Academia

Engineering is the field, discipline, practice, and profession that relates to the development, acquisition and application of technical, scientific and mathematical knowledge about the understanding, design, development, invention, innovation and use of materials, machines, structures, systems and processes for specific purposes (Marjoram and Zhong 2010:24). The engineering profession, as with other professions, is an occupation based upon specialized education and training, as providers of professional advice and services. Academic engineers are concerned with teaching and research, compared to engineers working in the industry.

Professionalisation of Engineering Education

The most crucial development of engineering was during the eighteen and nineteenth century, particularly during Iron Age and Steam Age of the second phase of the Industrial Revolutions. In Britain, where the industrial revolution began, many engineers had little formal or theoretical training. Engineering education was initially based on a system of apprenticeship with a working engineer, through practical activity preceding a more scientific approach (Marjoram 2010:135)

In continental Europe the development of the engineering education systems was based on the French and German models, with a foundation in science and mathematics, as compared to the British model. France developed the system of formal schooling in engineering after the Revolution under Napoleon´s influence, and engineering education in France has retained a strong theoretical character (Marjoram 2010:135). The French model influenced the development of polytechnic

engineering education institutions around the world at the beginning of the nineteenth century, especially in Germany where early interest in the development of engineering education took place in the mining industry. By the end of the nineteenth century, most of the now industrialized countries had established their own education systems based on the French, and the German Humboldtian model. A continued professionalization of engineering followed in the twentieth century, with the development of professional societies, journals, meetings, conferences, and the professional accreditation of exams, qualifications, and universities which facilitated education. International agreements relating to accreditation and the mutual recognition of engineering qualifications and professional competence was also established. [6]

Engineering Education in Uganda

Although Makerere started as a technical school and included courses in engineering, formal education and training of graduate engineers in Uganda did not start until 1969 with the opening of the Faculty of Technology (FoT). In addition to the engineering programmes at Kyambogo University, also located in Kampala, these two institutions constitute the core of the teaching, learning and research in engineering in Uganda today (Lugujjo 2010:214). The FoT started with an intake of 26 students in three areas of engineering; Civil, Electrical and Mechanical. The establishment of this faculty was motivated by a realisation of the Ugandan Government; that industries needed more technical manpower with engineering knowledge than what were graduating and that the majority of graduates at the time came from the University of Nairobi in Kenya. During the first 16 years, the Faculty was supported by UNDP-UNESCO-projects, which provided expatriate staff, scholarships, laboratory equipment and textbooks (CEDAT, n.d.). The programme instituted in 1978 remained virtually unchanged until December 1995 when a second major change took place in the engineering courses. It was resolved that admissions were to be direct into the three core disciplines of civil, electrical and mechanical engineering.

The civil engineering programme at Makerere contains the engineering disciplines dealing with traffic and transportation engineering, highway engineering, water resources engineering,

[6] Eg. Washington Accord (1989), the Sydney Accord (2001), the Dublin Accord (2002), the APEC Engineer (1999), the Engineers Mobility Forum (2001), the Engineering Technologist Mobility Forum (2003) and the Bologna Declaration relating to quality assurance and accreditation of bachelor and master programmes in Europe (Marjoram 2010:136)

construction management, public health and environmental engineering, geotechnical engineering as well as civil engineering surveying (CEDAT n.d.). Electrical engineering deals with the study and application of electricity, electronics and electromagnetism, computer engineering, and telecommunications engineering. Mechanical engineering is the discipline focusing on the design, construction and industrial application of mechanics and the production of tools and machinery. The mechanical engineering department at Makerere has laboratories for materials, metallurgy, thermodynamics, fluids and meteorology.

The emergence of new branches of engineering are usually indicated by the establishment of new university departments, sections in existing or new professional engineering organizations (Marjoram 2010:136). Priorities are reflected in the name of the departments at the University. At Makerere for instance, Civil engineering has been combined with environmental engineering, and electrical engineering has been combined with computer engineering.

Since its origins, the Faculty has expanded and now consists of six undergraduate departments, two sub-departments of Engineering Maths and Urban Planning, and a graduate programme. There were also plans to transform into a College of Engineering and Technology in order to foster the expansion and development of the Engineering options. In 1990, the Faculty of Agriculture started a department of Agricultural Engineering, with an arrangement that their students spend their first two years in the FoT, studying the same subjects with their Mechanical Engineering counterparts, an arrangement that still stands the test of time.

College of Engineering, Design, Art and Technology

In 2010, the Makerere University Council approved the Senate Recommendations to transform the University to a collegiate university. Before this, the University had one Constituent College (the College of Health Sciences), and twenty-two Faculties, Schools and Institutes. The background for this reorganization was a recognition that the University had become too big to be managed at the centre, and a need to divide the functions between the central administration of the university and the colleges (CEDAT n.d.). The former FoT split into the schools of Built Environment and School of Engineering with a total of graduate and undergraduate enrolment of over 2300 students (CEDAT 2011a). A reorganization of the previous university structure, to a College-structure in

2010, led to a consolidation of the former FoT and Margaret Trowell School of Industrial Arts (MTSIFA), to the establishment of CEDAT. Its mission statement is as follows:

> "The mission of CEDAT is to undertake high quality research relevant to the region's and global development needs and consequently produce highly qualified graduates with specialised skills but equipped with holistic knowledge, as well as Professional Services and Innovation for Sustainable National and Regional Development." (CEDAT 2011a)

The strategic plan seeks to address the emerging challenges of national and regional development, including lack of electricity, inadequate infrastructure, access to water, fast urbanisation, industrialisation and ICT (CEDAT 2010: v). The three strategic directions of CEDAT, in line with the strategic pillars of Makerere (Makerere 2008), are (1) Teaching and Learning, (2) Research and Innovation, and (3) Knowledge Transfer Partnerships and Networking.

Presidential Initiatives on Science and Technology

The PIST is an initiative that started aiming at enhancing the development of science and research in Uganda. The initiative supports the university´s main priorities in the area of research and innovation as defined in light of the scientific challenges and identifying role of universities as 'changing agents' in the economic development of the country (Makerere 2013). Makerere University has since 2010 been operating projects funded through the PIST, under the three colleges; College of Agriculture and Environmental Sciences, College of Veterinary Medicine, Animal Resources and Bio-Security, and College of Engineering, Design, Art and Technology. CEDAT receives funding for eleven projects under the PIST, including funding for rehabilitation and modernization of laboratories.

In 2012, the Government of Uganda has called for the tripling of enrolment of students in engineering and technology disciplines within the next ten years. According to the university Visitation Report 2016 (Rwendeire 2016), Makerere has experienced a notable increase in the student enrolment in the STEM programmes, from 16% in 2003, to 35% in 2015 (Rwendeire 2016: xv). This development aligns well with the NDP which outlines the national aim of 40 % student enrolment in science and technology disciplines (NDPII 2015:7).

Links with the industry

Engineering as a discipline is linking the sciences and societal needs, and therefore requires some sort of contact with both. Even though the engineering education in Uganda started from a recognition of a need for engineering knowledge and skilled manpower, it remains an open question whether the engineers have the required links to the industry. One established link is students' industrial training at the end of the second and third years of study (Lugujjo 2010:216). However, it has become increasingly difficult to find appropriate placement for students as most of the industries are privatized, and they regard training university students as being outside their mandate (Lugujjo 2010:216). Small- and medium-scale enterprises (SME) account for over 90% of enterprises in Uganda (Shinyekwa et al. 2016:197). Small-scale industries are too small to participate in coherent training programmes, and when 58% of the registered enterprises employs between five and ten people this have becomes a challenge for industrial training of students.

Industry, at its broadest level encompasses mining, manufacturing, utilities and construction, but with changes in technology also agro-industrial products have become tradeable (Newman, 2016, p.4). In Uganda the most important sectors of the industry are processing of agricultural products, mining and construction (Shinyekwa et al. 2016:201). The sector is dominated by small-scale firms characterised by limited manufacturing value addition and enterprises still depend heavily on imported utilities like machinery, spare parts and raw materials (Shinyekwa et al. 2016:201). The larger industries are predominantly foreign owned (Shinyekwa et al. 2016:192).

In this chapter I have given a contextual background to the role of Engineering in the national development agenda in Uganda, and I have introduced the country´s oldest university, Makerere University, which are one of the two universities in Uganda that educates engineers. In the next chapter I will introduce the conceptual framework for this study.

3. Conceptual Framework: Academics in Knowledge Societies and the Modes of Knowledge Production

In this chapter I will present the conceptual framework for the thesis. The chapter will introduce the concepts related to the relationship between academics and societal development.

The chapter 3.1 starts with the more recent debates about 'knowledge societies' and the argued 'knowledge for development paradigm'. Further, the early origins of universities and the academic profession are presented, and the development of the modern research university characterised by a growing specialization and academic autonomy. In 3.2. the modes of knowledge production will be presented, as one of the more recent debates about scientific knowledge, and the relationship between academics and societal actors in knowledge production. Finally, in 3.3. debates about knowledge production in African universities will be presented, and how economic reform processes have affected knowledge production at the universities, as well as the ideal of a 'developmental university'.

3.1. Knowledge society

The idea that we are living in a *knowledge society* is gaining acceptance, as is the notion that the modern economy is knowledge-based (Stehr 2012a:1). According to Stehr, the emerging form of society can be referred to as a knowledge society because the constitutive mechanism, or the identity of the modern society is increasingly driven by knowledge (1994:6). This is not a sudden development but represents a gradual process where the defining characteristics of society has changed, and new traits emerged. This transformation is through a development of a country's culture and economy, from an agrarian to an industrial economy.

"Knowledge for Development" was the title of the World Development Report (WB 1999), launched in 1999 by the WB. The report addresses the relationship between knowledge gaps and information problems, their impact on development and the ways that international institutions and developing-country governments can better address these challenges. This report was a starting point to what Koch and Weingart (2016:339) refers to as the "knowledge for development

paradigm", where they argue that scientific knowledge is *a*, if not *the*, crucial factor responsible for development, identified with economic well-being (Koch and Weingart 2016:11).

Development and Innovations and Creative Destruction

The concept of development can be understood as an essentially contested concept as it is not singular in meaning but can be understood in various ways depending on the context, being economically, socially, culturally or politically (Gallie 1956). In its simplest form, the term simply connotes a transition from one state to another. Yet, it also has a normative aspect. When speaking of 'developing countries' it is implicit that there is a desire for these countries to develop, thus increase their gross domestic product (GDP).[7]

Historically, technological progress has played a central role in development, for example in the past centuries in industrialisation of countries to modern economies. Schumpeter described development as a historical process of structural change, driven largely by innovation (Trace 2016:125). Innovation was defined by Schumpeter as 'a new combination' which could take form in five different types; as (1) a new source of raw material, (2) a new method of production, (3) a new product, (4) a new market or (5) a new organization (Schumpeter 2011:5). Schumpeter held technological competition to be the driving force of economic development (Fagerberg 2006:16).

Continuous improvement or marginal innovation was by Schumpeter considered as less important than radical or revolutionary technological change. By referring to the history of the productive apparatus of a typical farm, from the beginnings of the rationalization of crop rotation, ploughing and fattening to the mechanization of today, linking up with elevators and railroads, Schumpeter shows how this is a history of revolutions and thus development (1976:83) Also the history of the productive apparatus of the iron and steel industry from the charcoal furnace to current types of furnace, or the history of the apparatus of power production from the overshot water wheel to the modern power plant, or the history of transportation from the mail coach to the airplane. The opening up of new markets, foreign or domestic, and the organizational development from the craft

[7] The UN HDI is another way of measuring development, through 'human wellbeing', but this index has also been criticized for the high correlation between the component variables which means that the index provides us with little more information than what GDP per capita alone provides (Kovacevic 2011:15).

shop to the factory, illustrate the same process of 'industrial mutation' that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one. This process Schumpeter refers to as 'creative destruction' (Schumpeter 1976:83). Today this is associated with the idea of disruptive technological change; the mobile phone making landlines redundant, electronic media leading to the demise of prints and so on (Trace 2016:127).

Engineers and Waves of Innovation

Engineers and engineering knowledge have played a central role in the technological advancement, thus industrialisation and modernisation of countries especially since the first Industrial Revolution, spreading from the UK in the 18th century. The first Industrial Revolution took place from 1750–1850 and focused on the textile industry (Marjoram 2010:31). The second Industrial Revolution focused on steam and the railways from 1850–1900, while the third Industrial Revolution was based on steel, electricity and heavy engineering from 1875–1925. This was followed by the fourth Industrial Revolution based on oil, the automobile and mass production, taking place between 1900–1950 and onward, and the fifth phase was based on information and telecommunications and the post-war boom from 1950 (Marjoram 2010:31). Most analysts accept the 'Schumpeter-Freeman-Perez' paradigm of five waves of innovation since the first Industrial Revolution, although the precise dates, phases, causes and effects of these major changes are hotly debated. The same holds true with the sixth wave, which is claimed to be based on new knowledge production and application in fields like IT, biotechnology and materials, beginning around 1980, and the possible seventh wave based on sustainable 'green engineering' and technology which seem to have begun around 2005 (Marjoram 2010:31). These waves of innovations and industrial development all relates to cycles in the world economy (Marjoram 2010:31).

The Knowledge Society and Universities

Higher education institutions and advanced research is the cornerstone of knowledge-based societies (Kearney 2009:13). Internationally, there is growing consensus among national policy-makers that the university is a driver for economic growth and development (Cloete et al. 2015:18). This is linked to the role of the university in producing a highly skilled and competent labour force through university education, and in the development of new knowledge through scientific research. Science-based knowledge is seen as a precondition for the growth of the modern society

and its institutions (Halvorsen 2010a:238). Both contributions are essential to the creation of innovations and the development of a national economy which is globally competitive (Cloete et al. 2015:19).

Assié-Lumumba (2011) argues that every African state at independence conceived a national project, aiming to build a nation-state with a clearly articulated development agenda. Education as a social institution became a fundament in this planning, and the sub-sector of higher education, particularly the universities, appeared as an indispensable agency in the nation state building (Assié-Lumumba 2011:175). Research-based universities in many African countries thus became linked to the idea of modernity and the idea of development, as opposed to the tradition, linked to pre-modern, agrarian structures. This way Universities became part of the symbolic apparatus of modernity in many African post-colonial countries (Shils and Roberts 2004:164).

The Academic Profession and Universities

The academic profession, as with other professions, such as medicine or law, is characterised by the control over the acquisition and application of knowledge within their field. In addition, and distinctive from other professions, the academic profession is considered to be a key profession, as it is "the profession that educates the other professions" (Perkin 1969, quoted in Enders 2007:5). The academic identity is given by its ability to develop, spread and guard knowledge (Halvorsen 2017). In addition, the academic profession is also characterised by its monopoly in controlling recruitment, through the uptake of PhD candidates (Halvorsen 2017). Thus, this profession control its own reproduction.

The emergence of an academic profession is inevitably and closely linked to the origins of the university (Enders 2007:6). Higher education systems, structures, and institutions differ according to their historical development and traditional features, and current characteristics and efforts deals with recent trends and respond to new challenges. This diversity holds true for the academic profession. Starting in the 12th century in Europe, universities were established in Bologna, Salerno and Paris by an idea of a community of masters and students. Universities were established the following centuries, and within these institutions the academics formed guild-like associations of medieval masters with a growing feeling of shared beliefs and mutuality across institutions (Enders 2007:6). This can be seen as the birth of the academic estate and universities. By the 18th centuries

academics formed essentially a teaching estate, becoming partly involved in the social reproduction and controlling of the upper social elites (Enders 2007:6).

The impetus for reform and the birth of the modern university came with influence from Scotland and Germany, respectively during the 18th and 19th century (Enders 2007:6). Scottish scholars opened up for the establishment of new disciplines, followed by a growing specialization and departmentalization of knowledge. In Germany, the establishment of the University of Berlin in 1819, by Wilhelm von Humboldt is conventionally regarded as a symbolic founding moment of the modern research university (Collini 2012:23). The German tradition, often referred to as the 'Humboldtian University', introduced the concept of academic freedom, encompassing the freedom to teach and the freedom to learn as well as the ideal of 'basic knowledge' and 'science' (Enders 2007:6). With the German tradition, research came to be a defining element for many universities (Teferra and Altbach 2004:37). The ideal was a cross between a self-governing community of scholars and a collective of civil servants, in the tension between serving a variety of social needs as well as offering a form of resistance to the dominant values and practices of the society (Collini 2012:25). Universities came to be seen not simply as the nurseries of future clerical or administrative functionaries, but as centres of 'higher learning' as research, in addition to teaching, became a part of the defining purpose of the university (Collini 2012:23). The creation of a teaching-research nexus gave the professionalization project in academe an important push. It provided a kind of mutual legitimacy base for basic research and academic teaching that could benefit from each other (Enders 2007:6). The next half-century German scholarship and science sat the standards by which provision and achievement elsewhere were measured, and the Humboldtian model became highly influential in both European and American universities, and later also in the establishment of universities in colonized African countries (Collini 2012:24).

In the mid 20th century a consensus emerged among faculty in modern universities about what it meant to be a professional in the higher education system. Research formed the more prominent focus of academic work and knowledge was pursued for its own sake, the search for the latest frontiers of thrust was best organised in academic disciplinary units, reputation was established in national and international peer groups of scholars and quality was assured through peer reviews (Enders 2007:7). However, recent academic debates illustrate that these defining notions of the academic profession are not permanent, but more likely to be contested in various ways. Enders

(2007:7) argue that the academic profession seems to have lost its political standing and bargaining power within society. A central contribution to the debate about academics´ role in research was the book 'The New Production of Knowledge' by Michael Gibbons, Camille Limoges, Helga Nowotny, Simon Schwartzman, Peter Scott and Martin Trow (Gibbons et al 1994). The book has been widely cited, discussed and criticized, and is considered an important contribution to the debates and literature on the role and relevance of academics in the production of knowledge. [8]

3.2. 'The New Production of Knowledge'

In their book, Gibbons et al. (1994), and their sequel 'Re-Thinking Science' (Nowotny et al. 2001), the authors presents what they see as a shift in the way knowledge is being produced in contemporary societies. They argue that a new form of knowledge production is emerging alongside what they argue are the *traditional*, disciplinary one. The authors argue that there is an on-going transition in the production of knowledge; that the way in which scientific knowledge, technical practices, industry education and society at large are organized, and function today stands in sharp contrast with the relationships in earlier times (Gibbons et al. 1994:vii). This new form affects not only *what* knowledge is produced, but also *how* the knowledge is produced, *who* are involved in this process, the *context* in which it is pursued, the way it is organized, the reward system it utilizes, and the mechanisms that control the quality of what is being produced. The main change for the universities is argued to be that knowledge production and dissemination, are no longer self-contained activities carried out in a relative institutional isolation; it now involves interaction with a variety of other knowledge producers, or as one of the authors puts it: "in the advancing knowledge society, science is too pervasive to be the property of the scientists (Scott 1997).

The authors argue that this shift concerns a broad range of the academic disciplines, from the social sciences and humanities to the natural sciences and technology disciplines. The authors do not provide any empirical evidence, rather they have tried to describe the characteristics of what they see as the new mode of science, to further show how it is affecting knowledge production. The purpose of introducing these ideal types is therefore proclaimed as essentially heuristic, to

[8] In her PhD dissertation, Brandser argues that *The New Production of Knowledge* was one of the most discussed contributions to the current debate of the universities at the time (2006:201).

establish a common ground of references "to clarify the similarities and difference between the attributes of each and helps to understand and explain trends that can be observed in all modern societies" (Gibbons et al. 1994:1). The authors label this a transition from a *mode 1* to a *mode 2* of knowledge production. They argue that these mode-labels have been chosen because conventional terms such as applied science, technological research, or research and development (R&D) are inadequate (Gibbons et al. 1994:2). Key characteristics of each of the modes are presented in Table 3.

Disciplinary Knowledge Production - Mode 1

Mode 1 refers to a form of knowledge production – a complex of ideas, methods, norms and values - that has grown up to control the diffusion of the Newtonian model to more and more fields of enquiry and ensure its compliance with what is considered sound scientific practice (Gibbons et al. 1994:2). By Newtonian model, they argue that the ideal is the Newtonian empirical and mathematical physics. The authors argue that for many, mode 1 is identical with what is meant by science. Mode 1 problems are set and solved in a context governed by largely academic interests.

Mode 1 is meant to summarize the cognitive and social norms which must be followed in the production, legitimation and diffusion of knowledge. Forms of practice which adhere to the rules of Mode 1 are by definition scientific, while those that violate them are not. The authors argue that it is partly for these reasons that it has been necessary to use the more general terms *knowledge* and *practitioners* in Mode 2, whereas in Mode 1 it is conventionally to speak of science and scientists. Yet, Gibbons et al. (1994) emphasize that this is intended merely to highlight the differences, not to suggest that practitioners of Mode 2 are not behaving according to the norms of scientific method. In mode 1 the context is defined in relation to the cognitive and social norms that govern basic research and is not carried out in a context of application.

Transdisciplinary Knowledge Production - Mode 2

Mode 2 knowledge production is what Gibbons et al. (1994) refer to as the new mode of knowledge production. It is argued that the emergence of the mode 2 results from a broader range of considerations than primarily academic concerns. The knowledge is initially intended to be useful to someone, whether the industry, government or society. This context of application brings about that the knowledge is always produced under continuous negotiation, and will not take place unless,

and until the interests of the various actors are included in the process. While mode 1 science is carried out following the codes of practice relevant to a particular discipline, mode 2 is organized around a particular application (Gibbons et al. 1994:3).

The authors argue that a growing public concern about issues like the environment, health, communications, and privacy, have had the effect of stimulating the growth of knowledge production in a *trans*-disciplinary direction (Gibbons et al. 1994:7). They further argue that in recent years the growing awareness about the variety of ways in which advances in science and technology can affect the public interest has increased the number of groups trying to influence the outcome of the research process, and that this makes mode 2 science more social accountable. This is not only reflected in the interpretation and diffusion of results, but also in the definition of the problem and the setting of research priorities. An expanding number of interests, and so-called concerned groups, are demanding representation in the setting of the policy agenda as well as in the subsequent decision-making process (Gibbons et al 1994:7).

Furthermore, as the authors argue that operating in the context of application, as in mode 2 science, increases a sensitivity among scientists and technologists to the broader implications of what they are doing. The context of mode 2 makes all participants more reflexive, since the issue on which research is based cannot be answered in scientific and technical terms alone. By reflexive, the authors mean reflection on the values implied in human aspirations and projects; the process by which individuals involved in knowledge production try to operate from the standpoint of all the actors involved (Gibbons et al. 1994:168). The research towards the resolution of these types of problem has to incorporate options for the implementation of the solutions and these are bound to touch the values and preferences of different individuals and groups that have been seen as traditionally outside of the scientific and technological system.

As the nature of the two modes are different, the authors also argue the criteria to assess the quality of the knowledge differ. In disciplinary research, peer review judgements about the contributions is essentially the quality control. Careful selection of those who are judged competent to act as peers, is in part determined by their previous contributions to the discipline (Gibbons et al. 1994:8). In transdisciplinary research, additional criteria are added. In the context of application, a wide range of intellectual interests are incorporated, as well as other social, economic or political ones

(Gibbons et al. 1994:8). The authors argue that questions like "will the solution, if found, be competitive in the market?", "will it be cost effective?", "will it be socially acceptable?" be central to the quality control and evaluation. The authors admit that when quality is determined by such a wide set of criteria, it will become more difficult to determine what "good science" is.

Table 3: Own summary based on Gibbons et al. (1994)

Modes of Knowledge Production - Key Characteristics		
	Mode 1	*Mode 2*
1. What knowledge is being produced?	Disciplinary knowledge	Transdisciplinary knowledge
2. How is the knowledge produced?	Knowledge is produced within the context of an academic community and its interests.	Knowledge is produced in the context of application.
3. Who are involved?	Academics within the disciplinary research community.	It involves close interactions of many actors throughout the process, and it is not being institutionalized within the university structure.
4. In which context is it pursued?	Mode 1 problems are set and solved in a context governed largely by academic interest, within a specific, disciplinary community.	Mode 2 problems are set in the context of application, in a transdisciplinary social and economic context, and where sensitivity to the impact of the research is built in from the start.
5. What way is it organized?	Mode 1 is hierarchical, stable and permanent, and tends to preserve in its form.	Mode 2 is flexible and heterarchical, in terms of the skills and experience people bring to it. It is also transient and the composition of a problem-solving team changes over time and is not planned or coordinated by any central body. This is enforced by the fact that not only scientists are involved, but new kinds of knowledge producers. Socially accountable and reflexive, including a wider, more temporary and heterogenous set of practitioners, collaborating on a problem defined in a specific and localized context.
6. What mechanisms of quality control is there?	Quality is essentially assessed through peer review judgements about the contributions made by individuals.	Quality control of knowledge are assessed in the context of applications, and quality criterions therefore incorporates a wider set of interests, including social, economic and political as well as intellectual. Academic peers do not constitute the only peers of quality control, because "users" are as important as "producers" in transdisciplinary science.

Critics of the concepts

Gibbons et al. (1994:2) argue that no judgements concerning the value in the modes are made, but that their aim is to provide a conceptual framework for further discussion on what they see as a transition in the production of knowledge. However, as Brandser (2006:215) emphasizes, the dichotomy of *old* and *new knowledge* is not simply a descriptive distinction, but also normative. One can argue that it indicates that the *old knowledge production* is outdated, and ought to be adjusted, while the *new* knowledge production is an updated, better way of producing knowledge, which makes the concepts seems to be part of a normative agenda rather than descriptions of actual changes (Weingart 1997:592). Another critique of Gibbons et al. has been that they lack an historical context, and that the argument of the transition from mode 1 to mode 2 as an almost a linear development, is wrong. Rather, the relations between, and shifts in the balance of mode 1 and mode 2 over time is a more appropriate way of using these concepts (Hessels and van Lente 2008:756)

Universities and Mode 2

Universities, according to Gibbons et al. (1994), are institutions familiar with the mode 1 form of knowledge production. Gibbons holds that the universities of the world, whether in developed or developing countries, are built around Mode 1 production of knowledge (Gibbons 1998:52). This disciplinary structure of knowledge translates into a specific organizational form; segmented departments remain the defining administrative units for academic work, and that there are little co-operations with other knowledge producers and institutions outside the department.

Following the argued development of a new production of knowledge, Gibbons et al. (1994) projects that the university in the future will comprise only *one* part of the knowledge producing sector, and that their position in determining what shall count as *good* knowledge will be weakened. The closed university system, where the academics held the monopoly on providing training, credentialing and knowledge production, is being challenged (Jansen 2002:509). The massification of education are producing more graduates, which are continuing to develop skills outside the universities and are able to understand what the university researchers are doing (Gibbons et al. 1994:73). This massification has changed the traditional 'client base' of the university, with more students demanding education and with more students seeking life-long learning through

continuing education programs. International competition has further pressured for change, forcing universities to become more concerned about knowledge production, innovations and relevance of their activities to the external environment (Jansen 2002:509). With the rapid growth in technology and information sciences a new skills base has been created within the traditional university and forced changes in the curriculum (Jansen 2002:509).

Contextualised knowledge production has been shaped by a new climate in which society increasingly 'speaks back' to science (Nowotny et al. 2001:94). Society speaks back by demanding innovation in a variety of ways; through national objectives, emerging new regulatory regimes and in the multiplication of user-producer interfaces (Nowotny et al. 2001:95). One example is the 'Triple Helix' model, which is intended to be a sociological expression of what has become an increasingly knowledge-based social order (Etzkowitz and Leydesdorff 2000; Shinn 2002:600). The Triple Helix identifies the relationship between academia, industry and government as important in order to address new problems arising. The model is a conceptual framework including what is considered the three main actors in innovation processes; the government, the industry and universities (Etzkowitz and Leydesdorff 2000:111). The model provides a general framework for exploring complex innovation dynamics and for informal national, regional and international innovation and development policy-making. The Triple Helix thesis is that the potential for innovation and economic development in a knowledge society lies in a more prominent role for the university and in the hybridization of elements from university, industry and government to generate new institutional and social platforms for the production, transfer and application of knowledge (Leydesdorff 2000). The triple Helix enjoys a sizable following among the developing countries (Shinn 2002:603).

3.3. Knowledge Production in African Universities

Prevailing debates and ideas about the role and purpose of university institutions/and the identification of research topics/agendas, have been debated in European and American Universities for decades, if not centuries. The nature of the debates has had various orientations. Since the late 20th century a central debate has been about the relevance of academics and academic knowledge. The debate around African universities however, have been dominated with debates

about the role of the university in development of the post-colonial state, as "developmental universities" and more recently as actors in economic development.

Although the history of higher education on the continent goes back to institutions like the Al Azhar in Egypt, Al Zaytuna in Morocco and Sankore in Mali around year 1000, Mamdani argues these institutions are of marginal significance for contemporary African higher education (2017:86). As the African University began as a colonial mission, the organisation of knowledge production in the contemporary African universities is based on the disciplinary Humboldtian mode developed in European Universities over the 19th and 20th century (Shils and Roberts 2004:165; Mamdani 2017:86; Mamdani 2018:29). In the colonies, universities were set up to educate men and women to eventually serve as civil servants. During the colonial period, education was one of the critical issues in the relationship between the European colonizers and the people of the African continent, and education policies were an effective instrument for the colonial administrators to control the pace and direction of social change as well as fostering maintenance of law and order to avoid a social change they did not want (Teferra and Knight 2008; Sicherman 2006).

Developmental Universities

As a part of the independence process, public universities were set up as secular institutions that provided access without discrimination (Zeleza and Olukoshi 2004). According to Cloete et al. (2015:6) a basic assumption following independence was that universities in Africa were expected to be key contributors to the human resource needs of their countries, in particular the development of human resources for the civil service and the public professions. The universities became a symbol of political independence after the liberation from the British colonizers (Mittelman 2018:167). Having a national university was considered as much a hallmark of independence as having a flag, an anthem, a central bank and a currency (Mamdani 2018:33). The importance of the university in newly-independent African countries was underscored by the Accra declaration, that "all universities must be development universities*"* (Yesufu 1973, quoted in Cloete et al. 2015:7).

Decolonization of Makerere University

With decolonization, it became clear that a national university was not synonymous to a system that conveys local norms and beliefs (Mittelman 2018). At Makerere, symbols from its colonial period remained such as Oxford-Cambridge customs of dining at high table in residence halls, dormitories, and donning gowns, robes, at evening meals (Mittelman 2018:171). Another part of the post-colonial heritage was the teaching body, who were predominantly white (Mamdani 2018). The challenge became to refashion the education system to be cognizant of national development needs (Mittelman 2018:171). At Makerere, Ngũgĩ wa Thiong'o confronted this challenge in his essay collection *Decolonizing the Mind* (Thiong'o 1986). Questions like "What should be central to the curriculum at an African University?" and "In what language should African writers express themselves?" became topics for discussion, and his writings set off a surge of postcolonial writings on epistemological exclusion linked to material dispossession (Mittelman 2018:171).

Cloete et al. (2015:7) argues that despite the rhetoric of the development university, African governments did little to promote the development role of these institutions. It was late in this period that the World Bank-based "rate of return to investments in education"-study and concluded that efforts in African countries should concentrate on primary education due to the low rate of return from tertiary education (Cloete et al. 2015), with its far-reaching consequences for the higher education sector in many African countries, including Uganda.

Economic Reform Processes at Makerere

During the late 20th century a number of African countries implemented reforms that has been referred to as Economic Reform Processes (Samoff and Carrol 2003). The reforms implemented at Makerere has been described as an impressive example of institutional reform that takes advantage of different expressions of market demands (Court 1999:i). The reform had three central elements: implementation of alternative financing strategies, introduction of demand driven courses and new management structures (Court 1999:4). Let me detail each one of them.

Alternative financing strategies

During the reform process, Makerere went from being a government funded university, to rely heavily on other sources of funding. In 1994, the University Council accepted the principle that faculties with places remaining after the prescribed government intake could fill them with private

students, followed by the initiative of privately sponsored evening courses (Court 1999:4). Within three years the number of privately sponsored students exceeded the number of government supported students. Also, units at Makerere that was previously subsidized from central university funds, were now being contracted out to private management. Examples are bookshops, the bakery, the guest house and printing shops, which are still run by the university on a commercial basis. Makerere also established the Makerere University Consultancy Bureau, as a company with 51% shares owned by Makerere staff as individuals, and 49% by the university as an entity. The bureau engages in merchandising and provides consultancy services in line with business, organizational development, water and sanitation, and public health.

Demand-driven Academic Reforms

The change in the student body since 1993 led to an explosion of new degrees and diploma courses. As Court (1999:6) argues, the most effective way of attracting private students was to provide courses for which individuals, families, and companies were willing to pay. Their practical and professional career purpose suggests than an estimate of demand rather than a prescription of supply, is influencing the academic curriculum. Consequently, the result was for example to take an Arts subject and combine it with a skill in demand, such as Religious Studies and Conflict Resolution, or Geography and Tourism (Mamdani 2007:43).

Decentralized Management

The rapid expansion of enrolments and major alterations in funding patterns have been linked to radical changes in administration of and management of the University. The plan was to reduce the university's reliance on government funding by encouraging privately sponsored students, commercializing service units and institutionalizing consultancy arrangements. The recognition of an administrative re-structuring aimed to "improve funding and restructuring of governance to cultivate an innovative and entrepreneurial approach at all levels" (Tibarimbasa 1998, quoted in Court 1999:6). From the academic year 1995/96 to 1998/99 government funding was reduced from 83% to 69% of the budget (Court 1999:7).

Court (1999:7) argues that the main effect of the financial reform and revenue diversification has been to reduce Makerere's dependence on government, that the alternative funding (referred to as Internally Generated Funds (IGS)) had enabled the university to move from a situation of hand-to-

mouth dependency, to one where autonomous initiative, planning and allocation were possible (Court 1999:8).

In the following chapter I will introduce and discuss the methodological choices taken for this study.

4. Methodological choices: A Qualitative Case Study of Academic Engineers at Makerere University

This chapter is devoted to describing and explain my methodological approach and choices in studying the academic engineers at Makerere. The chapter is divided in four sub-chapters parts. Section 4.1. will start with the competing camps in the philosophy of social sciences, to arrive at what methodological tools I have chosen for this thesis. These abstractions might seem remote from the method I have applied, but as I will return to later in this chapter, as well as in the discussion, I believe this is an important perspective to include given the applied method and for the analysis of interview data. The discussion of the different approaches of research in social science is not an attempt to argue for which is better, rather it is an attempt to clarify why I chose the methodological tools I have chosen. In the following section 4.2. I will, first, explain why and how I have employed a qualitative case study method. In section 4.3. I will present the process of sampling of informants, the preparation for, and the carrying out of interviews. Finally, in section 4.4. I discuss the process of analysing interview data where I will clarify why I in this thesis I am applying a grounded theory approach to the analysis of the data.

4.1. Methodological starting point

Naturalist and Constructivist Philosophy of Science

Philosophical assumptions are unavoidable in methodological choices about designing and conducting research. According to Moses & Knudsen (2012:2) there are two methodologies that is said to constitute the two main camps of philosophical assumptions in the 'battle over reality' in contemporary social sciences; the naturalist and the constructivist methodologies. The distinction separates the two ideal positions, and their underlying ontological, epistemological and methodological differences. This thesis will not give an in-depth discussion on philosophy of social sciences. However, it is necessary to clarify the main camps, as it is an important perspective both in choice of methodological tools, but also in the following discussion of the production of knowledge.

The naturalist tradition of social science is strongly inspired by the natural sciences, and claims the existence of a real world, and that true knowledge about this objective real world can be revealed through systematic observation. The underlying presumption is that a real world exists independently of our experience of it, but that we can get access to this world by approaching through choosing from a hierarchy of methods (Moses and Knutsen 2012:8). On the other hand, constructivists emphasize the social context of knowledge, and would claim that systematic observation is not taking into account the influence and inherent biasness in the observer. In the constructivist tradition, there is not one reality but many, as it recognizes that people may look at the same phenomenon but perceive it differently.

The underlying assumptions of these positions/perspectives are fundamentally different. The joist in the naturalist philosophy of science is the atomistic ontology; an understanding that our world consists of independent particulars. A statement is accepted as true if it accurately corresponds to a state of affairs in the real world, often referred to as the *correspondence theory of truth* (Moses and Knudsen 2012:49). This is in line with a naturalist conviction; that it is possible to distinguish between value-laden statements and factual statements, and that facts are theoretically independent (Moses and Knutsen 2012:8). The epistemological foundation of naturalism relies on two ideas; (1) that knowledge is acquired through systematic observation (associations or variable correlations) where the ultimate purpose is to uncover regularities, and (2) that to re-state them as natural laws, that human knowledge grows over time through the accumulation of confirmed correlations, and this accumulation is reflected in the growth of increasingly accurate theories. The methodological approach then, in the naturalist philosophy of science is the systematic identification of the assumed regularities in nature and society, through human sense perception (Moses and Knudsen 2012:49). Following this naturalist conviction methods are ranked in a hierarchy where the randomized experiment constitutes the 'gold standard' with its potential to control variables, and where other methods are subordinate to this, as non-experiments (Frendreis 1983; Lijphart 1971).

Where the ontological joist in naturalism lies in the belief of a real world, the constructivist approach is that the world does not exist independently of our senses, and that human beings participate in the construction of our own reality. Consequently, the world appears differently to different people, depending on their contextual setting (Moses and Knutsen 2012:199). The

constructivist epistemology therefore relies on a broader repertoire of epistemological devices, and is not dependent on sensual perception alone as the only means of assessing knowledge. Methodologically, the constructivist scientist would argue that the world consists of regularities, like the naturalist scientists. However, a constructivist-oriented scientist would argue that these regularities in the world are socially constructed, and to gain knowledge about the world one need different tools to identify these socially constructed patterns and understand them in a meaningful context (Moses and Knutsen 2012:201). In this perspective, the researcher is as much a part of the socially reality, as the research phenomenon, in identifying and approaching the research objective.

Quantitative and Qualitative Research Approaches

In accordance with the methodological viewpoints, choices in research approaches consequently vary. Qualitative and quantitative research differ both in terms of the procedures and methods applied, but also in what data one seeks to collect. Quantitative research is based on systematic, empirical examination of observable phenomena, using statistical and mathematical techniques. The quantitative approach is in line with the naturalist tradition of social sciences, aiming at uncovering a reality which is expected to exist. In the naturalist tradition, the experiment is considered to be the gold standard of all methods, with its potential to uncover truths about the world. Through random selection, and comparison to a control group, one can systematically observe and demonstrate causal inferences as one is in control of the independent variables, and if or how they have an impact on the dependent variable.

A qualitative approach in contrast, is more in line with the constructivist tradition of social science, emphasising that truth is contextual and that the influence of the researcher is central for the understanding of the research results. In qualitative research, the experiment is not perceived as a gold standard*,* qualitative methods cover multiple/different approaches which is not classified as hierarchical. One is not necessarily aiming at establishing a causation between the independent and dependent variable, but rather exploring and describing the variables themselves, and seek to understand and interpret the social reality in terms of the actors' language and actions (Moses and Knutsen 2013:11). Instead of uncovering a true account, a constructivist scientist seeks to capture and understand the meaning of social action for the agent performing it, as well as for the scholar studying it.

While quantitative data can provide descriptive statistics, qualitative data can provide deeper insight in the social context. One example is research activity at universities, which is often measured in number of peer-reviewed articles. In their study of research productivity at African universities, Cloete et al. compared eight universities in eight different African countries. The top two universities in terms of research output in 2011 was University of Cape Town, with 1517 published articles, and Makerere University 382 articles (Cloete et al. 2015:28). However, in comparison to the rest of the world, universities on the African continent generates less than 1% of research globally (Duermeijer et al. 2018).

These statistics may in itself be informative, but it can also form the basis for further research. This thesis, informed by previous studies on the academic profession and research universities in Africa, seeks to understand the social reality 'on the ground' for the academics at one of these institutions. Their everyday challenges, their understanding of their work, rationale for their actions, their relation to actors in society etc. is best captured through a qualitative approach, which can provide a deeper understanding of the statistics. This way qualitative and quantitative research can rely on and thus benefit from each other. We know that African universities generate less than 1% of research globally, but what challenges the academics at these institutions meet when doing research, is more difficult and complex to answer. This study, through a qualitative approach, can provide a deeper insight in the conditions for the academics in their own terms.

A Common Logic of Inference?

Scholars have argued that the division between qualitative and quantitative research is artificial. King et al. (1994:4) aims at connecting the traditions of what are conventionally denoted qualitative and quantitative research, by applying a unified 'logic of inference' to both. In this, they are arguing that the underlying logic is the same for each research approach, and that the differences are mainly in style and techniques (King et al. 1994:3). Flyvbjerg (2006) also argues that the sharp line drawn between qualitative and quantitative methods is misleading. He argues that good social science is opposed to an 'either/or' and stands for a 'both/and' on the question on qualitative vs quantitative methods. He further argues that "good social science is problem driven and not methodology driven, in the sense that it employs those methods that for a given problematic, best help answer the research question at hand" (Flyvbjerg 2006:242).

Even though Flyvbjerg argues to eliminate the strict, conventional separation between qualitative and quantitative methods, he emphasizes that random sampling, in quantitative studies, will rarely be able to produce the kind of insight a qualitative case study can, in clarifying the deeper causes behind a given problem and its consequences, rather than to describe the symptoms and frequency of a problem.

4.2. Research Design: A Qualitative Case Study

Case Study

The case study is not a method, but rather an approach to an "in-depth, intensive study of a single unit or a small number of units of analysis, for the purpose of understanding a larger class of similar units" (Gerring 2002:37). One of the advantages of doing a case study is that it allows the researcher to carefully analyse contextual factors and how it may influence the workings of variables, which a statistical analysis cannot. In this thesis the units of academic engineers at Makerere University are selected for the purpose of understanding the overall larger case of the academics at Makerere University. In this thesis the case study provides an appropriate approach in investigating the academic profession. First since it opens up both for an in-depth analysis of a smaller unit. Second, but still generalize these observations with the purpose of understanding the larger case of the profession at this university. With the case of the academic profession at the university at large, the operationalised units of the study are the academic engineers. In this study the unit are the academic engineers at Makerere University in Uganda. This unit is being studied for the purpose of understanding the broader case of the academic profession at Makerere University.

Selection of Case

Gerring (2002:89) distinguishes between nine different techniques of case-selection, all with different uses, and potential for representativeness (Gerring 2002:91). A study of the academics at the School of Engineering (SoE) would be a typical case, as it exemplifies one discipline out of a variety under the academic profession. The typical case aims at testing hypotheses, to provide insight into a broader phenomenon, and is by definition assumed to be a representative case (Gerring 2002:91). By choosing the academic engineers as the unit, the study aims at testing hypotheses to provide insight to the broader phenomenon of the academic profession in Uganda.

A typical case can also serve an exploratory role (Gerring 2002: 91). The case of the academic profession among engineers at SoE at Makerere University is also a relatively novel subject of study which means that the research is of an exploratory kind. The case study is beneficial for the exploratory case, as it opens for identifying new variables and hypotheses and that the researcher can develop new theories that can be tested "through previously unexamined evidence" (George and Bennet 2005:21).

Case Studies and Generalizations

The supposed difficulty in generalizing from a case study has been considered a major shortcoming in case study research. Yin argue that the desired generalizations from case studies should therefore take form as *analytic generalizations* (2015:199). This involves moving to a more abstract level of ideas from a case study's findings and asserting, mainly through careful arguments rather than any numeric or statistical calculation, how these ideas might pertain to newer situations than those in the original study (Yin 2015:199). Generalizing in this manner may resemble what others have called 'transferability' with the extent of transferability depending on "the degree of similarity of the sending and the receiving contexts" (Yin 2015:199). Thus, the preferred analytic generalisations are posed at a conceptual level higher than that of the specific case in the study (Yin 2015:199).

Critique of the Case Study Approach

Flyvbjerg (2006) argues that there are many conventional misunderstandings about case study research. One central critique, typical among proponents of the naturalist camp within the social sciences, is that one cannot generalise on the basis of a single case (Flyvbjerg 2006:224). To this, Flyvbjerg argues that even though knowledge cannot formally be generalised, it does not mean that it cannot enter into the collective process of knowledge accumulation in a given field or in a society (Flyvbjerg 2006:227).

Although there are certain unique cases, it is nearly always possible to indicate at a higher abstraction level to what domain exactly the case belongs (Van Thiel 2014:98). For this thesis the implications of choice at SoE draws clear implications to what extent/level it is possible to generalize to the broader academic profession at Makerere. Yet, as will be later discussed, there

are structures and conditions at SoE which can be assumed to account for academics also at other colleges, even if some aspects are unique to this school.

Another critic of case study research is that is tends to have be biased towards verification of propositions. However, Flyvbjerg argues that this critic is not only related to the case study in, but is a fundamental human characteristic (Bacon 1583, quoted in Flyvbjerg 2006:234). Flyvbjerg argues that the case study´s in-depth approach forces the researcher to falsify, rather than verify (Flyvbjerg 2006:235). Quantitative research does not get as close to those under study as does the in-depth, qualitative case study research, and therefore is less likely to be corrected by the study objects 'talking back'.

4.3. Data Collection

NORHED Project - Research Group [9]

This thesis is written as a part of a research project under the Norwegian Programme for Capacity Development in Higher Education (NORHED) at Makerere University. The project is funded by Norad. The research group have covered a number of Colleges at Makerere University, from College of Social Sciences (CHUSS), School of Law (SoL), College of Agricultural and Environmental Sciences (CAES), College of Engineering, Design, Art and Technology (CEDAT), as well as the Deans, leaders at College level and the Senate. As previously mentioned, this thesis will cover the CEDAT, but the research group have discussed findings across all departments for comparison.

Selection of interviewees

In this study of the academic profession at Makerere, the unit of study is the academic engineers affiliated to the departments under The School of Engineering at Makerere University. The academic engineers were chosen because of their clear disciplinary boundaries and because of the School's long historical roots at the university, from the 70s as FoT. Even though most engineers at the university are affiliated to this School, however there are also engineers working at other

[9] For more information about the project, see Appendix 5: Information letter.

Colleges at the University.[10] In this case however, the informants are engineers based at the school of engineering as these are often referred to as the initial branches of engineering; civil, electrical and mechanical (UNESCO 2010).

The interviews were conducted during two fieldworks visits to Makerere University, in October 2016 and in October 2017. The selection of interviewees was through non-probability, purposive sampling, based on the criteria of the respondents work affiliation as academic staff at The School of Engineering. Contact was established with the informants by email, with help from a local staff at the Bergen Office at the University. Contact details of the interviewees was also obtained from the College's web page, where all academic staff and their contact details are openly available. In Table 4 the department structure under CEDAT is outlined, with the SoE. 20 interviews have been conducted with academics at the SoE, of which;

- 6 from the Department of Civil and Environmental Engineering
- 7 from the Department of Electrical and Computer Engineering
- 7 from the Department of Mechanical Engineering

Table 4: Department structure under College of Engineering, Design, Art and Technology, at Makerere University

College of Engineering, Design, Art & Technology (CEDAT)								
Margaret Trowell School of Industrial and Fine Arts			**School of Built Environment**			**School of Engineering**		
Dpt. of fine Art	Dpt. of Industrial Art and Applied Design	Dpt. of Visual Communication Design and Multimedia	Dpt. of Architecture and Physical Planning	Dpt. of Construction Economics and Management	Dpt. of Geomatics and Land Management	Dpt. of Civil and Environmental Engineering	Dpt. of Electrical and Computer Engineering	Dpt. of Mechanical Engineering

The Informants [11]

A large majority, 17 out of the 20 informants were male. The gender imbalance in the sample reflects the academic staffing at the SoE, as well as at the University, where 22% of the academic staff are female (Tamale et al. 2018:6). The age of the informants varied between 35 and 63 years.

[10] Department of Agricultural & Bio-engineering (CAES), Department of Geology and Petroleum Studies (College of Natural Sciences (CoNAS)), and Industrial Chemistry (CoNAS).

[11] For an overview of the informants, see Appendix 3: Informants at School of Engineering.

Out of the 20 informants, 19 had completed a PhD. Most of the academics had their bachelor's degree from Makerere, but at masters and PhD level almost all the academics had their education from abroad, mainly European countries or from the US. A few had completed a so-called 'sandwich-model' where the PhD programme is a collaboration between Makerere University and a foreign institution, in these cases Scandinavian Institutions.[12] The positions of the informants varied from lecturers to associate professors as presented in Table 5.

Table 5: Informants by Rank (Makerere 2017:29-31)

Position	Assistant Lecturer	Lecturer	Senior Lecturer	Associate Professor	Professor	Total
Informants	0	9	7	4	0	20
Total at CEDAT	67	38	17	10	3	137

The Semi-structured Interview

Rathbun argues that interviewing is a powerful but underused tool in political science methodology (2008:1). There are different strategies on how to conduct an interview, and a common distinction is made between semi-structured, close- and open-ended interviews (Rathbun 2008). While open-ended interviews are more used in ethnographic studies, and close-ended are used more in questionnaires and surveys. Where the close-ended interviews follow the order of the questionnaire strictly, the semi-structured interview uses the interview-guide instructive, aiming at getting the interviewee to speak freely. The flexibility in the qualitative research design requires the researcher to be open for new turns. This is also important in the interview situation and became important for my interviews as the informants often ended up talking about something or presenting a perspective that was not expecting when developing the interview guide. Yet, these reflections were in most cases highly relevant for the research question and might still provide important data for the thesis. This flexibility is one of the strengths of the qualitative approach and interviews as a method for gathering data on those characteristics of the social world that differentiate it from the natural world; human beings' effort to intentionally transform their environment on the basis of cognition, reflection and learning (Rathbun 2008:7).

[12] These candidates are supervised by scientist both locally and from the institution abroad, and consequently the PhD candidate spends a significant amount of time abroad during these programmes (Zink 2016:80).

Data from the interview are solely dependent on the communication between the interviewer and the interviewee. The conversation and the interviewees reasoning should not be stopped by a strict following of the order in the interview guide, and I tried as much as time allowed not to interrupt when the informants spoke. The order of the questions therefore depended on the informant and his or hers answer, and I had to be flexibility in changing the order of the questions in order to not stop the reflections of the informant. If an informant gives another perspective, this might be something that can give a broader understanding of the topic, that one has not prepared for. However, I also had to lead the conversation when the informants started talking off topic.

Interview Guide

In the semi-structured interview, data collection and analysis are a parallel process. However, there are some preparations that must be done before the collection. In the semi-structured interview, the interview guide is not strictly followed like a questionnaire, but still guide the interview. Further, I tried not to formulate questions that could be leading the interviewee in any particular directions, but rather open ended questions based on indicators (King et al.1994). The flexibility in the qualitative research design requires the researcher to be open for new turns.

My interview guide was twofold. The first part was more general about the everyday work and role at the university, while the second part was more directed to the role in research, innovations and outreach outside the university.[13] When creating the interview guide it was important to get feedback and input from other scholars, preferably with experience from the field. During the development of my interview-guide I got feedback both from my supervisor, who has broad experience with interviews with scholars at Makerere, and also from fellow master-students. With pilot-interviews and comments, the interview guide was revised several times. As I conducted interviews in two rounds, I also revised some of my questions.

A disagreement is on the kind of questions one should pose is weather one should ask for factual or non-factual information. King et al. (1994) argues that "We must ask for measures of the explanatory and dependent variables and estimate the causal effects ourselves. We must not ask for

[13] For complete interview guide, see Appendix 2: Interview Guide.

motivations, but rather for facts" (King et al. 1994:112). Van Thiel, on the other hand, argues that interviews should be conducted in the first instance, to acquire non-factual information, primarily on matters like opinions, relationships or perceptions (2014:95). One could argue that the strength of the interview as a method is the unique position of where the interviewer can ask for personal motivation and understandings of a situation. An important part of my interview guide was therefore non-factual questions about the academic's opinions, perceptions and relationships to various actors. Still, it is important to process the statements and information from the informants as precisely non-factual statements.

Rathbun (2008:2) argues that interviews often can be the best tool for establishing how subjective factors influence decision-making, the motivations of those involved and the role of agency on events of interest to the researcher. He further argues that we need not instantly accept these statements as facts, but when a consensus appears among those in a best position to know, it should be taken very seriously (Rathbun 2008:9). To understand how the academics understand their role at the University, the non-factual information, like opinions and perceptions are more valuable than a job description or the University Mission Statement that I could easily retrieve without conducting fieldwork or even talk to any academics on the ground.

From my experiences through the interviews, the interview guide is a general, but important, guideline for the interview. Even though the questions seem separate, the interviewee often covers several questions when answering one of them. This required me to carefully listen to the answers while also preparing for the next, to spare the informant the trouble of answering the same question twice. This type of interview can be rather strenuous for the researcher, as it requires the researcher to perform several tasks at once. One must listen, react to the respondent's statements, gain the respondent's trust, empathise, and show an interest, consider what elements of the conversation may be relevant or not, and continuously formulate follow-up questions to supplement the information that has been given (Van Thiel 2014:94). Also, a balance must be struck between refraining from steering the respondent in a certain direction and providing enough guidance to ensure that the conversation will render sufficient relevant data (Van Thiel 2014:94).

Rathbun argues that the researcher should show that he or she in an expert by the questioning, even if this means 'gratuitous use of jargon', because this will tell the interviewee that you are an

informed observer who cannot be easily manipulated (2008:11). Andersen (2006) on the other hand argues that it can be beneficial not to be too prepared, and that it can be advantageous to act uninformed. If one gives the impression that one already is well informed during the questioning, this might lead the informant to not explain what he or she considers a matter of course. This is a potential threat to the data collection. What might be seen as a truism to the interviewee, could potentially give a deeper understanding of the situation for the academic. In order to get a best possible understanding of the academics' values in shaping their activities and actions, I therefore tended to ask open questions, in order to also ensure that the informant would explain also what they themselves might took for granted.

Degree of Openness

My interview guide included an introduction, where I explained the aim of the study, and provides some information about the procedure that will be followed during the interview. The introduction is important to put respondents at their ease, as they might not be used to being interviewed (Van Thiel 2014:95). As a part of my introduction, I handed out this information letter with information about my project, my contacts and information about the recordings and use of the data.[14] In this introduction, I also informed about the possibility of withdrawing from the study, also after the interview had taken place. Van Thiel (2014:95) emphasizes taking sufficient time at the beginning and give an introduction, as this reduces the risk of respondents adapting their answers to the research situation by giving socially desirable answers or withholding information that might be important or relevant to the study (Van Thiel 2014:95). This could be managed or reduced through giving sufficient information before the interview, as well as emphasizing how their specific contribution is relevant and important in this study. In addition, I gave an introduction about my background as a previous exchange student at Makerere as the background for my specific interest in this topic.[15] This way of introducing myself and the study, I believe is also more in line with the Ugandan culture and courtesy and was well received among the informants.

Recording and transcription interviews

All of my interviewees were willing to be recorded, but the use of recorder could influence the interviewees willingness to speak freely. In advance I did not believe the recorder would restrict

[14] See Appendix 5: Information Letter

[15] Fall 2015 I was an exchange student at Makerere, studying political science at under graduate level.

the interview setting in any particular way. However, I had some cases where I refrained from further questions about the relation to the University central administration, because I thought it could be too sensitive for the respondent to speak freely about, when recorded. I also had an incident where I placed the recorder in front of the respondent, and I noticed the interviewee repeatedly looked at the recorder, when speaking about the government, and lack of government funding. This could have influenced the respondent's willingness to speak freely, and potentially also criticise the university administration and/or the government, and of course other topics I did not pick up on. On the other side, recording the interviews allows the researcher to focus fully on the conversation, and not on the computer or paper, taking notes during the interview. Despite the quite time-consuming task of transcribing interviews into written documents, the analysis of a fully transcribed interview allows detailed coding, and citations in a way which field notes would not allow.

It is important to note that transcriptions are based on an oral conversation and does not capture non-verbal communication. In order to capture this, I also took notes during the interview, in addition to the recording. At fieldwork I therefore strove to transcribe the interviews parallel with conducting interviews and while interviewing I took notes about the non-verbal expressions of the interviewee, as well as the surroundings, also to get a better recall of the interview situation when transcribing the recordings. As with one of my informants who seemed overloaded with work and seemingly fell asleep several times during the interview. Another informant insisted on having the interview at a café outside campus, as he preferred to work from there and not in his dusty, and noisy office. Another thing I noticed when conducting the interviews was the big difference in office space between the academics. While a few had large offices with several desks and computers, others almost had difficulty with opening their door because of their very small office space. The size of office did not seem to reflect the positions of the academics, as one of the largest offices were occupied by one of the lecturers.

The benefits of transcribing my interviews, especially when conducting many interviews, was that it was easier to keep track of all the informants. When analysing the data was it also an advantage to have the interviews in text, to be able to analyse and accurately quote the informants. The disadvantage of transcribing interviews was that was a quite time-consuming job. Yet, I benefit of

having the interviews transcribed outweighed the disadvantages for this thesis, as the importance of accuracy for the analysis is closely related to the quotes from the informants.

Critics of Interviewing

Rathbun (2008) writes about the scepticism about interviews as a data source to be used in the field of political science. He argues that methodological trends, like behavioralism and rational choice have drawn attention to the importance of rigorous analysis based on principles drawn from the natural sciences, thus a naturalistic approach and therefore been critical to semi-structured interviewing as a method. Behaviouralists stressed the importance of freeing explanation from the normative values of the researcher, and that data should be as objective as possible so that different researchers could agree on the meaning of the same piece of data (Rathbun 2008:3). Behaviourists prefers structured interviews, in which the same questions are asked in the same order, with a restricted number of answers (Patton 1990:277, quoted in Rathbun 2008:4). However, the very purpose of using interviewing for this study is to explore in-depth, in a way that second-hand sources, archives or surveys do not allow. In this study, the academics own perspectives on their own role in the knowledge production and ability to define relevance of their knowledge, is what they study aims to highlight and discuss. The interviewees in this case are chosen because of their perspectives given their position as academics at the university. This is further reflected in the selection of interviewees, where the purpose is not a random selection to generalize to the population, but rather a strategic selection to generalize analytically.

Validity of Interview Data

Rathbun argue that interview-data are inherently faulty because respondents have incentive to dissemble, and this raises the validity issue in interviewing (2008:5). The respondents might seek to preserve their reputation and legacy or retain private information. The interviewees may have an agenda in presenting a limited, adjusted or constructed answer, and this will always be a potential threat to interviewing as a method. However, the very purpose of interviewing is generally to go in-depth in a way that second-hand sources, archives or surveys do not allow (Rathbun 2008:4). One could argue that the argument that the interview data are inherently subjective does not necessarily pose a validity threat to this study. My research question is explicitly formulated to gain information about the academics´ own understanding of their role in the knowledge production and relevance to society, and their reflections on this. The interviewees in this case are chosen

because of their unique perspective given their position as academics at the university. This is also reflected in the selection of interviewees, where the purpose not is a random selection to generalize to the population, but rather a strategic selection to generalize analytically (Yin 2015).

The concept of validity is a contested concept in qualitative research. Guba and Lincoln have argued that the concept itself stems from a naturalist tradition, referring to a "real world" of which an objective truth can be measured or revealed through systematic observation and that it is therefore not compatible with a constructivist approach (Guba and Lincoln 1989, quoted in Maxwell 2013:122). Maxwell, on the other hand, argues that the use of the term does not imply the existence of any objective truth to which an account can be compared, but that it can be useful to include in a qualitative research design with the purpose of identifying validity threats (2013:122). Validity is here understood as the correctness or credibility of a description, conclusion, explanation or interpretation (Maxwell 2013:122). Validity threat is in this respect any aspect of the research design which can result in misinterpretations, or wrong conclusions based on the data available. The issue of a validity not a judgement of whether the data is valid or not, rather it is a matter of the assessment of the data. To avoid validity threats, an important part of the research design is to conceptualize such possible threats, and at the same time identify strategies on how to deal with them (Maxwell 2013:123).

A validity threat in this research design, relying to a large degree on interview data, could be that the academics interviewed are not presenting their actual views. This could be due to a number of reasons. One of them could be my connection to the Norad project. In the information letter I informed about my thesis, and that the fieldwork also was part of a research project funded by the Norad. One can therefore imagine that the informant would be less likely to problematize or criticize donor relations in fear of rejection on future funding proposals, even though this is way beyond my control.[16] I became aware of this challenge in one of the earliest interviews when one of the informants asked me to help him to get funding for one of his projects. In the following interviews I therefore clearly explained my position as a master´s student with funding from, and not a representative of Norad, to avoid further misunderstandings.

[16] It is also worth noting that the new CEDAT building, which opened in 2009, was fully sponsored by the Norwegian Government.

The strong reliance on interview data as the primary source leaves the opinions and views of the academics as the only view reflected in this thesis. Yet, it could be useful to also include informants like members of Uganda Institution of Professional Engineers (UIPE) or from government agencies employees of Uganda National Council for Science and Technology (UNCST) or Uganda National Council for Higher Education (UNCHE) or from the newly established Ministry of Science, Technology and Innovation (MoSTI).[17] Representatives from these agencies could open up for other perspectives and could potentially provide a different view on the topic, and thus a different perspective on the role of the academics from outside the institution.

4.4. Analysis of Interview Data

Grounded Theory Analysis of Interview Data

The qualitative analysis is the process of interpretation of data, carried out for the purpose of discovering concepts and relationships in raw data, and then organizing these into a theoretical explanatory scheme (Strauss and Corbin 1998:11). The data collected from interviews are generally in the form of quotes or statements by the respondent. While quantitative coding consists of applying a preestablished set of categories to the data according to explicit rules, aiming at generating frequency counts and measures, the qualitative coding aims to 'fracture' the data and rearrange them into categories that may facilitate comparison between the interviews, and that aid in the development of theoretical concepts (Strauss 1987, quoted in Maxwell 2013:107). Codes can be assigned to all kinds of content, like opinions, behaviours, motives, activities, meanings, relations, situations, events or perceptions (Van Thiel 2014:143).

The term *grounded theory* refers to a systematic method of qualitative data analysis, where the data collection, analysis and theory stands in a close relationship to another (Strauss and Corbin 1998:12). It is a systematic method for constructing theoretical analysis from qualitative data, with explicit analytic strategies and implicit guidelines for data collection (Charmaz and Belgrave 2012:2). Strauss and Corbin (1998) argues that theory derived from data is more likely to resemble the 'reality', than is theory derived by putting together a series of concepts based on experience or solely through speculation and assumptions. This makes the grounded theory analysis a largely

[17] The Ministry was established in 2016, and had its first financial year 2017/18, and could therefore not be included in this thesis.

inductive analysis, starting primarily with empirical data aiming at generating new theory, hypotheses or concepts, which is what I have done in the analysis of the interview data for this study. Still, there will always be an interplay between the induction and deduction, as the development of new hypotheses or concepts also rely on a degree of interpretation (Strauss and Corbin 1998:137).

There are different variants of the grounded theory approach (Charmaz and Belgrave 2012:3). The constructivist approach places priority on the studied phenomenon, as sees both data and analysis of the data as created from shared experiences and relationships with the informants (Charmaz and Belgrave 2012:3). In this view, the method may only provide more or less useful tools for learning and conceptualizing (Charmaz and Belgrave 2012:3). The constructivist grounded theory is different from the objectivist grounded theory. Where a constructivist view argues that the researcher *defines* what appears in the data, the objectivist view is that the researcher *discovers* findings in the data. This is an important distinction, where one in the constructivist tradition emphasizes the researcher's active role in the analysis of the data as the codes developed from the interviews reflects the researcher's interests and perspectives, as well as information from the data.

The process of coding the data is a two-step process (Charmaz and Belgrave 2012:12). By initial or open coding, the process of analytic decisions about the data starts, and allows for a more selective or focussed coding of the most frequent and significant initial codes to sort and conceptualize the large amounts of data. After I transcribed my interviews, I had 134 pages of interview data.[18] When coding the interviews, I started with an initial, open coding using the qualitative data analysis software NVivo. In NVivo I coded text that reflected opinions, relations, behaviours and activities among the academics.[19] While some codes are more descriptive, more or less summarizing responses to the questions posed, like 'typical work week' or 'process of curricula development', other codes were more interpretative, probing deeper into the meaning of the responses, like values or motivations for their actions or work. The following step of the coding proves involved a more selective, focussed coding with the most frequent responses, eventually

[18] All of the interviews were roughly the same length, 45-60 minutes, which amounted to 6-7 pages for each interview.
[19] For initial codes, and example from coding of one interview, see Appendix 4: Initial Coding Scheme.

resulting in the development of the typology of academics, which will be presented in the following chapter.

The grounded theory approach place priority on developing a conceptual analysis of the material (Charmaz and Belgrave 2012:19). A typology can provide an overview over the main trends in the data material, which further creates a more systematic framework for the discussion rather than merely presenting the codes (Maxwell 2012:105). The typology also proves useful as a framework in the following discussion. By making a typology, I also answer to the first sub-question for this thesis, namely how the academics themselves understand their role at the university.

Based on the initial coding I have developed a typology with categories that sums up trends, and variations among the academics. The typology of the academics at SoE will be presented in the following chapter. There, the empirical information that has been gathered is generalized; that is, it is put in a broader perspective than just the stories of each individual informant (Van Thiel 2014:25).

5. Analysis: A Typology of Academics at the School of Engineering

The development of a typology opens up for the creation of analytic categories, thus ideal types which distinguish and identify tendencies among the informants. As elaborated in the previous chapter, this is a part of the analysis of the data, and the categories that makes up the typology. Empirically, these categories are not mutually exclusive, but they serve as analytic categories from the tendencies and orientations expressed among the academics, and is thus a part of the grounded analysis of the interview data.

In this chapter I will present the typology of academics at the school of engineering, based on the initial coding of the interview data. First, I will describe the dimensions of the typology. Then I will undergo the criteria for categorization of each of the types in the typology. Finally, I will discuss the challenges of categorising. In the following chapter the types will form the basis for the discussion and it will be further discussed in consideration of the modes of knowledge production.

5.1. The dimensions

The typology is developed based on the initial coding of the interview data. The terms for each category are based on what the academics themselves are talking about during the interviews when referring to their own work and activities both within and outside the university. Although this is largely an inductive exercise, the dimensions have been developed in line with the conceptual framework on modes of knowledge production. The typology consists of four categories based on the activities the academics reported to prioritise, and which made up their typical work week.

The categories are developed based on the different activities the academics reported they were involved in. Although a large number of the academics were not able to find time for activities beyond preparing for and giving lectures, there were also many that juggled the different tasks and also prioritised other activities. It also includes their relations to the government, the industry, and donors, as well as the broader society. The categories are not merely a descriptive summary of the data, as they are rather an attempt to create categories through interpretation of the reasoning of the

informants and how they relate to their various roles. They go beyond what can be read from the university's mission statements and the College Strategy (Makerere 2008; CEDAT 2011a).

The typology is created by and consists of two dimensions. The first dimension is related to the academic's main activities and reflections about their role, distinguish between *knowledge dissemination* and *knowledge production*. The second dimension is related to who the academics perceived to be their 'target group' through the orientation of their work and separates between *on campus activities* and *beyond campus activities*. Together the dimensions form a typology that creates four categories of academic roles that stems from the initial coding of the data material; the Lecturer, the Researcher, the Consultant and the Entrepreneur.

Table 6: A Typology of the Academics at the School of Engineering

	Knowledge dissemination	**Knowledge creation**
On campus activities	The Lecturer	The Researcher
Beyond campus activities	The Consultant	The Entrepreneur

5.2. The Lecturer

"My work here basically, because I'm a lecturer, I'm here to teach." (I.13) [20]

The lecturer is the category of academics who were mainly occupied with preparing for and giving lectures, and not currently involved in research, consultancy work or private business. In total nine out of the 20 informants fit into this category.[21] The category does not reflect the academics position at the university, as several of the academics in this category held positions as Senior Lecturer and Assistant Professor. Rather, it reflects their actual work at the university. For the Lecturers, the majority of their work at the university consists of giving lectures to both undergraduate and graduate students. The academics in this category reported that they spent about 80% of their week

[20] For a complete list of informants, see Appendix 9.3: Informants at School of Engineering. In the following chapters I will refer to the Informants (I) followed by the number according to the table in the appendix.
[21] I.3, I.4, I.7, I.10, I.11, I.13, I.14, I.18 and I.19

on giving lectures, mark assignments, prepare for lectures and supervise master students. A few were also involved in supervision of PhD students.

> "A big challenge is the markings. The classes are big, so that's a big challenge. And sometimes I have to get people to assist me, cause the classes are about 100 students, and I give regular assignments." (I.3).

These academics stated that they were not involved in research at the university and only to a small extent involved in work outside campus. As with the academics quoted below, many had not been involved in research after they completed their PhD.

> "There isn't much research going on currently. The last research I was involved in was when I was doing my PhD." (I.4).

> "I have hardly done research, apart from supervising students and their work, but like personal research I haven't done it since I entered this office." (I.13)

Even though teaching occupy most of these academics´ time, this does not imply that these academics did not want to do research. As a matter of fact, the majority of the lecturers expressed that they would like to be able to do more research, but that mainly due to lack of time they were not able to prioritize this.

> "I don't have that time [for research], honestly speaking. Like I´ve told you, my table is always full." (I.18).

> "... but for the actual research, that I would love to do as myself, I almost have no time for that." (I.7).

As evident from the quotes above, the Lecturer described a very hectic work week at the university. Even though they expressed that would like to prioritize other activities, this was seen as not possible due to the hectic schedule.

5.3. The Researcher

> "I try to be as aggressive in my academics [in publishing]. And mainly that is because of promotion, to get promoted you have to publish three every year, from teaching assistant to lecturer to associate professor, and then to professor. My ambition is to become a professor." (I.1).

The academics that fit into this category are those that in addition to giving lectures at the university, also reported that they were doing research either currently, or on a regular basis. Five of the academics are placed in this category.[22] Their research was conducted through research projects at their department, or what they referred to as on a personal basis. Several of the academics referred to the possibility for promotions as a central drive for doing research, as reflected in the quote above. It was quite common among informants in this category reported that, in order to combine research and teaching, they also had to work a substantial amount of time beyond office hours; during evenings, weekends and holidays.

> "Like for example for today, because of other issues, I might not do all of the work I have planned. But I will spend a good amount of my night time working. I will find it very convenient, cause when I do research on night time I will be alone and especially when you are away from your family, you can do a lot more." (I.8)

The academics falling into this category were all involved in research projects, that was either funded by the government through the PIST, or by donors from the international development community.

> "But most of our funding, even for our research, our PhD research, has not come from government. So, they have limited control of which direction it takes." (I.18)

Several of the academics had completed their PhD as a part of the so-called 'sandwich programme'. Many of these informants had kept in touch with their academic colleagues at the institution abroad, and thus continued the research collaborations.

5.4. The Consultant

> "Consultancies we do. This is not related to the department. I do that, mostly it is from ministries. You have to do that because what they are giving you here you cannot survive on the salary, they give you here. So, you have to do it." (I.12).

The academics in this category, in addition to giving lectures at the university, also devoted a substantial amount of time to consultancy work upon request, either for government institutions or

[22] I.1, I.2, I.8, I.9 and I.16

private companies. Such academics reported that they were involved in consultancy on an irregular basis, but when the offer is there, they would prioritize it. Even though the majority of the academics reported that they at one point in their academic career had been working as a consultant, the two academics that fall under this category seemed to be more involved in and oriented towards consultancy work outside the university than in research at the department.[23]

> "The faculty is not related to this [consultancy work], but they are ok with it. Everyone does it at the university because, what they pay us is not as good enough as it should be. It's a matter of something extra. You actually have to work some extra, you can´t do without. Is definitely impossible, the money is so little so that you can´t make it." (I.1).

> " ... but obviously I also do a lot of work outside here, in terms of consultancy. And then I do also collaborate quite a lot with the sector. Right now, I´m working on the projects with Kampala Capital City Authority where we are looking at how to improve sanitation in Kampala." (I.20).

The main argument of all informants involved in any sort of consultancy work, was that the salary from the university is insufficient, and that they would take on consultancy work to supplement their income.

5.5. The Entrepreneur

> "I have a company now which does this all the time. Of course, the other one is another arm of my business, but I´m trying to link entrepreneurship to the university. Cause there is a gap, a very big gap." (I.6).

The academics within this category are lecturing at the university, but in addition they were also involved in innovative activities, either on a personal basis or through interaction with companies outside the university. Four academics fits this category as they responded that they had their own private business besides her/his position at the university.[24] An illustrative example is one informant with a combined academic and private business card, with contact details for each, on each side of the card.

[23] I.12 and I.20
[24] I.5, I.6, I.15 and I.17

A common view among the entrepreneurs was a strong desire to reach out and apply their knowledge in Uganda. Unlike the consultant, who responds to requests from others, the entrepreneur initiates their own work, and were often driven by a personal commitment towards using his/her knowledge to solve a particular problem in society.

> "Well, I think it´s not really the knowledge so much, I think it is really what somebody is able to do with the knowledge that is important. ... It's more of what capacity we can do, what limitations they have, what problems you have, and existing solutions and tend to work out the solutions. So, I would say it from that point of view, I´m looking for solutions to problems that exist within society. So, you get knowledge to knowledge per se but knowledge to solve the problems so that is really my angle." (I.15).

As another academic emphasised, the university was not facilitating for innovative activities, which indicates that the entrepreneurs have a personal involvement and drive towards what they are doing. The personal commitment was emphasised:

> "If you noticed, I don't know whether you took time to visit the laboratories and to see the activities going on. Most of the research we do is outside, it's not within Makerere. And it is personalized, it's not institutional research. So, the lecturers are engaged in research which is more personal, or in association with other institutions, but Makerere has not taken so much credited from the research and its outcome." (I.5).

Another academic argued that the University should facilitate for the academics by establishing a technology transfer office, as well as a patent office which could give advice to students and academics about intellectual property rights.

> "But then I´m also interested in technology transfer to small scale enterprise, so that's why this master we are doing, of technology innovation wants to transfer from here to industry. What we are doing, like if you saw the solar pump, we are transferring that to farmers (....) It´s difficult because it [technology transfer] has not been institutionalized. There should be a technology transfer office. But there is no technology transfer office, so we do it mostly do it on the personal initiative." (I.17).

> "The university should have an office which looks out for the intellectual property. So, that what staff and students do can be registered as intellectual property, and eventually sent to the community. But now we do the research, we come up with some good results, a few of us who feel they should go, they do it on an individual basis." (I.17).

Currently such an office was not available at the College, and therefore this academic spent his time on guiding students and colleagues on questions related to intellectual property rights, in addition to his position at the Department.

5.6. Sub-question one

From the initial sub-question, how the academics at SoE understand their role as academics at the university, the typology illustrates and documents a variation in the academic's orientations and role perceptions. The academics are involved in a variety of work which can be categorized accordingly. The categories are not an attempt to sort, and thus rank the informants through the categories. Rather, the typology provides a framework for illustrating how academics within the School identify differently with their role as academics. By creating such categories, one opens up for studying the variety and diversity among the academics which are often treated as a homogenous group, representing the academic profession. The typology is an attempt to conceptualize the variety and diversity among the informants, thus the academics within the SoE. Even though the majority of academics are mainly occupied with lecturing, the categories shows that a number of the academics are also involved in other activities related to research, consultancy or entrepreneurship and innovations.

6. Discussion: Academics´ Role and Relevance in National Development

This thesis seeks to address how the academics at the SoE at Makerere University understand the relevance of their knowledge to development in Uganda. In the previous chapter I introduced the four types of academics. I will start with these categories, and discuss the dynamics and challenges faced by the academics within each of the category. I will also discuss how these categories interrelate and possibly influences each other. I will show how the typology is informed by and related to the two modes of knowledge production as presented in the conceptual framework chapter. Further, I will discuss the dynamics between innovations and development, academic autonomy and relevance, and donor funding and accountability. Finally, I will discuss the findings and answer to the two remaining sub-questions initially raised, regarding conditions for knowledge production at the university, and demand of scientific knowledge from industry.

6.1. The Categories

6.1.1. The Lecturer

Job-market and Curricula

The Makerere reforms in the 90s have been widely discussed, and one of the strongest critics of the reform process has been by professor Mahmood Mamdani, currently the director of the Makerere Institute of Social Research (MISR). In his book 'Scholars in the Marketplace' (Mamdani 2007) he explains how the reform had two phases, starting with the privatization of the university, followed by a commercialization process which led to a deep-seated transformation of the university. Privatization mainly affected the relationship between the university and the market, whereby the university opened up its gates to fee-paying, private students, in addition to the government sponsored students. Commercialization, however, involved not only the external relation between the university and the market, but also the internal process of knowledge production at the university, and internal relations between different academic units (Mamdani 2007:97). Mamdani calls the result of these processes a 'vocationalization of higher education', meaning that the orientation of the university curricula was oriented to match with the demands

from the labour market.

According to Mamdani, the Science faculties and the FoT were not as affected by the reforms as the faculty of Social Sciences and Humanities. Yet, as Court (1999) shows the reform processes brought about changes for the entire university through alternative financing strategies, as well as the introduction of demand driven courses. It is therefore conceivable that the reforms might have taken a different form at the FoT. While the social science courses were oriented towards the market, and was criticised for this especially by Mamdani (2007), the courses at FoT are to a larger degree depending on a relation to the actors outside campus. What seems to be new however, is the more instrumental view of the hard science knowledge in innovation for development. From the University Strategic Plan from 2008, there is a section describing a desire to strengthen the link between the academics and other actors in the sector:

> "The shift from the current outreach paradigm to the knowledge transfer partnership and networking is impelled by the realization that much as knowledge, technology, and skills reside in Universities like Makerere, the community, public and private sectors also command knowledge bases from which Makerere can learn and leverage her entrepreneurial and innovative capability. Knowledge production and transfer between universities and broad public and private sectors is supposed to be a two-way traffic that calls for cultivation and fostering of symbiotic relationships." (Makerere Strategic Plan, 2008:13)

From what is referred to as the previous outreach paradigm, the new strategy is now rather to facilitate knowledge production as a dialogic process between the university, the public and the private sector. This idea represents a shift from the previous way of looking at producing knowledge, also in line with the principles of mode 2 knowledge production. However, in the transition to a mode 2 oriented knowledge production, it has been argued that the academic autonomy is challenged.

The rhetoric of the university spreading an entrepreneurial and innovative seems to have followed and strengthened by the university moving from being less dependent on government funding, towards private actors in the market. One example from at the Department of Mechanical Engineering is a program for Master of Science in technology, Innovation and Industrial Development, which was established in 2011. In the program description, it is argued that students graduating from the college, previously FoT, have been employed at the top level of the professional department of government, established companies and agencies, but that there has

been identified a “major gap in the area of innovation and industrial development”. Further it is argued that global changes, liberalisation of economies and opening of trade barriers now call for engineers who can take industrial organisations to a higher level, in particular for a growing economy like Uganda (CEDAT 2011b:1). The master’s degree programme seeks to educate engineers who can come up with new business ventures and sustain the industrial ventures, and that this previously have failed due to a lack of entrepreneurial skills among the candidates. This reflects a recognition that was touched upon by the academics at SoE; that there is a challenge for the academics to link up with industry because there is a lack of such businesses in the Ugandan economy.

A vibrant debate is the university’s ability to educate students that can fit into the job-market, and not end up unemployed. Mamdani discusses this challenge, with a special focus on the changes in curricula and programmes at the colleges of Social Sciences and Humanities (2007). Although a number of the informants at SoE agreed that it was important to keep this link close to the job-market, one academic problematized that the university should steer the education in accordance with such demands:

> "We as university teachers has to balance theory, and some aspects of practical work. We cannot train students at level of the companies in the field, which are so varied. So, we also have to recognize that once we train students here, the companies also have obligation to further train them in the area when they go out to the field. So, we get feedback all the time on how we can improve, we also know that we are limited within the university and academic setting on what we can impact the students. And the rest we have to leave to the companies to train the students. If the companies expect to get students right off the graduation into the job it is not realistic. The companies should be ready to train them as well, in the area in which the company’s core activities are best. So, because they are so varied, we cannot be training practical in all that different aspects. So, the obligation is twofold, we teach we do our part, they do their part, while we exchange ideas but we must stick to our key focus areas.” (I.12).

As this informant emphasises, there should be a distance between what the training the students get at university and what they are expected to do in when they graduate and get a job. The companies should not expect to get students graduated from the university ready trained for one specific job, but that the companies should be ready to train the students themselves.

Curricula Development

The link to the industry is also related to the process of developing curricula. Curriculum is revised for each study programme, every fourth year and is a long process where the academics, as well as stakeholders from certain industries are involved, e.g. Uganda Manufacturers Association (UMA). The final curricula draft is presented and approved by the University Senate. Another consequence of not being involved in research was discussed by an academic, who argued that there was a tendency to recycle old knowledge due to lack of research.

> "When you are not researching, only teaching, there is a ban out effect. That means there are tendencies of temptations to recycle old knowledge, without having quality time to get new knowledge and get renewed as the demands of high education requires." (I.9).

Another informant argued that much of the current curricula were not relevant in addressing the Ugandan context and challenges, because they were importing the curriculum and textbooks from other countries.

> "For example, if I'm teaching management, certainly most of the textbooks have been developed in the UK, in the US and in other countries. All the examples are on McDonald, or Walmart [informant laughs], and for a student they are far-fetch. What your interest would be is that you totally had information on how some of the industries are actually performing in our country. But even that time to go and secure that information so that then you can be able to use it as a case in your own lectures, is hard" (I.18).

As this academic emphasise, the lack of own research leads to import of text books from other countries, which makes the content and examples distant from the Ugandan context. When academics import textbooks from abroad, the challenge have become to relate what is identified in the curricula to the reality in the Ugandan society, and thus address local needs with their knowledge. Lack of research and therefore time to develop own curricula seems to have led to largely imported curricula.

In their book 'The Delusion of Knowledge Transfer', Koch and Weingart (2016) discusses the use of expert advice as tools for foreign aid to assess impact on policy-making in young democracies. In the book they show how knowledge has been transferred as a part of development aid, preventing local knowledge development and expertise. They further argue that transferring knowledge is posing a threat to the legitimacy of these countries´ governments as they risk losing control over their own policy agendas. A parallel can be drawn from their argument to what some of the

informants consider the situation to be at SoE, where the curricula developed for another context and society, is imported at the expense of potential local knowledge production. The same way technology transfer is not an easy solution to development, transferring curricula does not fill the knowledge gap as local knowledge production would (Yakubu 2017:5).

6.1.2. The Researcher

Research, as the strive for improved or new knowledge, have been considered a defining purpose of the university since the Humboldtian ideal from the early 1800 (Collini 2012:24). Research separates the academic from being a practitioner or a teacher. At the SoE a minority of the academics were involved in research as the amount of teaching was high and competition for research grants tough. Yet, a few of the academics were committed to research, essentially motivated by a desire for promotion and career-building within academia.

Academic Peers and Promotions

The idea of quality control of research through peer reviews is one characteristic of the mode 1 knowledge production. This is also the case at Makerere University, as with most universities globally, where academic publications are evaluated by peers before being published. The peer review system is an important basis for promotions at the University. A promotion at Makerere is based on established criteria from the Policy on Appointment and Promotion of Academic Staff (Makerere 2009). Promotions are primarily based on research output as measured by the number of publications, and years of teaching experience (Makerere 2009:5).

The academics who were active in writing articles, reported that the journals they are publishing in are not Ugandan, or even African, but European and American journals. These academics faced a challenge on the one side with balancing the relevance of their research to the Ugandan context, while on the other side meet another target group in international, largely Western, journals in order to get their articles published. For many, this became another hindrance for them to be promoted, when they had to balance being relevant to their own societal challenges and at the same time being relevant and of professional interest for colleagues in European and American journals, in order to get their articles published.

> "I would say Europe and American academics are most relevant, simply because of the advancement in their research." (I.1).

Teferra and Altbach (2004:39) problematises the practice of basing promotions mainly on publications. They argue that even though the state of research at African universities remains precarious and many researchers reports that academic promotion depends to a large extent on publishing, even when the environment does not appear to support research, publishing as a universal tool of measuring productivity remains a yardstick for academic promotion at African universities (Teferra and Altbach 2004:39). This pratice was also problematized by one informant at SoE, saying that:

> "Ok, we can publish and here in Makerere they insist in peer-reviewed journals. But that work is not accessed by those, actually the people that need the knowledge. If we were able to have maybe, put it in a format or in a language that these other people can access and which they can read. (…) We need to put in in a language that the community can understand." (I.6).

Another aspect, as the academic quoted above also refers to, is the language barrier. Uganda is a multilingual country with more than 40 different languages across the country (Ssekamwa 1997). In the Central Region, where the capital Kampala is located, most people speak and understand Luganda, Kiswahili and English. In the rural areas however, there are other dominating languages, and English skills are not as widespread in these areas. The debate about English as the main language at Makerere was central to the post-colonial debate about African Universities (Thiong'o 1986). Yet, at Makerere, Kiswahili still has the status of a foreign language, with departments of Kiswahili studies at campus (Mamdani 2018:35).

Research Funding

Another, and perhaps the main challenge associated with the academics' opportunities to do research is related to available funding. At Makerere there are mainly three sources of funding for research; internally generated funds, government initiatives, and donor funding. Less than 1% of the internally generated funds are spent on research and innovations (Rwendeire 2017:5). Government funding is also strictly limited, but CEDAT is one of the three colleges which has received funding for research projects directly through the PIST. Starting in 2010, 11 projects at the College has received support, among them the electric car Kiira EV, the iLabs Project and the MakaPads Project (Makerere 2013). The initiative supports the University's main priorities directly

in the area of research and innovation as defined in "light of the scientific challenges and the role of universities as change agents in the economic development of the country" (Makerere 2013). Despite the project funding through the Presidential Initiative, a most of the informants called for more government funding for research at the university.

> "… government does not provide enough money. No, there are donors and the private sector. Because, a lot of research has been supported by the Swedish and the Norwegians, and that has been a big driver on research projects over the years." (I.3).

The main source of funding for research is still foreign donors and development partners, like the Carnegie Corporation, Rockefeller Foundation, MasterCard Foundation, Bill and Melinda Gates Fund, SIDA, Norad, USAID and the EU. Donor funding makes up 80% of the institutional research at the university (Musiige and Maassen 2015:123). Such donor funding are often characterised as being relatively short term projects, from three to five years, and donors also prefer to invest on the basis of their own programmes and ideologies in individual projects (Musiige and Maassen 2015:123). Many academics at SoE expressed a concern towards this situation, where the only available funding where tied up by conditions that compromised their possibility to set their own priorities, or to formulate their own research questions.

> "In a situation where you find that our research is not defined by ourselves, in other words we don't have university funding that is available, and they say, ok we want researchers to solve this problem. So, we are somehow tied because we, we do not have funds so that we decide what we should do. So somehow it is influenced by the people who fund. If you write a proposal, and it is not fitting within a certain core it is not going to be funded" (I.4).

One academic argued that the university should provide funding for research, in order to meet national priorities related to development, implying that this is not the case today where funding is largely dependent upon donors. As the majority of the academics, he argued that the Ugandan government should prioritise more public funding for research.

> "This is a government university, the government is expected to fund special research, to provide resources, but that doesn't seem to be the priority of the government (...) The government should pick interest and fund our research." (I.4).

Before the University reforms in the 90s, Makerere was solely a public funded university. During the reforms, one recommendation from the WB was to reduce government funding in order to

reduce the university's dependence on government (Court 1999:7). In the published report from the WB, it is argued that the availability of funds that are not deriving from the government have enabled the university from a situation of "hand-to-mouth" dependency to a situation where autonomous initiatives are possible (Court 1999:8). The privatization, through reduced dependency on government funds, is argued to "have spread an entrepreneurial ethos within and beyond the university" (Court 1999:8).

Competitive Academic Culture

Today, over 20 years later, government funding for research is still strictly limited. The lack of such funding, and the predominance of donors, does not only seem to affect the research agendas, but also the broader academic culture at the university. A funding system based primarily on limited, highly competitive grants seems to have led to a competitive and individualised academic culture, resulting in many academics not collaborating with colleagues within or across departments. One academic was referring to the challenge of collaborating across departments because of the individualized research, even if they were working in the same topics.

> "I think our neighbours in agriculture [CAES] has a lot of processing, but the problem is that it is done on an individual basis." (I.17).

According to Gibbons et al. (1994) mode 1 knowledge is being produced in the disciplinary community, meaning that it is developed within the context of the academic community and its interests. To the extent the academics at SoE reported about the existence of collaborations, these seemed to be within their own departments, and not across either the department or college structure. Assuming that knowledge developed within the academic community allows for the academics themselves to set the research agenda. Data from the interviews suggests that there is not much collaboration at the SoE, even within the departments. That was the situation in which one, who referred to a high level of secrecy, even among colleagues within the same college:

> "They wouldn´t call you who is a water expert 'can you come and help me', they would kind of hide everything. Because they want to keep everything to themselves." (I.1).

One academic explicitly pointed to the lack of a research culture at Makerere in general, and that such activities were rather carried out on an individual basis, 'disconnected' from their position at the university.

> "Normally as a lecturer you are expected to teach, there is not much of a research culture at Makerere, you should have noticed. (…) Most of the research we do is outside, it's not within Makerere. And it is personalised, it's not institutional research. So, the lecturers are engaged in research which is more personal or in association with other institutions" (I.4).

According to Gibbons et al. (1994) the main change for the academics, in the transition from mode 1 to mode 2, is that knowledge production and dissemination in mode 2 are no longer self-contained activities carried out in a disciplinary isolation, but that it involves interaction with a variety of other actors like research centres, government agencies, think-tanks, private businesses and consultancies. The location, practices and principles of knowledge production are set in a context of application. The authors argue that by expanding the number of interest groups, these stakeholders are demanding representation in the setting of the research agenda, as well as in the subsequent decision-making process. This makes knowledge more socially accountable, and this way the knowledge becomes relevant to society (Gibbons et al. 1994:7). At SoE however, research is to a lesser extent taking place at the department, but rather at research centres in affiliation to the departments that are now organised as independent research institutions, e.g. CREEC, MAPRONAO ACE and netLabs!UG (sic).

An overall challenge however, seems to be lack of contact with society and actors outside Makerere. One academic reflected on how the situation ideally should be, and that they as academics should be in close contact with the society outside campus.

> "The starting point is not to be on campus, the starting point is to go to them, what are their issues and see how the university can address it. We go to manufacturers, we go to villages, we go to schools. We go there, what are their challenges, are they researchable, then we do the research. That´s the role of the academic, to do research in the value chain." (I.10).

Academic Culture and International Networks

The academic profession relies on an understanding of an academic community, a community of scholars holding seminars for scholarly debates, collaborating, disagreeing and challenging each other's ideas. Halvorsen emphasizes the importance of *trust* among the academics, as a precondition for the research community's existence (2010a). When the accountability shifts from the colleagues in the research community, to actors outside the university campus this could be detrimental to collegiality among the academics, and the trust among them.

The trend at SoE seems to be that research, to the extent it takes place, is based on the individual academics´ networks outside the University, rather than within Makerere. Several of the academics at SoE had networks in Europe and in the US and were involved in research and publications from other institutions. This is in line with tendency across Universities in East-Africa, where 70% of all research output was developed through international collaborations (Fonn et al. 2018:2).

6.1.3. The Consultant

The consultants at SoE are the academics spending a considerable amount of time working outside the university, applying knowledge upon request either by government agencies or private industry. A majority of the academics at SoE had at some point worked as consultants, and the reason was primarily argued to supplement their income. At SoE, one academic in particular expressed a concern towards this tendency where his colleagues were committing more time to work outside the university because this, he argued, was affecting their work and obligations at the university.

> "So, what happens, people do get opportunities, like consultancies and so on, (...) are away all their time and they forget their core business here. (…) Personal initiative is important. Because, if you don't, some colleagues are just in to consultancy, they don't care about research anymore. And they don't care much, and then therefore they are don't publishing a lot, very little, and not teaching properly or adequately. They are prioritizing this because it provides them money, more money than university does which is true. But then, as I said earlier, if you are here, you must also want to lead students, you must enjoy what you are doing otherwise you should be elsewhere, just doing private sector consulting and so on. So, it's actually someone´s individual choice." (I.3).

Scholars have problematized the increase in consultancy work among academics, arguing that consultancy work is a barrier to strengthen research capacity at the university (Wight et al. 2014), and resulting in extensive over-commitment and a wide diffusion of interest and attention (Coleman 1984:419). The latter was also a concern expressed by the academic in the above quote.

Consultancy Culture

Mamdani (2017:88) have been critical to the consultancy activity itself, and how it contradicts the academic role and scientific method. He argues that in the aftermath of the university reforms at Makerere during the 90s there have been a growing tendency towards more consultancy work among academics at Makerere. Today, he argues that the 'consultancy culture' among the academics is pervasive, and that it has negative consequences for postgraduate education and

research. When doing consultancy work, the academics are not formulating research questions based on academic interest and curiosity but answering to a pre-formulated question.

> "For consultants, research is all about finding answers to problems defined by a client. Consultants tend to think of research as finding answers, not formulating questions. Consultancy culture has been further institutionalized through short courses in research methods that teach students to gather and process quantitative information, from which they can cull answers." (Mamdani 2016:117).

Eventually, Mamdani argues, poorly paid academics changed their research work into consultancy contracts as a way of making ends meet due to the low salary from the university (Mamdani 2016:117). But for a number of the academics in this study, consultancy for the industry was one way to stay in touch with the industry, and that this was important also for him as an academic.

Government Consultancies

However, not all consultancy work was commissioned by private businesses. Another part of this kind of work was for government agencies, where the academic was commissioned as an expert within her or his field. Only a few of the academics at SoE reported that they had been working as a consultant for government agencies, which occurred on an individual basis, rather as an institutionalized cooperation with the University. One academic at the Department of Mechanical Engineering expressed a close link to several ministries, and that he had worked with them on several occasions.

> "We have strong linkages with the relevant ministries, the Ministry of Water and Environment and Ministry of Energy and Mineral Development." (I.15).

Even if this academic is using the collective "we", these links seem not to be representative for the other academics at this department, as one of his colleagues from the same department expressed a lack of linkages to relevant government agencies.

> "We need to bridge that gap. So that we locally can solve the problems and in the process the staff, students and Makerere makes some money. And also, feel proud that they have gotten involved in solving a problem. So, like struggling to reach the Minister of agriculture, to tell him why are you saying there is no solution for drought, we have solution right here." (I.17).

In general, the majority of the academics reported that they would like to see a lot more engagement with government agencies, in order to contribute with their knowledge and thus follow up the aspirations of the NDPs and Vision 2040. In line with the STI Plan of 2012, the academics also argued that a link should be institutionalised, and not like today where it appears to be based on personal relations and network. In 2016, the MoSTI was established with its first financial year starting the following year. This ministry could facilitate what the academics were asking for, through coordination of the STI sector and thus link the University with relevant government agencies.

6.1.4. The Entrepreneur

The entrepreneur is characterised by a personal commitment and drive to pursue innovative knowledge production and aiming at application. In line with the concept of mode 2, this desire of creating is pursued in the context of application, and not necessarily within the interest of the academic disciplinary community. The entrepreneurs are the academics with a strong ambition towards being innovative, and thus contribute to economic development in the country.

Entrepreneurial Scientists

In 1983, Henry Etzkowitz published an article titled 'Entrepreneurial Scientists and Entrepreneurial Universities in American Academic Science' (Etzkowitz 1983). Here entrepreneurial scientists are described as academic scientists that are eager and willing to direct and participate in programmes of research and development that are aiming at a commercial application (Etzkowitz 1983:198). Such scientists have, according to Etzkowitz, driven universities from the Humboldtian ideal of research universities, to universities with an entrepreneurial orientation, so-called entrepreneurial universities, that are considering new sources of funding, through patents, contracted research, and partnerships with private enterprise (Etzkowitz 1983). At the SoE a few academics were pursuing entrepreneurial activities through own private companies.

> "Yes, I have, but I also run a private company (...). But that one is private, outside the university. (…) This is purely a construction innovation company, that manufactures concrete based construction materials. Within varying environments. So, we are mobile, we run industrial scale machines" (I.5).

Among the entrepreneurs, there was expressed a dissatisfaction with the absence of 'institutional backing' from the University. In addition to the above-mentioned lack of links to society, the challenge for the entrepreneurs were reflected by one academic as a lack of competence at the University to support academics who wanted to reach out to society with his ideas.

> "The university, the industry and society can be able to benefit much, but now that interface, it's…we need one institutionalized, cause what we have right now is individuals. I go and visit an industry on a personal basis. But if that were institutionalized, and there is that platform where they assured that there is going to be an exchange of ideas and an exchange of solutions, an exchange of, a comprehension of problems and effort expended towards providing solutions, I think we would have a better research platform, maybe we would get them interested in funding some of these projects. But on a personal basis we, apart from having university car that is in the faculty there [the Kiira EV], probably there is not many willing to support the ideas that I bring on board as an individual. But if it was in an institutionalized setting, interface, thy would have an institution to hold accountable. They would have a centre to hold accountable for their money and the solutions that they seek for." (I.17)

Mode 2 and Quality Control

The context of application is central for the concept of mode 2 knowledge production, as it has a clearly defined goal of where to apply the knowledge being produced. Other actors are also involved in the knowledge production in addition to the academics. The quality control in this sense is not through academic peers but is rather an evaluation by a variety of stakeholders and their various perceptions about the knowledge applied, if the problem is solved and the users are satisfied. The evaluation in mode 2 is not a based on an academic assessment of the knowledge itself, or the methods applied, but how the outcome works out in practice, for the different stakeholders.

A challenge that was brought up by several academics who also had a private company, was the lack of support from the university. One informant argued that the University should have a technology transfer office, who could support and advice academics on how to reach out to industry with their products, as well as help out in registration of patents.

> "I´m also interested in technology transfer to small scale enterprise, so that's why this master we are doing, of technology innovation wants to transfer from here to industry. (...) It´s difficult because it has not been institutionalized. There should be a technology transfer office. But there is no technology transfer office, so we do it mostly on a personal initiative. (…) The university should have an office which looks out for the intellectual property. So, that what staff and students do can be registered as intellectual property, and

> eventually sent to the community. But now we do the research, we come up with some good results, a few of us who feel they should go, they do it on an individual basis." (I.17).

Industry in Uganda

But even with a technology transfer office, a general challenge for engineers at the university is that the Ugandan industrial sector is dominated by small-scale firms with limited value addition (Shinyekwa et al. 2016:192). SMEs account for over 90 per cent of enterprises in Uganda (Shinyekwa et al. 2016:197). 58% of the registered firms employ between five and ten people, 18% employ between eleven and twenty people, whereas 9% employ between twenty-one and fifty people (Shinyekwa et al. 2016:197). As this document, a large majority of companies have ten or less employees. Larger industries in Uganda are predominantly foreign owned. The telecommunications sector in Uganda is one example which is characterised by heavy involvement of multinational companies, including MTN from South Africa, and Airtel from the Indian company Bharti Airtel (Shinyekwa et al. 2016:207). Also, at the department of civil engineering, an academic was worried about the domination by foreign companies. His reasons was as follows:

> "Our construction industry still has a lot of challenges, because it is still dominated by foreigners. Just like governments is not supporting research institutions, even the industry isn´t much support to build the local capacity. That´s why you find that most of the big projects are being run by foreigners" (I.4).

Another example of a sector which have been dominated by foreign workers and companies, is within road construction that has been run by Chinese contractors (Namubiru 2018). The largest road construction project in Uganda in recent years is the Kampala - Entebbe Expressway, which has been an important project for the government as it reduces the time from the international airport in Entebbe to Kampala from 2 hours to 30 minutes (Biryabarema 2018). The construction of the road has been outsourced to the Chinese Communications Construction Company (CCCC) and funded by government partly through loans from China Exim Bank (CEB) (Egessa 2016). At the SoE, one of the academics at civil engineering, were critical towards this project and how it prevents Ugandan expertise and engineers from participating in the projects, leaving the engineers to do the coordination of the project and not the professional assessments or decisions.

> "Once the economy is small, once you are depending on borrowing, loan money that comes with conditions about who the contractor is going to be, then the contractor brings their senior engineers, even their junior engineers, and therefore the engineers work, those who are lucky to be employed by government institutions that are coordinating these

> projects still do no technical decisions, they are just there as messengers, handling meeting, archiving files here and there, and looking at designs they cannot own and they pass. For example, the Kampala-Entebbe express highway is designed and constructed by Chinese engineers. The design was developed in Chinese, they could not be read. There were complaints that the design should be translated into English, a few things were converted but by the time construction was taking place, by the time somebody has approved to proceed and go on, when you can't read designs which are in Chinese. I mean even if somebody translates them into English, it's useless, the decisions have already been taken and construction is ongoing." (I.5).

Lack of knowledge demand?

The knowledge demand stemming from business continues to be weak, especially the part of such demand directed to local use. At SoE, especially within mechanical engineering, the academic engineers described a situation where the businesses in Uganda did not constitute a demand group, either because they were not interested in scientific knowledge, or that they did not have the resources to partner with the academics.

> "Then when you go to the regular manufacturers, sugars, steal, you go for the cheapest and most, what should I call it (…) It's about costs, so they don't really move in to… If they need something new, they go by some new machinery get a consultant, but many of they don't do that. (...) The technologic innovation depends on the industry. Plus, people. That's a problem with Uganda. Cause many times people feel it's cheap. A new kind of soap, just go to the distributer and ask them for a new set of chemicals, they give you and you mix. But they don't get a chemist to help them, or for a new perfume or... No, I think people just don't want to spend money. It's safer to just go buy a new. It's a major weakness actually." (I.11).

The high cost of credit is also a major constraint in the country, and only a very small proportion of Ugandan businesses have access to a bank loan as interest rates often range between 22-25% (WB 2017b). Some of the academics argued that the problem was that the demand for academic knowledge from the industry was absent.

> "… our industry here doesn't value research. They focus on their profit. When you tell them about research it is about you to fund the research, you will not get money from them." (I.16)

> "but the industry does not ask for our knowledge. When you move around in Uganda, the private sector still very weak, and people never ask for private service, only public (...) even the policies does not encourage to the private sector." (I.10).

> "Many of the stakeholders are not interested in academia, they are more interested in the practical aspects. But (…) there is no way we can to without the fundamentals." (I.18).

One academic argued that a consequence of the lack of interaction and dialogue with actors outside campus was that research tended to both "start and end" at campus, and not actually benefit or help people outside.

> "Another problem that we have been having at the university, we create our own problems and solve them. So, we should try to solve problems that are relevant to the society. And in that way, they own it, if we don't solve with them or what is theirs, then it becomes our problem and they are not interested" (I.16).

In setting the research agenda, one informant argued you had to start by moving outside campus, to get input to formulate the research questions.

> "The starting point is not at campus, the starting point is to go to them, what are their issues and see how the university can address it. We go to manufacturers, to the villages, to the schools (…) what are their challenge, are they researchable, then we do research. That's the role of the academic, to do research in the value chain." (I.10).

As this informant highlights, it is important to have a dialogue and start outside campus. This reflects the mode 2 thinking, where the research ideally is carried out to solve a problem. Still, this academic emphasise the role of the academic to use their knowledge to identify and address these challenges, as a starting point for setting the research agenda and formulate the research questions. Another academic had a clear idea of what he wanted to be done.

> "I don't know anyone who has successfully done irrigation for example. Now, when the rain does not come, we are finished. I would like to see (...) a way of introducing irrigation. Whatever the case might be, but we can innovate irrigation for Uganda. It rains now and then, but we need it (…) and you can actually solve it." (I.6)

Much of what is said here is related to constraints; structural conditions in the economy translated into little demand, to academic knowledge and candidates, and within the university little is done to promote engagement with society and create conditions for the development of a 'scientific entrepreneur'. However, despite these constraints we can observe academics that orient themselves and their activities toward such an understanding of their academic role, based on a personal initiative and commitment to do so.

6.2. Innovations and Development

The government of Uganda adopted the country's first national STI policy in 2009, followed by the implementation plan in 2012. In these documents, the universities are identified as key institutions to achieve the overall goal of the policy, to "strengthen national capacity to generate, transfer and apply scientific knowledge, skills and technologies that ensure sustainable utilisation of natural resources for the realisation of Uganda's development objectives" (MoFPED 2009:13). Linking innovations to national development capacity is largely a recent idea in the discourse of national development in most African countries (Yakubu 2017:2). Yet, the idea of linking Universities to national development is not new. As discussed, the post-colonial ideal for many African universities was the developmental university, where the mission of the University reflected the goals of the state. What seems to be *new* in this regard is rather the linking of innovations and development, and in particular the university´s strategic role in this process, especially in regard to the science and technology disciplines.

> "There has been a growing policy focus on the university's contributions to innovation and economic development – the main assumption being that more complex and competitive economic and technological global environments require rapid adaptation to shifting opportunities and constraints. As such, the university is expected to play a central role in this adaptation since, as the main knowledge institution in any society, it is assumed to link research and education effectively to innovation" (Cloete et al. 2015:5)

Various studies the last decades have pointed to a variety of changes in the role of the academics at the university, such as the increasing orientation of science systems towards strategic goals, like the national development plans, or the emphasis of relevance of the knowledge produced (Hessels and Van Lente 2008:740). However, despite the many supporters of universities role in development rarely clarifies *what* role universities should have.

Cloete (et al. 2015:19) argues that the debate regarding the universities role in society seems to reveal two somewhat contradictory perspectives; a direct instrumentalist, service role, and one as "engines of development" role which is based on strengthening knowledge production and innovations. The role of the academics is different in these two notions. In seeing the academics as 'engines' through knowledge production, reflects an appreciation of scientific knowledge, and that the academics keep an autonomy in setting the research agenda. As engines for development, it can be argued that the academics retain their autonomy, in the sense that the academics themselves

formulates the research agenda, and that results from this research might serve as an engine for development. This can be understood in line with the mode 1 of knowledge production where research is defined and conducted within the disciplinary academic community. In a service role academics are expected to respond directly upon requests and missions set by actors or clients external the university. This view reflects a utilitarian appreciation of knowledge, measured in "output" or innovations, which is in line with the mode 2 thinking.

Innovations and Economic Development

Schumpeter defined innovations as *new combinations* of existing resources, carried out by entrepreneurs (Fagerberg 2006:7). Such new combinations are evidently depending upon production of knowledge. However, the concept of innovation relates differently to the two modes of knowledge production. For mode 1, new knowledge can be understood as a prerequisite that might or might not lead to innovations. By contrast, the very purpose of knowledge production in mode 2 seems to innovation, with the strong emphasis on application, relevance and social accountability.

Schumpeter emphasised the role of innovations in economic and societal change and argued that innovations are the driver of economic development. In his theory of economic development, innovations are central to capitalist growth, driven by the introduction of new products, new methods of production, new sources of supply, new markets and new ways to organise business (Fagerberg 2006:7). In line with Schumpeter, Beckert argues that innovations are another cornerstone of the capitalist dynamics, and by satisfying previously unmet needs, as well as creating new ones, the rate of innovation has an immense impact on the economic performance of firms, regions and countries (2016:169).

The Innovation Process and its Uncertainty

Gibbons et al. (1994) describes the process of knowledge production and thus the process of innovation as a linear process, where one starts with identifying a problem or a need, then systematically work to find a solution. Beckert on the other hand, emphasizes the nonlinear and unpredictable process of innovation, and the underlying uncertainty; that no one knows its precise outcome at the timewhen it begins (2016:171). The developer does not keep means and ends separate but defines them interactively as he frames the problematic situation (Beckert 2016:171).

What is initially planned as an innovation, might lead to completely different discoveries. Beckert further argues that creativity and imagination is not emphasised in the literature on innovations. The innovation process is unpredictable, and non-linear, and it is therefore many development processes might lead to discoveries that cannot be foreseen (Beckert 2016). Before an innovation takes place and a product is successfully introduced to the market, it is also impossible to say whether it will be profitable to invest resources to pursue it (Beckert 2016:186). It is therefore an uncertain financial investment, which the industry in many cases cannot afford to take. Government-funding is therefore in many cases a more 'reliable' and have in many cases had the capacity to support even projects when the outcome is uncertain (Mazzucato 2015).

This uncertainty is not reflected in the national policy documents in Uganda, where innovations appears as an instrumental, key factor leading to economic growth and prosperity. Neither is it reflected that, as Beckert argue, decisions about innovations are based on and motivated by normative imageries and 'fictional expectations' about the future (2016:173). In Uganda, the desired future, as formulated in the vision statement is a transformed society, from a peasant to a modern society, and attaining status as a middle-income country, through among others, technological innovations, growth in the industrial sector and manufactured exports growth (Uganda Vision 2010:13).

Non-linear Innovation

The idea that modernization comes about or evolves through access to ever more sophisticated levels of technology has, together with conceptions of economic growth, underpinned the ideas of development for the last century (Trace 2016:15). An instrumental belief that innovations will lead to economic growth is reflected in the development plans, underpins this idea. Reality, Trace argues, is a bit messier than this. Technology is a product of human interactions, and the use and innovation of technology inevitably reflects the political, social and cultural nature of the societies from which it emerges. Moreover, human beings shape and in turn are themselves being shaped by technology, and this "messiness" means that technological progress is not as linear as we might like to believe, neither is the social impact of an innovation easy to predict (Trace 2016:15). Several development processes lead to discoveries completely different from those intended by the planner. This phenomenon is also known as *serendipities*, and well-known examples of this are the

discovery of pencilling, the invention of the microwave oven and the invention of the post-it note (Beckert 2016:172).

There appears to be a great optimism about the potential innovations have to bring solutions for lifting people and their countries out of poverty, but the overall consensus seems to leave the normativity in technical solutions outside the debate. The actual need for technologic advancement does not secure that one's needs are being taken into consideration. Knowledge produced in the context of application have to have a target group, and for it to be profitable the target group must have the resources to pay for the products or services. People living in extreme poverty does not constitute a profitable market, and without those participating in setting the research agenda there is little reason to expect they will be beneficiaries of new technologic advancement. The process of social accountable knowledge production, as Gibbons et al. (1994) puts it, only reflects the interests of those who are already at the table where the decisions are being made.

Following this argument, one can further argue that the claim of mode 2 to be socially accountable is rather misleading. According to Halvorsen et al. (2005:11) the increasing privatization of knowledge as products that can be bought and sold, facilitated by the reinforcement of intellectual property rights and patenting, contradict the idea of knowledge as a common good. When knowledge is developed in the context of applications for a particular user, this knowledge is no longer accessible and open to the public, but privatized and commodified and thus conflicting with the norms and traditions of public universities.

Politicisation of the Research Agenda

A. Kasozi, professor of history at Makerere, and the former executive director of the National Council for Higher Education in Uganda, recently welcomed the idea of transferring all university affairs from the Ministry of Education and Sports, to the newly established MoSTI. His argument, which is also supporting the recommendation from the Makerere Visitation Report (Rwendeire 2017), is that "due to the digital revolution the roles of the university has changed from just being the apex of a training and teaching system managed as other teaching institutions, to a major driver of economic development at the head of a country's research and innovation system" (Kasozi 2018:28).

This raises the question if the priorities of the national development agenda and the research agenda should overlap to the extent that this implies. Further one could argue that if so, this leaves the university as an institution for the state to use, as an extended part of the state, and not an autonomous institution. If research is only initiated when serving a goal according to national development, i.e. goals that are set external to the university and the academic profession, this would to reflect a situation where the research agenda has been politicized. Collini argues that one central role of the university has not only been to pursue practical goals, like training of personnel for state institutions, but to offer a form of resistance to the dominating practices and values in the society (2012:25). The strategic funding of projects through the PIST can is an illustration of how the research agenda are being politicised, whereby the universities have been reduced to instrument for economic growth and development. With the funding directed towards a few certain projects, there is no room for the academics to use their knowledge to oppose or challenge the policy agenda, nor pursue 'curiosity driven research' (Higgins 2016:52). The state does not seem interested in scientific knowledge per se, but merely knowledge and innovations as an instrument for economic growth.

6.3. Academic Autonomy and Relevance

Academic Autonomy

In the European Humboldtian tradition, academic freedom was mainly defined as the freedom of teaching and research, the freedom of academics to choose their topics, concepts, methods and sources, and the right to contribute to their academic communities according to the standards and rules of the academic world (Enders 2007:11). This understanding of autonomy corresponds with the mode 1 thinking, where knowledge is produced within an academic community, controlled by the academic community through peer reviewing mechanisms. This is argued to be the traditional way of knowledge production.

Halvorsen argues that what is at stake for the research universities in most countries today, is autonomy for the universities and academic freedom for researchers (2010a:239). In mode 1 the academic autonomy is guarded by the standing of the disciplinary peers in evaluating, criticising, debating and contesting knowledge, methods and truths within the discipline. By contrast, in mode 2 the focus is rather on the relevance of the knowledge to a given user or client, and by this shifting

the orientation from a process of research to a process of production or innovation where a satisfactory outcome constitutes the value of the research. In this view, academic autonomy is not important as long as the academic contribute as agreed in advance.

The relation to actors outside the university campus might differ from one discipline to another. Highly theoretical disciplines might be more dependent on academic peers than a direct links to societal actors. As an applied science, engineering is to a large degree dependent on relatioships to societal actors, especially to the industrial sector. Still, the control of defining what knowledge is relevant in the discipline and setting the research agenda remains the core of the academic work. Halvorsen (2010a:239) argues that academic autonomy ensures that a variety of knowledges can develop, not through disciplinary isolation as in the mode 1 thinking, but through a multitude of contacts with society. This way knowledge can develop according to its internal criteria, open up for external debate and scrutiny, yet still be protected from external pressure and private interests (Halvorsen 2010a). Even so, this is not a mode 2 argument where relevance is defined by actors outside the academic community but proves an alternative to the mode 1 thinking without compromising on academic autonomy in setting the research agenda and developing curricula.

Relevance of Knowledge

The concept of relevance is an ambiguous concept, with no singular definition. Neither does relevance constitute an objective phenomenon that can be measured. The concept of relevance is largely a relational as it is a matter of who defines it, and in regard to what. It captures the relations between a given goal and a chosen mean to reach the goal in question, and thus, the definition of relevance for higher education will shift over time (Skauge 2005:335). According to Gibbons et al. (1994), knowledge is relevant when it is socially accountable and thus mode 2 knowledge is inherently relevant because it is developed in a context of application. ‘Traditional’ notions of autonomy and academic freedom are being replaced by concerns with social accountability and market responsiveness in the new production of knowledge. The argument by Gibbons et al (1994) implies that mode 1 knowledge therefore is not necessarily relevant beyond the academic community.

At Makerere, the reform processes in the 90s unfolded under the banner of inter-disciplinarily and relevance (Mamdani 2007:43). Traditionally, relevance of engineering programs was judged

according to the appropriateness of the training to meet the needs of the government and wider public service. This has however changed, due to restructuring and the privatization of the economy in Uganda (Lugujjo 2010:215). Engineering programmes now have to respond positively and quickly to the demands of the marketplace and the industry, whilst at the same time produce graduates who can create jobs through fast adaptability and entrepreneurship (Lugujjo 2010:215).

The debate about university autonomy vs. relevance is not a new debate. According to Mamdani, there has been two camps. One side mobilized in defence of academic freedom, and the other calling for more engagement with knowledge relevant for social and political issues of the day (Mamdani 2018:30). But one can also question whether these camps really are conflicting. In line with the mode dichotomy, one could argue that the mode 1 is in accordance with the protection of the academic autonomy, while mode 2 is calling for more engagement with societal stakeholders. Yet, as Halvorsen argue, academic autonomy does not mean disciplinary isolation, but should rather involve a multitude of relations with society (2010a:239).

Paradox of Innovation and Relevance

Higgins (2016:52) argues that the most difficult reality for all those who wish to pay more than lip-service to enabling innovations, is that innovations so often emerges from the unintended consequences of research and enquiry, an argument in line with both Beckert (2016) and Trace (2016). He further argues that it is crucial to ensure that a portion of academic enquiry is devoted to pure, and non-instrumental research (Higgins 2016:52).

Halvorsen (2012:65) argues that the current trend at universities where innovations is viewed as the 'products' of research is the most valuable, is detrimental to the research university and that it breaks down the links between the faculties by a differentiation according to a competitive criterion, rather than building collegiality, through trust and cooperation (Halvorsen 2012:73). As collegiality, trust, and cooperation is undermined, this might lead to less creativity and a general loss of knowledge within the academic culture as a whole. Paradoxically, what was supposed to foster innovation, might turn out just opposite, and lead to less creativity and consequently less innovation.

In agreement with Collini, arguing that universities ideally should offer a form of resistance to the dominant values and practices in society, Skauge argues that universities should avoid a situation

where relevance in higher education becomes too relevant, because society not only need new instruments for achieving goals, but sometimes society also needs new goals to address (Collini 2012:25; Skauge 2005a:336). In order to come up with new goals, creativity is required and thus relevance for the current/established agenda is not necessarily the best way to address such aspirations. In Schumpeter´s terms, innovation is not a continuation of trajectories from the past, but a process of 'creative destruction', implying a departure from existing path. This process thus prerequisites creativity, and the instrumental orientation of knowledge to have immediate relevance, as in the mode 2 thinking, might prevent 'creative construction' (Schumpeter 2011:9).

Quality Assessment

Criterions of social and economic accountability are introduced in mode 2 as a measure of relevance of knowledge (Gibbons et al. 1994:168). This also introduces new questions for consideration, such as "will the solution be competitive in the market?" or "will it be cost effective?", replacing such mode 1 questions as "does this meet the standards for scientific research?" or "how does this match previous research in this area?". This focus on accountability and productivity brings further assumptions about how to make the university more efficiently, and such measures is closer to a mindset of economic rationality than to criteria of scientific research (Collini 2012:135). This transition where academics are asked not to formulate the questions, but answers, is opening up for a different role for the academics in the process of knowledge production. Instead of formulating research questions based on previous knowledge and scientific curiosity, they risk ending up acting as expert or consultants answering to pre-posed questions.

Socially Accountable Knowledge

While Gibbons et al. (1994) argues that the involvement of other stakeholders than academics makes the knowledge production process more socially accountable, it obviously challenges the autonomy of the academic in setting the research agenda as well as the development of curricula. The context of application brings about that the knowledge is always produced under an aspect of continuous negotiation, and will not be produced unless, and until the interests of the various actors are included in the process (Gibbons et al. 1994). Academic curiosity is no longer justifying the knowledge production, but a bargaining process among stakeholders will make up the principles for the research agenda and define what is relevant and useful to society. When the academics loses control of their definition of relevant knowledge, they also lose control of work autonomy and over

the priority-setting of what knowledge to search for or how they develop this knowledge. This way the negotiated research agenda challenges science as striving for knowledge production as 'truth-telling' aiming at serving the public and not vested interests in the economy or in politics.

By arguing that knowledge is relevant when it is socially accountable, one assumes that the relevance of scientific knowledge to society can be objectively given. In this view there is no perceptions of conflicting interests or unequal power relations among actors involved. What the industry, private businesses, government agencies, or civil society actors sees as relevant knowledge, is not necessarily concurrent with what an academics sees as relevant in the field of their discipline.

Transdisciplinary Knowledge

According to Gibbons et al. (1994), the mode 1 is disciplinary and takes place within the institutional department as an academic community, and therefore the knowledge is developed by, and largely for academics. Research in is mode 2 largely referred to in terms of solutions and outcomes. In mode 2 the shape of research is argued to be beyond that of any single contributing discipline, and is transdisciplinary. Transdisciplinarity in this meaning is not multidisciplinary or interdisciplinary which involves several academic disciplines, but "trans" - here denotes *across* or *beyond;* implying the involvement of other actors than academics. The main difference from the disciplinary research is argued to be that mode 2 involves a diverse range of specialists to work in teams on problems in a complex application-oriented environment, and not being limited to the academic disciplinary community (Gibbons et al. 1994:5). Transdisciplinarity involves a continuous linking and relinking, in specific clustering and configurations of knowledge which is brought together on a temporary basis in specific contexts of application. Thus, it is strongly oriented towards and driven by problem-solving (Gibbons et al. 1994:29).

As discussed, there are a number of challenges for the academics at SoE to be able to do research. As shown in the previous chapter a minority of the academics interviewed were currently involved in research. Among those who were involved in research, a majority of them reported that of the research projects were in collaborations with other universities outside Uganda. Still, the research was largely driven by academics. They would however like to see more partnerships with the industry, but many of the academics had challenges with reaching out to industries in Uganda.

Lack of Knowledge Demand

Arocena and Sutz (2010:574) argues that importing knowledge has been of paramount importance in every successful story of development, but the problem of knowledge for development could not be solved solely by importing knowledge. For knowledge to be developed locally, in the context of application, there is a need for a platform where the various actors can meet for mutual exchanges. The challenge for the engineers at Makerere seems to be that there is a lack of demand for their knowledge from the private sector. Several of the academics at SoE also argued that the Ugandan industry lacked an interest in scientific knowledge and therefore they would not engage with academics.

> "If you don't do innovations, people are not interested. So, technologic innovations can really affect the livelihood of people, and also the quality. People want something new, something different. Or to do, if it is a process and that can be beneficial to the industry, improve the, may be cheaper, energy saving, cleaner production." (I.16)

> "The approach from the third world is that people should have a product which is sellable, and then make money or create jobs, that's the thinking. That's why they are talking of basic research, you don't want things to be hanging in the library and all that. (…) ok you kind of do both. In the process of doing academic or science or whatever it is, your outputs should be spinoffs, should be ideas or whatever come out of that, then you say ok now I have a patent, now I have an innovation which can go out to industry (…) But from the African set point people are like, why should you be doing research for this, when actually we want things that can put food on the table. So, they'd rather have products, things which really works and gives quick results, than something than might never materialise in anything." (I.13)

A majority challenge for the industry, dominated by SMEs, have been access to bank loans due to the high interest rates (WB 2017). Shinyekwa et al (2016:208) argues that the government of Uganda should rethink its adoption of economic liberalism, and the private sector-led industrial development strategy, and rather coordinate industrial manufacturing and encourage foreign companies to partner with local industrialist and adhere to national targets and development aims (Shinyekwa 2016:208). This way the local businesses can grow and thus the demand for advanced engineering knowledge.

6.4. Donor Funding and Accountability

Financial and political support for higher education and research are generally considered crucial to any country´s development, and this support has become even more critical in recent decades, with the growing emphasis on creating "knowledge societies" (Hydén 2016:1). From the reforms in the 90s, Makerere University have received less funding from government. What Court (1999) argued would free the universities from being dependent on state funding, have led to a university dominated by and dependent upon donor funding for being able to conduct research. The role of donors plays a significant role in funding the research at the University. As shown, the donors tend to act or be treated more like stakeholders in knowledge production, than mere funders and facilitators. In many cases donors are not only facilitating for knowledge production through funding, but also involved in what knowledge is being produced and thus setting the terms for the research agenda.

Donors like SIDA, Norad and USAID are heavily supporting Makerere University through loans and grants for educational programs, infrastructure development, and research projects. Support through aid-programmes is a part of the donor's foreign policy, which requires reporting and results from the academics, and entails accountability towards the funding donor (Ziai 2014:9). Despite the commitment to ideals of participation and partnerships in bilateral programmes, there are structural elements in the donor-recipient relationship which prevent a symmetrical participation of all actors in the decision-making process. As Hydén argues, asymmetrical donor-partnerships have produced results at the cost of national development in the South (2016:22).

Several of CEDAT's donors have been funding projects and infrastructure development more than a decade, and the donor-recipient relation is reflected in the CEDAT strategic plan, where it is emphasised that the academic community must maintain and sustain "donor goodwill, to work hard to satisfy the donors and the stakeholders' requirements" (CEDAT 2011a:9). Many informants were critical to this funding structure, where donors to various degrees were determining the research topics, and thus setting the research agenda.

> "Then the, of course the overarching one [challenge] is that we have to rely on donor funding for research, as the university doesn't have this, and you don't get it from the industry. So, you have to write proposals to get money" (I.10)

> “It is rare that you initiate your own topic and look for funding, it [the topic] is usually within the funding.” (I.18)

Yet, as the alternative to this funding is not to be involved in any research at all, many agreed on those premises. It came with a cost, though, both in terms of university autonomy and academic freedom:

> "But I would not say that I have defined that research myself, it has been defined by somebody. Somebody has asked me if I’m interested in cooperating. I´ve looked at what they are proposing and if it fits within what I would like to do research on then I accept. So, I that way I wouldn’t really say that I define my own research purely, but I have an input to ignore if I’m not interested in it." (I.20)

Many of the academics at SoE were critical towards the conditions that followed with the donor funding, arguing that the funding were steering research priorities, not according to national development, but according to another set of research priority in accordance with the interests of the donors involved.

> “So, people will then go and look for projects which will not necessarily be solving these problems within our community, but more like ‘state of the at problem or another problem from another region where the funding is coming from” (I.7)

One of the academics at SoE were particularly concerned with the lack of local funding and national priorities in the research agenda, and argued that the donors were dominating in setting the research agenda towards global priorities over national, Ugandan interests.

> «Personally, I think there are global interests in certain areas. If I could think right now, I would say renewable energy, in the area of water and environment, in the area of health and safety, in the area of biomedical engineering, in the area of food security, and that is what seems to be driving most of the research (funding) that is coming to us. Now, the area of manufacturing I think is a local interest, for us to improve our GDP. For us to basically develop as a nation we need manufacturing. But, I think most of the funding, maybe 70%, does not come from Uganda. So, this is our interest, but I think that the government should fund the area of where its interests are, which are manufacturing (…) But most of our funding, even for our research, our PhD research, has not come from government. So, they have limited control of which direction it takes» (I.18)

The above quote reflects how the funding is favouring parts of the discipline which is of global interest, and thus disregard other parts of the discipline which they argue would be of importance for Uganda’s development. The commitment to global development aims have also been criticised

by Hydén, who argues that donor funding can have a negative impact upon national institutions´ capacity to take responsibility for own development in terms of national goals (Hydén 2016:22). Hydén argues that the youth unemployment crisis is one example that many African countries are facing, and that this is a result of the governments´ blind adherence to a set of global goals that have no productive relationship towards their own local economic and social realities (2016:26). He further criticises the donors´ excessive focus on priorities, like the MDGs or the current SDGs, because they risk undermining the long-term investments that is required for building scientific capacity (Hydén 2016:26).

Another challenge with the dominance of donor funding, as argued by the academics, was a lack of continuity. The funding structure facilitates research projects for a few years but does not ensure a continuity after the funding ends. This uncertainty is also a challenge for the academic to be creative or develop something that requires more time.

> «And another thing is that, normally when you are dealing with a project, something like maybe someone to three, four years, if these years elapse then you don't have any more financing to even go and monitor these activities. So, the lack of continuity of projects, also can be a problem. Well, I could say that is funding, because normally you write a project and it is, I mean as a project it has a certain limited duration. Maybe, by the time it ends you haven't got another one. Or you have got another one, but that is a different field. So, it becomes difficult to continue the same, along the same lines» (I.4)

According to Mazzucato, the importance of state funding for innovations have been under-communicated (Mazzucato 2015). She argues that a whole range of general-purpose technologies, which have themselves formed platforms for further technological innovations, came into existence primarily through government funded and government-led research and development (Mazzucato, 2015:96). By using the Apple products iPhone, iPod and iPad as examples, she argues that Apple, in fact is more *commercially* rather than *technically* innovative, through inventive recombination of existing and largely publicly funded technology R&D products. Her argument is that the products is not an invention made by Apple as a single actor but has been developed by access to technologies resulted from major government funded research programmes (Mazzucato 2015:96).

Mazzucato´s argument contradicts what the WB recommended Makerere in the early 90s, namely to reduce government funding in order to end the state dependency and 'hand-out' mentality' (Court 1999:8). Instead, Court argues that the reduced dependence on government had spread an

‘entrepreneurial ethos’ within and beyond the university, where autonomous initiative, planning and allocation were possible (1999:8). The reality for the academics at SoE however, seems to be quite different from the WB interpretations. The majority of the academics at SoE argued that they would like to receive more state funding of the university, both in order to secure national development priorities, but also for them to be able to plan for longer-term research.

> "In many cases is not like you go and buy sugar. You know, you can go and buy sugar, they tell you it is 5000 shillings in Ugandan money and you simply go and have the transaction, you give the money and you get the sugar. Everybody know that what you got is a standard product. When it comes to innovation, when it comes to finding solutions for the problems that communities have, it’s an iterative process. Which basically means a lot of money that is going to go outside, to waste, as much as you’d want to reduce that. But if you have a direct, that this funding is specifically for this and that the end of the day you are going to have an output, in a business sense that is ok. But in an education scenario, people wouldn’t even want to start if at the end of the day you’re going to tell them they are supposed to produce this [holding up a mobile phone], and yet they have to find out the ways of producing this which requires, where evidently there will be mistakes. So, at the end they shall produce a product that is 100$, if they have spent 400$. But now they can only account, so to speak, for the 100$ that is physically embedded in the product that they are producing. No one wants to do that." (I.18)

As the informant above argue, financing research and innovations goes beyond financing that particular end product. For the academics to be able to innovate, they must also be allowed to try and potentially also fail. In line with Beckert’s argumentation, the process of innovation is unpredictable and nonlinear (2016). The mode 2 logic, where knowledge is assumed to be produced in a context of application and where one instrumentally seeks a solution to a defined problem, there is no room for a messy, unpredictable process that might potentially leading to another discovery. As with other serendipities, the invention of the post-it note started with the 3M’s engineers aiming for a new glue recipe, but discovered that they substance they had made only by accident (Beckert 2016:72). Pragmatically, a “problem to the solution”, rather than the opposite, was found through a process of experimentation that led to the discovery of a use for the 3M’s new substance. Following the argument of Mazzucato, and if the government would actually want to fund innovations at the university, they must prioritize long-term research, allowing the academics to try and fail, and try again in order for them use both their knowledge and their creativity.

6.5. Back to the Starting Point: The Research Questions

From the categories in the typology it is possible to answer to the first of the three sub-questions raised initially; 'how do the academic themselves understand their role as academics at the university?'. The academics interviewed understood their role in various ways and emphasised different work in their relation to work both within and outside the University. From the typology, the identified four various categories of academics at the SoE; the Lecturer, the Researcher, the Consultant and the Entrepreneur. These categories reflect a variety among the academics in the way they spend their time and how they described their role as academics and illustrates the diversity of identities and orientations among the academics at the SoE.

The second sub-question was 'what are the conditions for research and knowledge production at the School of Engineering?'. As discussed, the conditions for research at SoE were described as challenging by the informants, for several reasons. Beyond practicalities, of outdated and poor laboratory equipment, the funding structure is argued to be one of the main obstructions for the academics to do research. In the era before the reductions of public funding during the reform processes in the 90s, Makerere used to be a government funded university. Today, most of the research at the College is funded by foreign donors, except from a few strategic projects funded through the PIST. Government funding is essentially to cover salaries for the university employees. Many of the informants were very critical of this structure, because in most cases the donors tend to have pre-defined areas and topics they fund. This leaves no room for the academics themselves to develop research projects based on what they consider relevant for the Ugandan context, neither for disciplinary or scholarly development nor to national, economic development. Many informants said they would want to prioritize differently if they could, i.e. different areas of the discipline. The structure of funding has direct implication for what knowledge is being prioritized and the academics have little saying in these priorities. Therefore, it is difficult for them to address the national challenges and the national development agenda in terms of local needs and problems.

The final sub-question was 'how do the academics consider the relevance of their knowledge to society and is there a demand for their knowledge?'. A few academics were in frequent contact with the industry. However, the academics expressed that they would like to see more partnerships with actors outside campus. Several of the informants argued that the dialogue was

missing because of the lack of interest in, or demand for scientific knowledge. As shown, the Ugandan industry is dominated by SMEs. While the small businesses lack capacity, both financially and in personnel, the foreign companies import machinery, spare parts and raw materials (Shinyekwa et al. 2016b:201). That situation translates into lack of knowledge demand, and this seems to be evident as a broader structural problem due to characteristics of the industry in Uganda. Even though the academics are identified as key actors for economic development in the national development plans, the broader societal links that this presuppose, are missing. This lack of societal links leaves the academics isolated at campus, not as in an 'ivory tower' that academics traditionally have been accused and criticised for, but unwillingly isolated due to lack of the necessary links to actors outside campus. As one informant put it: "we create our own problems and solve them" (I.16). The academics at SoE expressed a desire for more partnerships with the industry but argued that it was difficult for them to achieve this because the industry was not interested and did not demand scientific knowledge. For the academics to be relevant and be able to contribute they must have some sort of links to actors outside campus, which is not currently there. In order to change this, and thus create a local knowledge demand, Shinyekwa et al. argue that the Ugandan government should coordinate industrial manufacturing, by encouraging foreign companies to partner with local industrialist and adhere to national targets and development aims (Shineykwa et al. 2016:208).

7. Conclusion

7.1. Concluding Remarks

This thesis is case study of engineers at Makerere University in Uganda. In a broad sense the thesis has sought to explore the relationship between scientific knowledge and development in a low-income country. The research question for the thesis is 'how the engineers at Makerere University perceive the relevance of their knowledge to national development and industrialisation of Uganda?'. The research question is largely an empirically oriented research question, and thus the thesis has opened up for the informants to describe their own understanding of their role at the university and the relevance of their knowledge. This ethnographic approach, through the grounded theory analysis of interview data, separates the study from previous studies on the relation between higher education and society, which often have been more quantitatively oriented focusing on research output in terms of articles published. The focus on the academics as a distinctive actor within the university institutions have opened up for new perspectives and nuances, which a study of the university as an institution and academics across all colleges as one unanimous unit would not allow.

Overall, the engineers at SoE perceived their knowledge as relevant for the development and industrialization. However, the informants raised several challenges that made it difficult for them to 'reach out' with their knowledge to society. In a broad sense it appears that the political and economic conditions of Uganda, as a fundamental prerequisite for the 'knowledge society', does not seem to facilitate for, nor appreciate scientific knowledge, unless it is a strategic initiative from the President. In this concluding chapter I will link on to the research question, and present the main findings in those term.

7.2. Main Findings

The University and the Role of Academics

One finding from this work is the large variation among the academics in how they understand and fulfil their role at the university. Where previous studies have tended to treat academics as a

unanimous group, this study shows how a group of academics within the same college vary in motivations and aspirations. This differential shaping of the individual members of the academic profession shows that the academics within the university, through differing roles, are not given, but that there is a certain amount of space to shape this role for each academic.

While the academic profession is characterised by the control over the acquisition and application of knowledge within their field, this does not seem to be the case for the academics at SoE. As is evident from the discussion, acquisition and application of knowledge, hence research and usage, confined and restricted by factors beyond the control of the academics. Nor can one say that these academics control the recruitment of PhDs, as they are fully dependent upon available external project funding. What they are in control of is the reproduction of established knowledge, through lectures, student training and consultancy work. This makes the academics' ability to make their knowledge relevant, beyond the university campus, restricted. This lack of control of central aspect of the professions' working conditions is at odds with much of the literature on the professional. It even threats the very definition of a profession.

Modes of Knowledge Production and Funding

The lack of availability for funding is another factor, making research an unattainable activity. Even though many informants were critical towards the foreign donor funding and its conditions, such donors remain the largest funder for research at the university. Previous literature has well-documented the importance of donor funding at African Universities (Hydén 2016; Kasozi 2016). The priorities of the donors have a strong tendency to change, and therefore the challenge with this heavy reliance on donor funding is that it they are unpredictable and short-term. The sum of all the donors involved, results in a fragmented agenda with no clear, unambiguous direction for the country´s development. What this thesis also have shown, is how this funding have direct consequences for the knowledge being produced at the University, both in terms of prioritised areas and favoured disciplines, as well as for specific topics within the disciplines.

In terms of mode 1, some of the informants at SoE were involved in research, and among these, knowledge does not seem to be produced within the context of the academic community and its interest. In terms of mode 2, the academics are not in dialogue with relevant stakeholders, such as actors in the industry. On the question of whether knowledge production was carried out in the

context of scientific curiosity or a context of application, one informant argued that there was another third context: "I would like to add a third one. The third one, it is carried out on the basis of funding available" (I.18). This combination, of being dependent upon the availability of funding from donors, and at the same lack required links with the industry seem to force the academics to end up in an intermediate position, where knowledge is neither produced in the context of application, nor in the context of scientific interest and curiosity. As the quote above demonstrates, knowledge production, to the extent it takes place, are shaped by a set of criteria other those that has been conceptualized in mode 1 and mode 2.

The conceptual framework, with the modes of knowledge production have provided a useful framework for discussing the academics' role in, motivation for, and orientation towards knowledge production. Still, as discussed, the concepts also have clear limitations in this case of academics in a low-income country like Uganda. The concepts are characterized being developed based on universities located in industrialised economies, primarily in western Europe and the US. In the context of Uganda, with the absence of institutionalised links between industry and the universities, these concepts do not capture this social reality. Neither does the concepts take into consideration the unequal power-balance among the stakeholders, especially the international donors, in the production of knowledge.

Discrepancy Between Knowledge and Needs

With one exception, all of the informants at SoE had obtained their PhD from Universities outside Uganda, the majority from European countries and the US. According to Kasozi (2016:88), the lack of 'homegrown' African scholars has led to academics assuming that they can import knowledge and technologies from abroad, without any 'translation efforts'. Instead, he argues, scholars who have knowledge and experience of African conditions must produce 'African centred' knowledge, instead of importing concepts and models that are allegedly 'universal' (Kasozi 2016:88). At SoE, the informant's idea of development suggests that they have worked and lived on another continent, and thus their image of development in their home country seems to bear evidence of this. The Kiira EV is an illustrative example of an innovation where there could be argued to be a discrepancy between the knowledge produced at the university, and the needs on the grounds in the Ugandan society. The car, depictured in the introduction, is one example of a project from the SoE that illustrates this point. Stories about "the new face of Africa´s transport" make

sensational headlines in the media, both nationally and internationally. But in a country where 89% of the population does not have access to electricity, and only 4% of the total road network is paved, this priority might seem more of a symbolic value and shaped by an image of development imported from another societal context (Uganda Vision 2010:13).

Academics, Innovations and Implications for the University

Academics are identified as key actors in national, and global development agendas. In Uganda, there is a particular emphasis towards the STEM disciplines and the ability of these disciplines to solve the challenges of the country, and the Presidential Initiatives directly funds strategic research priorities at the College. As discussed, this illustrates a politicization of the research agenda, whereas the academics are left serving the priorities and projects set out by the government. Yet, there seems to be a discrepancy between the actual needs on the ground and the ideas and visions for development.

According to Court, the 'entrepreneurial ethos' spread among academics at the Makerere campus after the reduction in government funding during the reforms in the 90s (1999:8). The ideal of entrepreneurial, thus innovative, academics seems to have accelerated after these reforms as it is now also a part of student education to develop 'entrepreneurial skills' as shown in the master's degree programme at SoE (CEDAT 2011b). Initially I started this thesis with showing how the academics from the hard sciences have been promoted as key actors for economic development and industrialisation of Uganda, and that the university have received strategic funding under the PIST. Innovation seems to have become the overall goal for academics. This way academics have come to be seen as economic actors, not conducting research based on scientific criterions, but creating innovations in the terms of economic development, and therefore challenging their academic autonomy since they no longer formulate their own research questions.

As discussed in this thesis, the focus on innovations as the main outcome of higher education institutions reflects an instrumental understanding of knowledge production for development. This reduces the broader mandate of higher education and science institutions, to merely be an instrument for economic growth. As discussed, this linear understanding of innovations, as reflected in the mode 2 concept, is not taking the 'messiness' and uncertainties of the innovation process in consideration. Therefore, a linear, instrumental understanding of development and

industrialisation as a result of research could be argued to be unrealistic. These findings further lead up to the discussions about the so-called Market-led and the Developmental university. As argued by Mamdani, Makerere shifted the direction from being a developmental university, to a marked-oriented university during the reforms (2007). These reforms of the university went hand in glove with the reforms directed toward the economy (i.e. neo-liberal reforms enforced by the Bretton Wood organizations). The broader implications for the university seem tobe that all parts of the university, from student enrolment to scientific research, as well as in curricula development, is steered by the market-logic for short-term, economic growth considerations for and by the university. The university has itself become a part of the economy that is governed by the logic of the market, and not by a central, national strategy for development. In addition to this, the absence of a central, controlling units at the university counteracting this, has negative consequences for the University´s ability to prioritise for long-term national development.

7.3. Limitations and Further Research

There are certain aspects and limitations to this thesis that I would like to draw attention to and comment on. Firstly, one could argue that the research question for the thesis, formulated as 'how *they* perceive the relevance of their knowledge' is a highly subjective assessment. Yet, through this approach, I have been able to not merely answering 'yes' or 'no' to this research question, but to discuss the broader issues of how their educational background, the lack of societal links between academics and industry as well as the dominance of donor funding and conditions are steering the ability for the academics to define the relevance of their knowledge.

Another aspect of the thesis is the strong reliance on interview data. The primary source leaves the opinions and views of the academics as the only view reflected in this thesis. Yet, there would be useful to also include relevant actors from government agencies like members of UIPE, employees of UNCST or UNCHE or from the newly established MoSTI. These agencies could open up for different perspectives on the role of the academics and scientific knowledge in development.

According to Yakubu, the linking of innovation to national development capacity is largely a recent idea in the discourse of national development in most Sub-Saharan African countries (Yakubu 2017:2). Given the findings from this work, that the academics lack networks linking them to other

actors in the sector, it would be interesting to see if and how they are able to coordinate and link this sector in Uganda. For further studies, Uganda could therefore serve as an interesting case for further investigation, given that the country has adopted a national STI Policy, and recently has established a new Ministry to initiate and coordinate the sector in its development effort.

The role of the academics and higher education systems, its missions and structures differ according to their historical development, and current characteristics of higher education deal with recent trends and respond to new challenges (Enders 2007:6). This changing environment makes studying the academic profession, a study of an occupation in continuous development, adjusting, adapting but also resisting tendencies in society. Thus, the study of academics' role and relevance in national development, in any given country, opens up for further studies and will be an ongoing debate as long as universities exists.

8. Bibliography

Abbott, A. (1988) *The Systems of Professions. An Essay on the Division of Expert Labor*. US: University of Chicago Press.

Ajayi, J.F.A., Goma, L.K.M., & Johnson, G.A. (1996) *The African Experience with Higher Education.* The Association of African Universities. Accra: African Universities House.

Altbach, P. (2003) *The Decline of the Guru. The Academic Profession in Developing and Middle-Income Countries.* New York: Palgrave Macmillan.

Arocena, R. and Sutz, J. (2010) Weak Knowledge demand in the South Learning Divides and Innovation Policies*. Science and Public Policy*, 37 (8) October, p. 471-582.

Arocena, R., Göransson, B., and Sutz, J. (2014) Knowledge Policies and Universities in Developing Countries Inclusive Development and the "Developmental University". *Technology in Society,* 41, pp.10-20.

Assié-Lumumba, N.T. (2011) Higher Education as an African Public Sphere and the University as a Site of Resistance and Claim of Ownership for the National Project. *Africa Development* Vol. XXXVI (2), pp.175-206.

Bariyo, N. (2015) Africa Startup Plans Hybrid Car Line. *Wall Street Journal* [Internet], August 17. Available from: https://www.wsj.com/articles/african-startup-plans-hybrid-car-line-1439864479 [12.11.18]

Beckert, J. (2016) *Imagined Futures. Fictional Expectations and Capitalist Dynamics*. Cambridge, Massachusetts: Harvard University Press.

Biryabarema, E. (2018) Chinese-built expressway divides Uganda as debts mount. *Reuters*. [Internet], 31.01.2018. Available from: https://www.reuters.com/article/us-uganda-road/chinese-built-expressway-divides-uganda-as-debts-mount-idUSKBN1FK0V1 [25.10.18].

Bisaso, R. (2017) Makerere University as a Flagship Institution: Sustaining the Quest for Relevance. In: Teferra, D. (Ed.) *Flagship Universities in Africa*. Durban: Palgrave Macmillan.

Bleiklie, I. (2005) Academic Leadership and Emerging Knowledge Regimes. In: Bleiklie, I. and Henkel, M (eds.) *Governing Knowledge*. Netherlands: Springer.

Brandser, G.C. (2006) *Humboldt Revisited. The Institutional Drama of Academic Identity.* [Doctoral Dissertation] Bergen: University of Bergen.

CEDAT (n.d.) Historical Background*. College of Engineering, Design, Art and Technology.* [Internet]. Available from: https://cedat.mak.ac.ug/about-us/historical-background [17.10.18]

CEDAT (2011a) *Empowering CEDAT to Meet Emerging Development Challenges.* Strategic Plan 2011-2018. College of Engineering, Design, Art and Technology. Makerere University.

CEDAT (2011b) *Program for Master of Science in Technology Innovation and Industrial Development.* Department of Mechanical Engineering, School of Engineering, Makerere University. April.

Charmaz, K. and Belgrave, L.L. (2012) Qualitative Interviewing and Grounded Theory Analysis. *The SAGE Handbook of Interview Research.* 2nd Edition Thousand Oaks: SAGE Publications, pp. 347-366.

Clark, B.R. (1998) Creating Entrepreneurial Universities. Organizational Pathways of Transformation. *IAU Press.* Issues in Higher Education. New York: Pergamon Press.

Cloete, N., Muller, J., Makgoba, M.W., and Ekong, D. (1997) *Knowledge identity and curriculum transformation in Africa*. Cape Town: Maskew Miller Longman.

Cloete, N., Baliey, T., Pillay, P., Bunting, I., and Maassen, P. (2011) *Universities and Economic Development in Africa.* Centre for Higher Education Transformation. Cape Town: African Minds.

Cloete, N., Maassen, P., and Bailey, T. (2015) Knowledge production, contradictory functions in African higher education. *African Higher Education Dynamics Series.* Volume 1. Cape Town: African Minds.

Collini, S. (2012) *What are Universities for?* London: Penguin Books.

Coleman, J.S. (1984) The Idea of the Developmental University. In: Hetland, A (ed.) *Universities and National Development: A Report of the Nordic Associations for the Study of Education in Developing Countries.* Stockholm: Almqvist and Wiksell International, pp.85-104.

Court, D. (1999) *Financing Higher Education in Africa: Makerere, the Quiet Revolution.* Washington, D.C: The World Bank.

Duermeijer, C., Amir, M. and Schoombee, L. (2018) Africa generates less than 1% of the world´s research; data analysis can change that. *Elsevier* [Internet] Available from: https://www.elsevier.com/connect/africa-generates-less-than-1-of-the-worlds-research-data-analytics-can-change-that [09.11.18]

Egessa, H. (2016) Uganda: We must be told the truth about Kampala - Entebbe Expressway. *All Africa* [Internet], 30.12.16, Available from: https://allafrica.com/stories/201612300005.html [25.10.18]

Enders, J. (2007) The Academic Profession. In: Forest, J.F, and Altbach, P.G. (2007) International Handbook of Higher Education. Part 1. *Springer International Handbooks of Education.* Volume 18. Dordrecht: Springer, pp. 5-21.

Etzkowitz, H. (1983) Entrepreneurial Scientists and Entrepreneurial Universities in American Academic Science. *Minerva*, 21 (2/3) June, pp.198-233.

Etzkowitz, H. and Leydesdorff, L. (1998) The Triple Helix as a Model for Innovation Studies. Conference Report. *Science and Public Policy*, 25 (3) June, pp.195-203.

Etzkowitz, H., Webster, A., Gebhardt, C., and Terra, B.R.C. (2000) The Future of the University and the University of the Future: Evolution of Ivory Tower to Entrepreneurial Paradigm. *Research Policy,* 29, 2003, pp.313-330.

Etzkowitz, H. (2003) Research Groups as "Quasi-Firms": The Invention of the Entrepreneurial University. *Research Policy,* 32, 2003, pp. 109-121.

Fagerberg, J. (2006) Innovation: A guide to the literature. *Oxford Handbooks of Innovation*. Oxford: Oxford University Press.

Federici, S., Caffentzis, G., and Alidou, O. (2000) *A Thousand Flowers*. *Social Struggles*

Against Structural Adjustment in African Universities. Asmara: Africa World Press.
Flyvbjerg, B. (2006) Five Misunderstandings About Case-Study Research. *Qualitative Inquiry*, Vol.12, No.2. April 2006, pp. 219-245.
Fonn, S., Ayiro, P.L., Cotton, P., Habib, A., Mbithi, P.M.F., Mtenje, A., Nawangwe, B., Ogunbodede, E.O., Olayinka, Golooba-Mutebi, F. and Ezeh, A. (2018) Repositioning Africa in Global Knowledge Production. *The Lancet*, 392 (10153) September, pp. 163-165.
Frendreis, J.P. (1983) Explanation of Variation and Detection of Covariation. The Purpose and Logic of Comparative Analysis. *Comparative Political Studies*, 16 (2) July, pp. 255-272.
Gallie, W.B. (1956) Essentially Contested Concepts. *Proceedings of the Aristotelian Society*. New Series, Vol. 56 (1955-1956), pp. 167-198.
George, A.L. and Bennet, A. (2005) *Case Studies and Theory Development in the Social Sciences*. Cambridge, MA: MIT Press.
Gerring, J. (2002) *Case Study Research: Principles and Practices.* NY: Cambridge University Press.
Gerring, J. (2004) What is a Case Study and What is it good for? *American Political Science Review*. 98 (2) May, pp. 341-354.
Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., and Trow, M. (1994) *The New Production of Knowledge. The Dynamics of Science and Research in Contemporary Societies.* Sweden: Sage Publications.
Gibbons, M. (1998) *Higher Education Relevance in the 21st Century*. The World Bank. October 1998.
Halvorsen, T. and Skauge, T. (2004) Constructing Knowledge Societies? The World Bank and the New Lending Policy for Tertiary Education. *Journal of Higher Education in Africa*, 2 (3) pp.139-151.
Halvorsen, T., Mathisen, G. and Skauge, T. (2005) *Identity Formation or Knowledge Shopping Education and research in the new globality*. SUI Reports Series R3. Bergen: SIU.
Halvorsen, T. and Nyhagen, A (2005) *The Bologna Process and the Shaping of the Future Knowledge Societies.* Conference Report from the Third Conference on Knowledge and Politics, The University of Bergen May 18-20th 2005. Bergen: the Department of Administration and Organisation Theory, the Department of Sociology and Forum for University history at the University of Oslo, pp. 331-341.
Halvorsen, T. (2010a) Politics and Knowledge. The Interplay between the Research University, Democracy and Academic Freedom. In: Alemu, K, A., Halvorsen, T. and Mwiandi, M. (eds.) *Shaping Research Universities in the Nile Basin Countries.* Book 1. Kampala: Fountain Publishers, pp. 236-255.
Halvorsen, T. (2010b) Between Democracy and Dictatorship, Modernity and Tradition A Contribution to the Debate about the Research University in Africa. In: Alemu, K, A., Halvorsen, T. and Mwiandi, M. (eds.) *Shaping Research Universities in the Nile Basin Countries.* Book 2. Kampala: Fountain Publishers. pp. 210-223.
Halvorsen, T and Vale, P. (2012) *One World Many Knowledges.* Cape Town: African Minds, SANORD.

Halvorsen, T. and Nossum, J. (2016) North South Knowledge Networks. *Towards equitable collaborations between academics, donors and universities.* Cape Town: African Minds.

Halvorsen, T., Ibsen, H., Evans, H-C. and Penderis, S. (2017) *Knowledge for justice. Critical perspectives from southern African-Nordic research partnerships*. Cape Town: African Minds, SANORD.

Halvorsen, T. (2017 u.p.) *The Academic Profession*. [Unpublished manuscript] Department of Administration and Organization Theory, University of Bergen.

Hessels, L. K. and Van Lente, H. (2008) Re-thinking new knowledge production: A literature review and a research agenda. *Research Policy* 37, pp.740-760.

Higgins, J. (2016) The first philosophers were astronomers: Curiosity and innovation in higher education policy. In: Halvorsen, T and Nossum, J. (eds.) *North South Knowledge Networks. Towards equitable collaborations between academics, donors and universities*. Cape Town: African Minds, pp. 41-56.

Hydén, G. (2016) The role and impact of funding agencies on higher education and research for development. In: Halvorsen, T. and Nossum, J. (eds.) *North South Knowledge Networks. Towards equitable collaborations between academics, donors and universities*. Cape Town: African Minds, pp. 1-40.

Jansen, J.D. (2002) Mode 2 knowledge and institutional life: Taking Gibbons on a walk through a South African university. *Higher Education* 43: Netherlands: Kluwer Academic Publishers, pp. 507-521.

Jowitt, P. (2010) Engineering, innovation, social and economic development. In: UNESCO Report (2010) *Engineering: Issues, Challenges, and Opportunities for Development*. Paris: UNESCO Publishing, pp. 39-42.

Kagolo, F. (2011) Museveni pledges better pay for scientists. *New Vision*. [Internet], November 24. Available from: https://www.newvision.co.ug/new_vision/news/1003744/museveni-pledges-pay-scientists [17.10.18]

Kavuma, R.M. (2011) Uganda´s first electric car proves the potential of Africa´s universities. *The Guardian* [Internet], November 10. Available from: https://www.theguardian.com/global-development/poverty-matters/2011/nov/10/uganda-electric-car-education [12.11.18]

Kasozi, A.B.K. (2003) *University Education in Uganda. Challenges and Opportunities for Reform.* Kampala: Fountain Publishers.

Kasozi, A.B.K. (2016) The Status of Research at three Ugandan Universities. In: Halvorsen, T. and Nossum, J. (eds.) K*nowledge Networks. Towards equitable collaborations between academics, donors and universities*. African Minds: Cape Town, pp. 85-108.

Kasozi, A.B.K. (2018) in New Vision 21 March 2018, pp.28

Kearney, M.L. (2009) Higher Education, Research and Innovation: Charting the Course of the Changing Dynamics of the Knowledge Society. In: Meek, L., Teichler, U. and Kearney M.L. (eds.) *Higher Education, Research and Innovation: Changing Dynamics*. Germany: INCHER-Kassel, pp. 7-25.

Kiira (n.d.) *Our story.* [Internet]. Available from: http://kiiramotors.com/about-us/ [18.10.18]

King, G., Kehane, R. and Verba, S. (1994) *Designing Social Inquiry, Scientific Inference in Qualitative Research*. Princeton: Princeton University Press.

Koch, S. and Weingart, P. (2016) *The Delusion of Knowledge Transfer*. Cape Town: African Minds.
Kovacevic, M. (2011) *Review of HDI Critiques and Potential Improvements.* Human Development Research Paper 2010/33.
Kutesa, F., Tumusiime-Mutebile, E., Withworth, A. and Williamson, T. (2010) Uganda´s Economic Reforms. *Insider Accounts.* Oxford: Oxford University Press.
Leydesdorff, L. (2000) *The Triple Helix: An Evolutionary Model of Innovations.* Research Policy 29, 2000, pp. 243-255.
Lijphart, A. (1971) *Comparative Politics and the Comparative Method*. *American Political Science Review*, 65 (3), pp. 682-693
Lingärde, P. (2018) Sweden Remains the Largest Donor to Research Capacity in Uganda. *Daily Monitor.* [Internet], 02.11.18. Available from: http://www.monitor.co.ug/OpEd/Commentary/Sweden-remains-the-largest-donor-to-research-capacity-in-Uganda/689364-4832608-jr7ru/index.html [02.11.18]
Lugujjo, E. (2010) Uganda. In: UNESCO Report (2010) *Engineering: Issues, Challenges, and Opportunities for Development*. Paris: UNESCO Publishing, pp. 214-216.
Makerere (2008) Makerere University Strategic Plan 2008/09-2018/19. [Internet] Available from: https://pdd.mak.ac.ug/images/PDD_Docs/Makerere-University-Strategic-Plan2008-09-2018-19.pdf [08.10.18]
Makerere University Council (2009) *The Policy on Appointment and Promotion of Academic Staff as Reviewed and Approved by the University Council. (...)* [Internet]. Available from: https://policies.mak.ac.ug/policy/policy-appointment-and-promotions-academic-staff [09.10.18]
Makerere (2013) Presidential Initiative on Science and Technology Projects Annual Report FY 2012/13. [Internet] Available from: https://pdd.mak.ac.ug/docs/project-reports/PresidentialInitiativeProjectsAnnualReport2013.pdf [18.08.18]
Makerere (2016) African Center of Excellence in Materials, Product Development and Nano-Technology. Makerere University, African Centers of Excellence II. February.
Mamdani, M. (2007) *Scholars in the Marketplace*. *The Dilemmas of Neo-Liberal Reform at Makerere University, 1989-2005.* Dakar: CODESRIA.
Mamdani, M. (2017) The Importance of Research in a University. In: Ssempebwa, J., Neema-Abooki, P. and Musaazi, J.C.S. (eds.) *Innovating University Education. Issues in Contemporary African Higher Education.* Kampala: Fountain Publishers, pp. 85-98.
Mamdani, M. (2018) The African University. London Review of Books Vol. 40, No.14. July 2018.
Marjoram, T. and Zhong, Y. (2010) What engineering is, what engineers do. In: UNESCO Report (2010) *Engineering: Issues, Challenges, and Opportunities for Development*. Paris: UNESCO Publishing, pp. 24-26.
Marjoram, T. (2010) An Introduction to the organization of the profession. In UNESCO, 2010, In: UNESCO (2010). *Engineering: Issues, Challenges and Opportunities for Development*. Paris: UNESCO Publishing, pp.135-137.
Maxwell, J.A (2013) *Qualitative Research Design, An Interactive Approach.* US: Sage

Publications.
Mazzucato, M. (2015) *The Entrepreneurial State. Debunking Public vs. Private Sector Myths.* Revised Edition. US: Public Affairs.
Mittelman, J.H. (2018) *Implausible Dream. The World-Class University and Repurposing Higher Education.* New Jersey: Princeton University Press.
MoSTI (2017) *Ministerial Policy Statement. Financial Year 2917/2018*. Presented to Parliament for the Budget Debate by Dr. Elioda Tumwesigye, Minister of Science, Technology and Innovation. March [Internet] Available from: http://mosti.go.ug/sites/default/files/publication/2018/08/Ministerial%20Policy%20Statement%20for%20Science%20%26%20Tech%2017-18_0.pdf [18.08.18]
Musiige, G. and Maassen, P. (2015) Faculty Perceptions of the Factors that Influence Research Productivity at Makerere University. In: Cloete, N., Maassen, P. and Bailey, T. (eds.) *Knowledge Production and Contradictory Functions in African Higher Education*. Cape Town: African Minds, pp. 109-127.
Mokyr, J. (2002) *The Gifts of Athena. Historical Origins of the Knowledge Economy*. Princeton: Princeton University Press.
Moses, J.W. and Knutsen T.L. (2012) *Ways of Knowing. Competing Methodologies in Social and Political Research.* Second Edition. London: Palgrave Macmillan.
Mugerwa, Eric B. (2002) *Political Penetration and Primordial Attachment at Makerere University.* A Study of Organisational Effectiveness. MK Publishers Ltd. Kampala, Uganda.
Musisi, N.B. & Muwanga, N.K. (2003) *Makerere University in Transition 1993-2000*. Partnership for Higher Education in Africa. Fountain Publishers. Kampala, Uganda
Mutiba, P.M. (2016) *A History of Uganda. The first 100 years 1894-1995*. Kampala: Fountain Publishers.
MoFPED (2009) *National Science, Technology and Innovation Policy*. Ministry of Finance, Planning and Economic Development. August.
MoFPED (2012*) National Science, Technology and Innovation Plan 2012/2013 – 2017/2018.* Ministry of Finance, Planning and Economic Development. March.
Namubiru, L. (2018) Chinese contractors are going to keep dominating road construction in Uganda. *Quartz Africa.* [Internet], 13.07.18. Available from: https://qz.com/africa/1326618/china-is-building-expensive-roads-in-uganda/ [25.10.18]
Newman, C., Page, J., Rand, J., Shimeles, A., Söderbom, M. and Tarp, F., (2016a) *Made in Africa. Learning to Compete in Industry*. Washington, D.C: Brookings Institution Press.
Newman, C., Page, J., Rand., J., Shimeles, A., Söderbom, M. and Tarp, F. (2016b) *Manufacturing Transformation: Comparative Studies of Industrial Development in Africa and Emerging Asia.* United Nations University World Institute for Development Economics Research. UK: Oxford University Press.
NDP I (2010) *National Development Plan (2010/11-2014/15)* [Internet] April. Available from: http://npa.ug/wp-content/themes/npatheme/documents/NDP2.pdf
NDP II (2015) *Second National Development Plan 2015/16-2019/20.* [Internet] June. Available from: http://npa.ug/wp-content/uploads/NDPII-Final.pdf

Nowotny, H., Scott, P. and Gibbons, M. (2001) *Re-Thinking Science. Knowledge and the Public in an Age of Uncertainty.* UK: Polity Press.

Parsons, T. (1973) The American University. Cambridge: Harvard University Press.

Rathbun, B.C. (2008) *Interviewing and Qualitative Field Methods: Pragmatism and Practicalities*. The Oxford Handbook of Political Methodology. Oxford University Press.

Readings, B. (1996) *The University in Ruins*. Cambridge: Harvard University Press.

Rwendeire, A. (2017) *Bringing the Future to the Present.* The Report of the Visitation Committee on Makerere University, 2016. Presented to H.E. General Yoweri K. Museveni President of the Republic of Uganda and the Visitor to Public Universities. August. Kampala

Said, L.M. (2015) Could this start-up help prevent future fuel crisis in Africa? *CNN* [Internet], June 19. Available from:https://edition.cnn.com/2015/06/19/africa/tapera-alternative-energy-africa/index.html [12.11.18]

Samoff, J. and Carrol, B. (2003) From Manpower Planning to the Knowledge Era: World Bank Policies on Higher Education in Africa. *UNESCO Forum Occasional Paper Series.* Paper no.2, October. Stanford: Stanford University.

Scott, P. (1997) Changes in Knowledge Production and Dissemination in the Context of Globalisation. In: Cloete, N., Muller, J., Makgoba, M.W., and Ekong, D. (eds.) *Knowledge identity and curriculum transformation in Africa*. Cape Town: Maskew Miller Longman.

Shils, E. and Roberts, J. (2004) The Diffusion of European Models Outside Europe. In: Rüegg, W. (ed.) *A History of the University in Europe.* Volume 3. UK: Cambridge University Press, pp. 163-232.

Shinn, T. (2002) The Triple Helix and New Production of Knowledge: Pre-packaged thinking on science and technology. *Social Studies of Science,* 32 (4) pp. 199-614.

Shinyekwa, I., Kiiza, J., Hisali, E. and Obwona, M. (2016) The Evolution of Industry in Uganda. In: Newman, C., Page, J., Rand., J., Shimeles, A., Söderbom, M. and Tarp, F. (eds.) *Manufacturing Transformation: Comparative Studies of Industrial Development in Africa and Emerging Asia.* Chapter 10.

Schumpeter, J.A. (1976) *Capitalism, Socialism & Democracy.* Fifth Edition. New York: Routledge.

Schumpeter, J.A. (2011) *The Entrepreneur*. Edited by Becker, M., Knudsen, T. and Sveberg, R. California: Stanford University Press

Sicherman, C. (2006) *Becoming an African University, Makerere.* Kampala: Fountain Publishers.

Sicherman, C. (2008) Makerere`s Myths, Makerere`s History: A Retrospect. *Journal of Higher Education in Africa*, 1, pp. 11-39.

Skauge, T. (2005a) Is Relevance Relevant? In: Halvorsen, T. and Nyhagen, A. (eds.) *The Bologna Process and the Shaping of the Future Knowledge Societies.* Conference Report from the Third Conference on Knowledge and Politics, The University of Bergen May 18-20th 2005. Bergen: the Department of Administration and Organisation Theory, the Department of Sociology and Forum for University history at the University of Oslo, pp. 331-341.

Skauge, T. (2005b) NUFU Co-operation for Knowledge as an alternative to marginalization by market. In: Halvorsen, T., Mathisen, G. and Skauge, T. (eds.) *Identity formation or Knowledge Shopping. Education and research in the new globality*. SUI Reports Series R3. Bergen: SIU, pp. 329-357.

Ssekanga, K. And Garrett, R., M. (2005) Job Satisfaction of University Academics: Perceptions from Uganda. Springer. *Higher Education* 50, pp.33-56.

Ssekamwa, JC. (2000) *History and Development of Education in Uganda*. Kampala: Fountain Publishers.

Ssempebwa, J., Neema-Abooki, P. and Musaazi, J.C.S. (2017) *Innovating University Education. Issues in Contemporary African Higher Education.* Kampala: Fountain Publishers.

Ssekamwa, J.C. (1997) *History and Development of Education in Uganda*. Kampala: Fountain Publishers.

Stehr, N. (1994) *Knowledge Societies.* London: Sage Publications.

Stehr, N. (2012a) Knowledge. In: Ritzer, G. (ed.) *The Wiley Blackwell Encyclopaedia of Globalization.* Wiley Blackwell.

Stehr, N. (2012b) Knowledge Societies. In: Ritzer, G. (ed.) *The Wiley Blackwell Encyclopaedia of Globalization.* Wiley Blackwell.

Strauss, A. and Corbin, J. (1998) *Basics of Qualitative Research. Techniques and Procedures for Developing Grounded Theory*. Second Edition. Sage Publications. London, UK.

Tamale, S., Kabonesa, C., Mbazira, C., Ezati, B. and Mushengyezi, A. (2018) *Report on the investigation of sexual harassment at Makerere University.* [Internet], June. Available from: https://news.mak.ac.ug/sites/default/files/downloads/Makerere-Committee-Investigating-Sexual-Harassment-FINAL-Report-June2018.pdf [15.08.18]

Tavory, I. and Timmermans, S. (2009) Two Cases of Ethnography. Grounded Theory and Extended Case Method. *Ethnography* (10) 3, September, pp. 243-263.

Teferra, D. and Altbach, P.G. (2004) African Higher Education: Challenges for the 21st century. *Higher Education* 41, pp. 21-51.

Teferra, D. and Knight, J. (2008) *Higher Education in Africa: The international Dimension.* Accra: Association of African Universities.

Teferra, D. (2017) *Flagship Universities in Africa*. Germany: Springer Verlag.

Thiong'o, N. (1986) *Decolonizing the Mind. The Politics of Language in African Literature*. Nairobi: East African Educational Publishers.

Thompson, P. (2017) *To Leaders of Universities and other Higher Education Institutions around the World*. President of the UN General Assembly. [Internet] 24 May, Available from: https://www.iau-aiu.net/IMG/pdf/letter_un_2017.pdf [28.11.18]

Trace, S. (2016) *Rethink, Retool, Reboot. Technology as if people and planet mattered*. UK: Practical Action.

Tumushabe, A. (2013) Arts courses to blame for joblessness - Museveni. *Daily Monitor* [Internet], 19.08.13. Available from: http://www.monitor.co.ug/News/National/Arts-courses-to-blame-for-joblessness---Museveni/-/688334/1958856/-/kn5f0gz/-/index.html [18.10.18]

Todaro, M.P. and Smith, S.C. (2011) Economic Development. Eleventh Edition. Essex: Addison-Wesley.

Uganda Vision (2010) *Uganda Vision 2040*. National Planning Authority. [Internet]. Available from: http://npa.ug/wp-content/themes/npatheme/documents/vision2040.pdf [18.10.18]

UBOS (2016) *Uganda National Households Survey 2016/2017 Report*. [Internet] Available from: https://www.ubos.org/onlinefiles/uploads/ubos/pdf%20documents/UNHS_VI_2017_Version_I_%2027th_September_2017.pdf [15.11.18]

United Nations (2015) *Transforming our World: The 2030 Agenda for Sustainable Development.* Resolution 70/1 adopted by the UN General Assembly, September.

UNESCO (2005) *Towards Knowledge Societies*. UNESCO World Report. France: UNESCO Publishing.

UNESCO (2010) *Engineering: Issues, Challenges and Opportunities for Development*. [Internet] Available from: http://unesdoc.unesco.org/images/0018/001897/189753e.pdf [10.08.18]

Van Thiel, S. (2014) *Research Methods in Public Administration and Public Management*. New York: Routledge.

Watermayer, R. (2010) Engineers, technologists and technicians. In: UNESCO Report (2010) *Engineering: Issues, Challenges, and Opportunities for Development*. Paris: UNESCO Publishing, pp. 27-30.

Wandera, D. (2014) Arts Courses are useless - Museveni. *Daily Monitor* [Internet], 18.08.14. Available from: http://www.monitor.co.ug/News/National/Arts-courses-are-useless---Museveni/688334-2422052-8n0f9n/index.html [18.10.18]

Weingart, P. (1997) From "Finalization" to "Mode 2": Old Wine in New Bottles? *Social Science Information,* 36 (4). London: SAGE Publications.

Wight, D., Ahikire, J. and Kwesiga, J.C (2014) Consultancy Research as a barrier to strengthening social science research capacity in Uganda. *Social Science & Medicine,* September 116, pp. 32-40.

Whyte, M. and Whyte, S.R. (2016) Dilemmas of Knowledge Production in Ugandan Universities. In: Andersen, H.K., Madsen, M.L and Jensen, S. (eds.) *Higher Education and Capacity Building in Africa: The Geography and Power of Knowledge under Changing Conditions*. New York: Routledge, pp. 41-57.

World Bank (1999) *World Development Report 1998/99: Knowledge for Development*. Washington DC: Oxford University Press.

World Bank (2000) *Peril and Promise. Higher education in developing countries*. Washington, DC.

World Bank (2002) *Constructing Knowledge Societies: New Challenges for Tertiary Education.* The World Bank. Washington, D.C.

World Bank (2010) World Bank Research and Development expenditure (% of GDP) [Internet]. Available from: https://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS [11.10.18]

World Bank (2017a) New Country Classifications by income level 2017-2018. *World Bank Data Team* [Internet], 07.01.17. Available from: https://blogs.worldbank.org/opendata/new-country-classifications-income-level-2017-2018 [04.11.18]

World Bank (2017b) Uganda Economic Update Fact Sheet. *World Bank* [Internet], 08.02.18.

Available from: http://www.worldbank.org/en/news/feature/2017/02/08/uganda-economic-update-fact-sheet [17.10.08]

World Bank (2018) *World Development Reports.* [Internet] Available from: http://www.worldbank.org/en/publication/wdr/wdr-archive [20.01.18]

Yin, R.K. (2015) Case Studies. *International Encyclopaedia of the Social & Behavioural Sciences*, 2nd edition, Volume 3.

Yakubu, H. (2017) Higher Education for Innovation and Development. In: Ssempebwa, J., Neema-Abooki, P. and Musaazi, J.C.S. (2017) *Innovating University Education. Issues in Contemporary African Higher Education.* Kampala: Fountain Publishers, pp. 1-17.

Zeleza, P.T. and Olukoshi, A.O. (2004) *African Universities in the Twenty-first Century. Liberalisation and Internationalisation.* Senegal: CODESIRA.

Ziai, A. (2014) Progressing Towards Incoherence: Development Discourse Since the 1980s. *Momentum Quarterly*, 3 (1) pp. 3-14.

Zink, E (2016) Research training, international collaboration, and the agencies of Ugandan scientists in Uganda. In: Halvorsen, T. and Nossum, J. (eds.) *North-South Knowledge Networks. Towards equitable collaboration between academics, donors and universities.* Cape Town: African Minds, pp. 57-83.

9. Appendices

9.1. Appendix 1: Uganda Vision 2040 Targets

Complete 'Table 2.1, Baseline Status and Vision Targets' (Uganda Vision 2040 2010:13-15)

Development Indicator		**Baseline Status 2010**	**Target 2040**
Per capita income (USD)		506	9500
Percentage of population below the poverty line		24.5	5
Income distribution (GINI Coefficient)		0.43	0.32
Sectoral composition of GDP (%)	Agriculture	22.4	10.4
	Industry	26.4	31.4
	Services	51.2	58.2
Labour force distribution in line with sectoral contribution (%)	Agriculture	65.6	31
	Industry	7.6	26
	Services	26.8	43
% share of national labor force employed		70.9	94
Manufactured exports as a percentage of total exports		4.2	50
Gross capital formation as % of GDP		24.1	30
Saving as a % of GDP		14.5	35
ICT goods & services as % of total export		0	40
Technology up-take & diffusion (Technology Achievement Index (TAI))		0.24	0.50
Public expenditure as a % share of R&D to GDP		0.1	2.5
Innovations as measured by patents registered per year		3	6000
Electricity consumption (kWh per capita)		75	3668
% of population with access to electricity		11	80
Water consumption (m^3 per capita)		26	600
% population with access to safe piped water		4	80
% of standard paved roads to total network		4	80
% of cargo freight on rail to total freight		3.5	80
% of population in planned settlements	Urban	51	100
	Rural	0	100
% level of urbanization		13	60
Labour productivity (GDP per worker – USD)	Agriculture	390	6,790
	Industry	3,550	24,820
	Services	1,830	25,513
	Total	1,017	19,770
Life expectancy at birth (years)		51.5	85
Infant mortality rate per 1000 live births		63	4
Maternal mortality rate per 100,000 live births		438	15
Under 5 mortality rate per 1000		96	8
Child stunting as a % of under 5s		33	0
Literacy rate (%)		73	95
Gender Related Development Index (GDI)		0.51	0.90
Population growth rate		3.2	2.4
Forest Cover (% land area)		15	24
Wetland cover - % of total area		8	13
Corruption Perception Index		2.5	7.1

9.2. Appendix 2: Interview Guide

Part 1

1. Could you please tell me about your educational background and previous work experience?
2. Can you give a description of a typical working week?
3. Are you able to prioritize research? (Of your interest? If not, why? (time, money etc) Would you like to prioritize research more?)
4. How much, and what kind of interactions do you have with students? (Do you like your job as a teacher? How important is teaching for you in your role as a professor? Do you think you are valued enough for your teaching efforts?)
5. Are you involved in the PhD education at this department?
6. What was your last publication/chapter/article/work?
7. How is your relation to the administration?
8. What forum of influence is the most important for you as an academic? How and to what degree are you participating in such forums?
9. Are you in regular contact with academics outside Makerere, in Uganda or from countries?
10. Are you familiar with professor Mamdani and his book "Scholars in the Marketplace"? In this book, he has some suggestions for Makerere. Do you think they are still relevant, and if what are your thoughts on these suggestions?
    a. Remove vocational programs from campus
    b. Find a consensus in politics and society for the funding of a "research university"
    c. That research must be an integral part (component) of higher education.
    d. That the funding of students must be based on the idea that higher education is a pubic good
    e. That privatization leading to commercialization – which may be contradictory to the university as a public good – must be stopped.
11. Mamdani also argues that there is a need for expanding vocational education, but that this is best done by setting up a string of community-based colleges across the country, because vocational education does not need a campus setting. What is your take on this?

Part II

12. How do you make your academic work relevant by relating to other disciplines?
    E.g. to actors outside campus, to the general public (articles in newspaper, etc), consultancy work, commissioned research, by direct contact with people in industry, bureaucracy or otherwise)
12. How do you try to make your work, and knowledge relevant? (For example, by how you teach your students, curriculum development, the structuring of relation between education and work, reform of the system of higher education and learning)
13. How is the process of deciding the curriculum at this department? (Who are involved?)
14. Have you experienced a conflict/mismatch between what the students want to learn, and what is being taught? Are there any possibilities for students to communicate their view on the curriculum?
15. What kind of teaching methods do you use in your classes? (theoretical, practical lab etc).

a. Ideally, would you have carried out your classes differently? (If yes why, and how?)

16. In general, do you know which sector your graduated students are working? Public or private?
17. Are the graduate students employed by the university, private companies, public sector, international companies, internationally, self-employment or others? How is the labour-market for Ugandan engineers? Are many engineers unemployed for a long time after they have graduated?
18. In his book, Mamdani refers to a World Bank estimate (from 2005) that Uganda, among several African countries, will experience that a quarter to almost half of the college-educated nationals will move to OECD countries. This estimation is over ten years old, do you still see this as a concern? Do you believe this is a concern for your discipline?
19. Are you involved in multi-disciplinary research, or collaborations with other departments or colleges at Makerere?
20. What about other engineering schools/institutes outside Makerere? i.e. in research, education, other*?* How?
21. Have you been or are you in regular contact with other academic professionals, in networks outside Makerere? Like UIPE or others? International organizations?
22. How do you as a professor consider the importance of technologic innovation (vs. basic research) in your discipline? How, why?
    a. Who represents in your view the main driving forces behind this innovation? (academics at Makerere, organizations outside Makerere, society demands, students, other?)
    b. Do you think that the education is arranged in a way that allows this? Would you say the research you are involved in (at this department) is relevant to society? In what way? Do you have examples?
23. Who would you say is the main driver behind your research; your own academic interests, other academics at Makerere, private companies, government/political demands, international donors or others?
24. How do you see your and role at Makerere, and in relation to society, compared to for example colleagues at social sciences or humanities, or other sciences?
25. What would you do with your roles as a professor, and with your university organization to secure more relevance in society of your knowledge?
26. Is there anything you would like to add?

9.3. Appendix 3: Informants at School of Engineering

(N=20)	College (Department)	Position	Age	Gender	Bachelor's Degree (Country)	Master's Degree, (Country)	PhD (Country)	Date of Interview
I.1	Civil and Environmental Engineering	Lecturer	40	M	Uganda	Belgium	UK	10.10.2016
I.2	Civil and Environmental Engineering	Senior Lecturer	59	M	Ukraine/Russia (USSR)	Russia	Russia	17.10.2016 01.11.2017
I.3	Civil and Environmental Engineering	Senior Lecturer	58	M	Zambia	Ireland	France	18.10.2016
I.4	Civil and Environmental Engineering	Lecturer	45	M	Uganda	Uganda	Uganda	02.11.2017
I.5	Civil and Environmental Engineering	Lecturer	41	M	Uganda	Uganda	South Africa	14.11.2017
I.6	Civil and Environmental Engineering	Senior Lecturer	45	M	Uganda	UK	UK	19.10.2016
I.7	Electrical and Computer Engineering	Lecturer	-	M	Uganda	UK	UK	14.10.2016
I.8	Electrical and Computer Engineering	Senior Lecturer	37	M	Uganda	Uganda and Sweden	Uganda and Norway	14.10.2016
I.9	Electrical and Computer Engineering	Senior Lecturer	48	F	Uganda	US	Canada	19.10.2016
I.10	Electrical and Computer Engineering	Ass. Professor	-	M	(unknown)	(unknown)	Uganda and Sweden	19.10.2016
I.11	Electrical and Computer Engineering	Lecturer	40	M	US	US	US	13.10.2016
I.12	Electrical and Computer Engineering	Lecturer	35	M	UK	UK	Uganda and Sweden	13.10.2016
I.13	Electrical and Computer Engineering	Lecturer	-	F	Uganda	South Africa	South Africa	01.11.2017
I.14	Mechanical Engineering	Senior Lecturer	60	M	Turkey	Turkey	South Africa	11.10.2016
I.15	Mechanical Engineering	Ass. Professor	58	M	Uganda	Turkey	US	12.10.2016
I.16	Mechanical Engineering	Ass. Professor	45	M	Uganda	Uganda	Sweden	19.10.2016
I.17	Mechanical Engineering	Ass. Professor	63	M	Uganda	Australia	Australia	21.10.2016
I.18	Mechanical Engineering	Lecturer	-	F	Uganda	Uganda	UK	31.10.2017
I.19	Mechanical Engineering	Lecturer	-	M	Uganda	India	*	01.11.2017
I.20	Mechanical Engineering	Senior Lecturer	-	M	Uganda	Uganda	Sweden	03.11.2017

* This informant had not completed a PhD.

9.4. Appendix 4: Initial Coding Scheme

Code	Description of Code	Informant	N=20
		I.1	**I.2, I.3, …, I.20.**
Department		Civil and Environmental Engineering	
Title		Lecturer	
Age		40	
Gender		M	
Education	*Bachelor (Country, year of graduation*)	Uganda 2000	
	Master (Country, year of graduation	Belgium 2004	
	PhD (Country, year of graduation	UK, 2010	
Started working at Makerere		2000	
Everyday work	*What the informants reports as their work in a typical work week at the University*	"Normally I come in every day and I tend to have about 6 hours of teaching, 3 hours for the undergrads and 3 hours for the grads, but also 2 hours for the postgrads."	
Research	*How the informants report their involvement in research currently or recently. Also, their involvement in setting the research agenda*	"When it comes to research its normally personal, cause you intend not to react so easily or understand so what you are doing and it could be very disturbing. (...) The research is more of a personal. Not so much administration, mostly teaching."	
Consultancy work	*To what extent the informant is involved in consultancy work. If also, what are the motivations behind this.*	"We also look at consultancies as another source of incoming, cause many can come to you have developed a dam over here, what should they do, how should they design it, and develop (…) At the same time you also look at additional funds for your own, private research. As mainly consultancies I would say, not research as such. Because guys can come to you with a project they want to develop, and they want you to participate and design for them and of course you have to be willing to. The faculty is not related to this, but they are ok with it. Everyone does it at the university because, what they pay us is not as good enough as it should be. It's a matter of something extra. You actually have to work some extra, you can´t do without."	
Industry	*How the informant describes the department/university´s relation and links to the industry. Also, industrial training for students and relation to industry through this training.*	"Yeah, there are other engineers and actually they support us a lot because they can come in with their project, and you can help them, join them for 2-3 months and you get something extra. And most of them who have been to European countries, they know the relevance of employing academics because they will bring them something of content. Compared to bringing someone who has been in the field fulltime. Yeah, so it helps a lot. And most of them are open minded, they are willing to open up to us and. Tell you 'I´m stuck here, can you help' and so on."	

Job Market for Students	*To what extent the informant believed that graduates or students have to move abroad to get relevant work. Is brain drain a challenge? Unemployment?*	"It's extensively relevant, and most of our students are all employed. So, this is very good for us in engineering. Especially in water and those topics. They are mainly employed by the ministries of works, traffic and transportation, and the ministry of water. So, yes they are mainly employed by the public." "We also have that but they are mainly looking for more advanced, like masters and phd levels. Not the ones that have just quitted out the bachelors. So, most of these private institutions look out for high (…) phd students mainly. But most get jobs in the public sector." "Most of us who leave Uganda to study, would never return. But also, it is about performance. When you tend to leave Uganda, you tend to perform much better than any other in other countries. I mean if you are in Europe, say Norway or Sweden, we tend to perform a lot better than these other guys coming from other countries. You kind of preform better when you go outside. And I would say that most of us who return, it's just a big passion for our country, and we want to come back to do something for your country. You could feel that if you wanted to leave you kind of fail the water system in my case, so I´ve tried to come back and. I feel like a responsibility, to come back and yes to return. I´ve been responsible enough to come back."	
PhD Candidates	*How, if, the informants are involved in the PhD recruitment at the department, and how the training of the candidate is at the department.*	"We try to create, I try myself a lot to emphasise that we can have phd programmes. The challenge is the funds. Personally, I show them a lot of what to do, and how to. But very few are here, most of us who gets opportunities tend to go away. We do not have many phd students no. I would say one or two, and they are also some in the sandwich programme, they are here and half of the time on the other." "Our students are very very good, simply because, even because in Uganda itself its very challenging in terms of academics in Africa. We have the fourth ranking in Africa, as Makerere which is very interesting. So, you find that we are very very aggressive with our academics. But the most challenging part is when you finish the bachelor course, getting masters and phd is challenging because we don't have funds or programmes supporting this, and that kind degrades our students. Funding is the main problem, otherwise we have the rise, our students are very capable of going out, I would say I´ve taken out maybe 10 students to phd level after here, but they are there they are always on the top of, even the lecturers is always they´re kind of thanking me for bringing the students to them. They are doing very well. But I think because we are emphasising our standards and that kind of gives them the toughness in their academics."	

Relevance of Knowledge	*To what extent the informants experiences that their knowledge is of relevance to society. Also what they would do/change to become more relevant (Graduates gets work, in relation to national development plans, societal needs)*	[For higher education to benefit society] "Increase the public funding, or the (…) the government should look for funds, so that also the university education is free. So, that it can generate funds from elsewhere to run the universities. Either from business community or from taxes, from a special tax for education, that would be very good. Especially for tertiary education. So that tertiary education is free. Then more people would get access and then the staff can be better payed." "So you find that most people are not as informed as those in muk. And again, those who get a contract for consultancy for example, they are scared of coming to muk cause they are sure that at muk the guys are very expensive, that they have to employ. And that's a big mistake that we tend to think about."	
Motivation	*What the informants reports as encouraging or discouraging in their work at the university. The reason for the informants actions, desires and needs. From within and external. Promotion, outreach to/impact on society etc.*	"I´ve written a lot. I have quite a number of them that I have published. This is my own research, that I have done beside the teaching. I try to be as aggressive in my academics. And mainly that is because of promotion, to get promoted you have to publish 3 every year, from teaching assistant to lecturer to associate professor, and then to professor. My ambition is to become a professor." "I enjoy it so much [role as a teacher], because I´ve been here long and I´ve got so much experience. Outside Uganda, I´ve published a lot and I find it very grateful. Cause my school, it wasn't a very high ranking school in Uganda. So, when I came in the university, they were like are you from this school and you've come for engineering, how come, how do you manage and so on."	
Academic Network	*Academic network both within Makerere, Uganda, African, but also in Europe, US etc. Network can be an indicator of active academic engagement in the field, beyond teaching. No network might indicate that most work is completed within the department/university*	"Yeah I do. Like, there are many that I am writing papers which are mainly outside Uganda. Because they know much more, and you can come in here I am the only expert in water. If you want someone that is better than you and publish much more. They always help us to do work together. Cause they are interested in looking at, what´s happening in Africa, how challenging is it, how can you develop it. I would say Europe and American academics are most relevant, simply because of the advancement in their research. When they publish, they are doing a lot, a lot, a lot.." "Here it is working. But outside it's a bit difficult, because you´ll find a project which is about structure engineering and once it´s there they can´t tell you much (…). Natural sciences/physics would be relevant, but they would not relate comfortably with us. Simply because we tend to know more than them because they are more like... We go beyond the practical side of it, we apply in the field, we are more an applied science. But for them they are more theoretical in the lab and that's all.	

Challenges	*What kind of challenges does the informants meet in fulfilling their expectations at the university, both from the university itself but also form the government through NDPs*	In the university I have campaigned to have weekly presentations within the university, from different disciplines in the university every Thursday or Friday in the main hall, and present what they are doing, to share what we know. But it is still not working out. But I´ve seen that in Imperial College, so I'm like, why not share the same kind of... But again, it is not easy for people to accept..."	
Culture	*How the academic describes the culture among the academics at the University*	"We could open up to each other, it would be good for our development. But we tend to be closed to each other, even within the university itself. Someone who is in food science up there [pointing towards CAES building] he could have a water project, they wouldn't call you who is a water expert 'can you come and help me', they would kind of hide everything. Because they want to keep everything to themselves. And then you find yourself that you are going out there, you interviewing him again on what he did and like you should have told me you are doing this, we could have done more. So the cooperation between the colleges is limited." "And opening up to us is another big challenge. And also, that is draining us a lot, because it would be much higher. If we were to open up to each other, and kind of relate comfortably."	
Curricula	*How is it developed? Who takes part?*	We sit as a group, I my case I even look at curriculum from outside like in British colleges and so on. I would say it is what helps us preform much better because I tend to look at Boston university, what the curriculum is like, what it is not like, how can I have them. In my computer, I have a lot of notes from different universities, but I pick out what I think is of extreme relevance to our nation.	
Facilities/ Infrastructure	*Infrastructure and facilities at University*	"For example, our lab down here, the machinery has been there for over 40 years, we don't have anything new. And that is also not a very good idea. We need a more modern equipment I would say. A good example would be, if you go to the field you have no gps on you, we don't have a gps system which is modern. But you have it here [referring to his iPhone 6 plus]. So, it's a bit of a disturbing situation."	

9.5. Appendix 5: Information Letter

UNIVERSITY OF BERGEN
UiB Global

Bergen 06. September 2016

To whom it may concern

Makerere Institute of Social Research (MISR) has been awarded a NORHED project funded by the Norwegian agency for development aid (NORAD). At Makerere there are a number of such projects devoted to support for higher education and development. These projects are led by academics at Makerere, but they all also have Norwegian partners. Most projects also have a research component the two partners work jointly to deliver results from.

The NORHED project at MISR is called: *Building and reflecting on Interdisciplinary PhD Studies for Higher Education*. Much of the support for the project is to build a high-quality PhD program. As the title show, the purpose of the program is also to reflect on how one should secure the recruitment to the academic profession. Thus, some of the project funding set aside for theoretical reflections and empirical studies of how PhD works in relation to the broader social structure of the academic profession at MISR. What are the conditions at Makerere for the future after-growth of the academic profession, and how does the academic profession conceive of itself as the responsible actor securing the quality of this after-growth?

In connection with the NORHED project at MISR a group of scholars from the University of Bergen will visit Makerere to work on the Norwegian part of the project. The focus of this project is to study "The academic profession and its identity at Makerere". The hypothesis is that the identity of professors and scholars, what we call the academic profession, will have an influence on how the profession tries to secure its continued recruitment through the PhDs. In other words; we want to map under what conditions, with what support and with what future PhDs are being educated by the established academic profession. To do this we need to study the academic profession itself, to understand its identity, at Makerere, and in relation to both the broader community of academics as well as to different actors of society.

To do this we have selected a number of departments where we hope to interview academics (professors and professors to be). These are:

1) The department of Political Science and Public Administration (disciplines: Politics, Public administration)
2) Department of Sociology and Anthropology
3) Department of Law and Jurisprudence
4) The Department of History, Archaeology and Organizational Studies

The interviews at these departments will be conducted by UiB Master student Andrea Kronstad Felde (andreakronstadfelde@gmail.com).

Further:
4) College of engineering, design art and technology, emphasizing the different departments of engineering.

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5) College of Natural Science, emphasizing department of chemistry, geology and engineering.
6) College of computing and information sciences, emphasizing department of information technology.

These interviews will be conducted by UiB Master student Anja Myrtveit (anja.myrtveit@gmail.com).

Further:
6) College of Agriculture and Environment with about equal emphasis on a) the School of Agricultural Science, b) The School of Forestry, Environment and Geographical Sciences c) the School of Food Technology, Nutrition and Bioengineering.

These interviews will be conducted by PhD candidate Reidar Øygard (reidar.oygard@uib.no).

Further:
Interview with academics in positons of academic leadership, firs of all
7) The Senate
8) Leaders at College level
9) Deans

Such interviews will be conducted by Associate Professor Tor Halvorsen (tor.halvorsen@uib.no).

All of the 4 researchers belong to the research center University of Bergen Global (UiB Global). Their academic background is Politics and Administration. Tor Halvorsen is the responsible contact to the MISR NORHED project at the University of Bergen.

Coordinator at the Makerere – Bergen collaboration office, Margaret Kyakuwa (PhD), is research assistant and local organizer of the field work. (margaretkyakuwa@yahoo.com).

We do hope we will be well received and that those of you who take time to be interviewed find it rewarding despite being pressed for time and under heavy workloads.

We will ask for permission to record the interviews. This is entirely voluntary and will not be done if somebody decline our request. At any time, before, during or after the interview you can withdraw your consent. If after, the recording that contains information that can directly or indirectly identify you, will be deleted. The recording will be available only for the research group and will be stored and used with confidentiality. When the project is ended, estimated to June 2019, the material (recordings and transcripts) will be anonymized.

UiB Global expresses its hope that they will be well received and are given the best of opportunity to pursue their research according to expectations.

Best regards,

Tore Sætersdal
Head of Department UiB Global
University of Bergen