# On the Road to the Knowledge Economy

An analysis of the case of Mozambique in the Introduction of Knowledge and Skills as a Foundation of Economic Growth

**Louise Friis Pedersen**
**01-12-2008**

**On the Road to the Knowledge Economy**

An analysis of the case of Mozambique in the Introduction of Knowledge and Skills as a foundation for Economic Growth

*By:*

Louise Friis Pedersen
Development and International Relations
Aalborg University

**Abstract**

The dominance of the global knowledge economy is posing an increasingly higher pressure on the developing nations to adapt to new development paradigm where knowledge and skills constitute the basis for economic growth. Whereas natural resources and low labour costs no longer are regarded as sufficient to maintain sustainable economic development, it is argued that the transformation to a knowledge-based society is a prerequisite for countries that want to maintain comparative advantages. This has lead many developing countries to adapt the discourse of the knowledge economy to their development strategies. The question on how poor developing countries can match these highly westernized doctrines with their own reality and doing it with a successful outcome does however remain.

Based on the case of Mozambique, this thesis does an attempt to identify the major constraints that an African developing country meets in the adaption to the knowledge economy. This is done by analysing the adaption- readiness of two main agents of change, namely the system of higher education and the private sector. The study shows a range of severe internal limitations of the two agents and a serious gap between the human recourses and knowledge produced in the system of higher education and the needs of the private sector. It furthermore shows that Mozambican institutions are characterized by a highly conservative culture, where knowledge-sharing and collaboration is being regarded as the exception rather than the norm. It is therefore argued that Mozambique foremost needs to strengthen the functioning of the knowledge producing and consuming agents and their mutual interconnectedness before the initiatives presented in knowledge and innovation-based strategies can be successfully realised.

# Index

## Acronyms and Abbreviations

| | |
|---|---|
| CAT: | Credit Accumulation Transfer |
| CFPE: | Centro de Formação Profissional Electrotécnica |
| FDI: | Foreign Direct Investment |
| GDP: | Gross Domestic Product |
| GoM: | Government of Mozambique |
| HE: | Higher Education |
| HEIs: | Higher Education Institutions |
| HR: | Human Resource |
| HRM: | Human Resource Management |
| ICT: | Information and Communication Technology |
| IFTRAB: | Inquérito Integrado à Força de Trabalho |
| IMF: | International Monetary Fund |
| INE: | Instituto Nacional De Estatística |
| INEFP: | National Institute for Employment and Vocational Training |
| IPPCTs: | Public Scientific and Technological Research Institutes |
| IS: | Innovation Systems |
| KE: | Knowledge Economy |
| MIC : | Ministry of Industry and Commerce |
| MOSTIS: | Mozambique Science, Technology and Innovation Strategy |
| NSI: | National Systems of Innovation |
| OECD: | Organization for Economic Co-operation and Development |
| PARPA: | Action Plan for Reduction of Poverty |
| PBL : | Problem Based Learning |
| PEES: | Strategic Plan for Higher Education |
| PhD: | Doctor of Philosophy |
| PIREP: | Integrated Vocational Education Reform Programme |
| PRE | Economic Rehabilitation Plan |
| QNAC: | Quality Assurance and Accreditation System |
| R&D: | Research and Development |
| S&T: | Science and Technology |
| SADC: | Southern African Development Community |
| SMEs: | Small and Medium Enterprises |
| STI: | Science, Technology and Innovation |
| TVET: | Technical and Vocational Education and Training |
| UEM: | Universidade Eduardo Mondlane |
| UP: | Universidade Pedagógica |
| WB: | World Bank |
| WBI: | World Bank Institute |

# Tables and Figures

## Tables



## Figures

# 1. Introduction

Changes in the nature of the global economy and the convergent impacts of globalization are altering the type of input that drives competitiveness of nations towards an increasingly stronger focus on the impact of knowledge and technology. Consequently it is assessed that a country's capacity to create wealth depends less on natural resources and more on the capacity to transform and add value to resources. In other words, does it depend on capabilities in science, technology and innovation. Knowledge is now recognized as the driver of productivity and economic growth and from this steams the concept of the 'knowledge economy' (KE) (OECD 1996: 3).

For a developing country, this points to the need of adopting new methods to follow the global economics trends in order to increase competitiveness. Thus, for many African economies, these changes have significant impact whereas they for the most part are relying on production of primary material and natural resources. In the context of African countries, there is a growing recognition that a transition into modern economies needs the involvement of substantial investment and a focus on the role of knowledge as a basis for development weather human, social or economic (Dahms & Stentoft 2008:13, Juma & Agwara 2006: 219, Salmi 2006:32, Kuruvilla & Chua 2000:12, Lall 2001:129).

An important key to participation in the global knowledge economy (KE) is the development of human resources for increasing skills and competence of workers and for the production of scientific knowledge (Peters 2001:1). As the main actor in the construction of human resources and knowledge, this gives a renewed role to the system of education:

> *"The role of education in general, and of tertiary education in particular, is now more influential than ever in the construction of knowledge economies and democratic societies. Tertiary education is indeed central to the creation of the intellectual capacity on which knowledge production and utilization depend and to the promotion of the lifelong-learning practices necessary for updating people's knowledge and skills."* (World Bank 2002:1)

With this increased attention, the African system of tertiary education faces the challenge of redefining its role in order to respond to the changing character of the global knowledge economy. According to the World Banks Africa Action Plan for 2006-2008, this includes gaining the capacity to use global knowledge in science and technology, the capability to asses existing information and generate new understanding thought research as well as a closer relationship with the economy's productive sectors (Bloom et al 2006:i).

In Mozambique, one of the world's poorest countries that rank number 172nd out of 177 countries on the human development index (HDI), there has been an increased acknowledgement of the importance of science, technology and the creation of adequate human resources (HDI 2007/2008). This is outlined in the country's 'Action Plan for Reduction of Poverty' (PARPA) where the key element for overcoming poverty is economic growth achieved through public investment in human capital and productive infrastructure and institutional reform to improve the climate for private investment (WB 2004:1). With respect to the issues of knowledge and human resource development the matters have received increased attention in the PARPA I (2001-2005) to PARPA II (2006-2009). PARPA I (2001-2005) states that "Without a doubt, knowledge is an indispensable means for improving the living conditions of Man. Education is also essential for rapid growth, as it expands the quantity and quality of human capital available for productive activities, and the ability of the nation to absorb new technologies." (GoM 2001:3) while PARPA II further increases the attention to especially science and technology (S&T): "Through S&T, new knowledge can be generated to provide solutions for many aspects of poverty, and the (existing or new) knowledge can be applied to intractable problems that cause or perpetuate poverty. A failure to build S&T into a poverty reduction strategy will as a minimum impair its performance—if not utterly ruin its effectiveness". (GoM 2006:63)

Mozambique has taken some important steps to carry out these incentives from the PARPA both with respect to science, technology and higher education and attempts thereby to cope with the challenges of the dynamics of the knowledge economy. The question on how or if a poor developing country like Mozambique can manage to match these highly westernized doctrines with its own reality and doing it with a successful outcome does however remain. To explore this question, it is essential foremost to identify the main obstacles for adaption as well as to analyze the producers and users of knowledge and skills.

*What are the main obstacles for introducing knowledge and skills as the foundation for economic growth in line with the currents of the knowledge economy and what role does the system of higher education play in this process?*

## 2. Methodology

With point of departure in the problem statement, the thesis aims to explore the main obstacles for a developing country's adaption to the knowledge economy. Through the case of Mozambique, this is done by focusing on one of the main players in this process, namely the system of higher education and its articulation with the productive sector.

By operating on the basis of the notion of the 'knowledge economy'(KE), the thesis adapts the argument that the global economy is experiencing a period of radical change and that the relationship between economy and knowledge is altering in both quantitative and qualitative terms, which underlines the importance of focusing on knowledge and learning in relation to economic development (Abramovitz & David 1996:35).To this follows that developing countries must take the necessary steps to transform their economy to the principles outlined in KE in order to maintain economic development. The supporting argument is that traditional developing country export products are losing value and that it is no longer considered competitively sustainable merely to rely on cheap labor and natural resources (Juma & Agwara 2006: 219).

The concept of the knowledge economy is thus applied as an ideal type to which developing countries must aspire. It must in this context be underlined that it is *not* the purpose of the thesis to discuss the validity of this claim. The hypothesis builds on the argument that national economies in the leading Western countries is increasingly based on knowledge and information which acknowledges knowledge as the driver of productivity and development (OECD 1996:3, World Bank 2002:7, Salmi 2006.32, Dahms & Stentoft 2008:13).

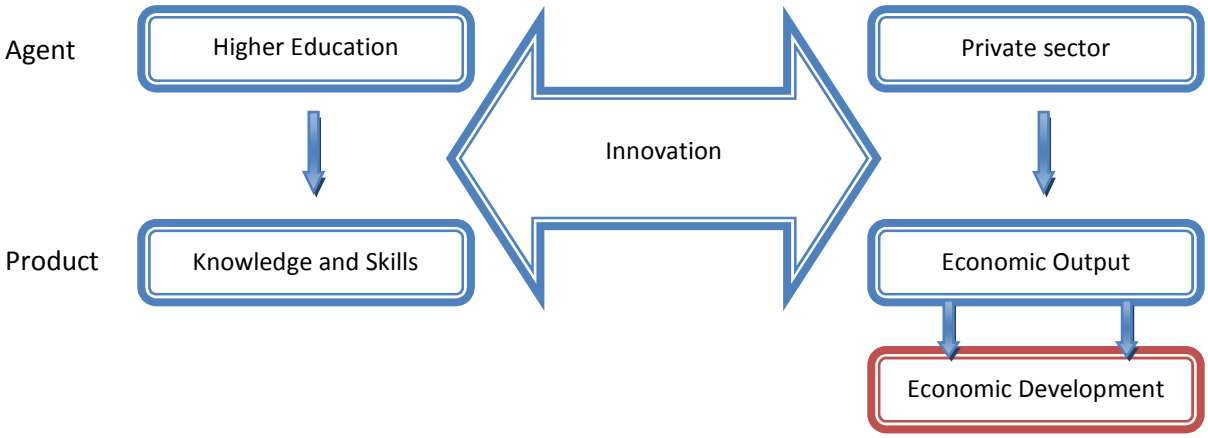
As the major knowledge and skills producing agent, the system of higher education is estimated as a key player in the transition to the knowledge economy. This is because a main objective of developing countries in the aim for economic growth is assumed to be the development of knowledge and human resources that can respond to the demands from the economic change (Kuruvilla & Chua 2000:12, Lall 2001:129). The concentration is on the skill development function of higher education whereas it is estimated as a superior necessity in a developing country as Mozambique with an urgent need for skilled workers. Knowledge production will however also be included.

Higher education can however not alone create economic development. As Romer (1986, 1990) highlights in the premises of his growth model[1], does the market play an essential role in the tprocess of concerting new knowledge into goods with practical value. It is thus crucial with a strong private sector that can transform knowledge and skills to exchangeable economic output (Dahlman 2007:3). The process of applying knowledge to the economy is named 'innovation' and has in the context of the knowledge economy gained recognition as a leading factor in economic development (Lundvall , Muchie & Gammeltoft 2003:2). The framework for facilitating this process

[1] More on this in theory chapter 3

will therefore also be treated. Due to the limited scope of the thesis there will not be focus on the role of the public sector, although recognizing that it is also relevant to the innovation process.
The underlying assumption of the thesis that constitutes the connection between higher education, innovation, private sector and economic development is illustrated in figure 2.1

**Figure 2.1:**
**Connection between Higher Education, Innovation, Private Sector and Economic Development**




The thesis will be carried out within the framework provided by approaches of the knowledge economy and explored through the following research questions

A) What initiatives have Mozambique taken within in order to improve Mozambique's responsiveness to the knowledge economy?
B) What are the major knowledge and skills needs of the private sector and how are they produced in the HE system?
C) What are the major obstacles in the synergy between the skills and knowledge production of the HE system and the needs of the private sector?

## 2.1 Theoretical Framework

The theory chapter has two functions: To give a background perspective on the knowledge economy and to provide a set of analytic tools on which the analysis will be based. The can be divided into two blocks:

The *first* block gives an overview over the theoretical background of the role of human resources in economic development and the concept of the knowledge economy. It thereby captures the

essence of the theoretical reasoning that underlies the thesis and underpins key features of the theories to support the empirical data. In relation to the theories on human resources, it is important to notice that the thesis uses the terms of human capital as be comparable with human resources and human capabilities. This emerges as a result of an inconsequent use of the different terms in the literature.

The examination of the characteristics of the knowledge economy will include studies of 'endogenous growth theory' or 'new growth theory' in which the theories of the knowledge economy are embedded. Also will the conceptual framework of knowledge and learning be treated including a definition of knowledge, and theories on its production, use and distribution as well as an understanding of its role in the economy.

The *second block* deals with the role of the system of higher education in the economy and seeks to explore how the institutions of higher education actively can take part in the knowledge economy. It also treats the theories of 'national systems of innovation' (NSI) by treating the system in which the process of innovation is embedded and thereby adds a systemic perspective to the analysis. The NSI present an image on how higher education ideally should be linked with other actors of the innovation system in order to foster an innovative economy that has the capacity to respond to the trends of the global knowledge economy. This is further highlighted in the triple helix model, which will also be addressed.

## 2.2 Empirical Data

The analysis will be conducted on the basis of both primary and secondary empirical data. With this combination the study will be based on multiple sources of evidence which creates a better fundament for the argumentation. Furthermore, it is estimated that nor primary neither secondary data alone would be able to provide sufficient information to answer the problem statement properly.

The secondary data will primarily be used to establish background understanding of the Mozambican situation. It will therefore concentrate on the history and development of the system of higher education, the characteristic of the private sector and the labor market.

The primary data collection was carried out through a field study to Mozambique. The main purpose of this data is to investigate the embeddedness and articulation of the HE system in the Mozambican society by exploring the connections and responsiveness between the main actor groups of the innovation system. The emphasis is put on the relations between the HE system and the private sector.

The data collection carried out during the field study consists of reports and statistics provided by approached institutions and organizations as well as qualitative interviews with stakeholders within the groups of the system of innovation (Dahlman 2007).

Interviews have a semi-structured character, which ensures the answers of key questions, while allowing for spontaneous and in-depth elaborations of other issues (Kvale 2008:129). This method

was chosen instead of for instance questionnaires for several reasons. A main cause is that the purpose of the interview also is to gather information which is unknown beforehand and to give space to personal point of views of the interviewed person in order to collect as many different perspectives as possible. Moreover, it is estimated that the semi-structured interview is the most appropriate way to get around too many misunderstandings caused by cultural differences. For this reasons, the interviews was also carried out in Portuguese so the interviewed person not should be limited in expressing his or hers opining because of the language. The interviews were recorded and notes where taken to underline main points. A short summary can be found in the list of interviews in appendix VI.

Geographically, the interviews were carried out in the capital of Maputo while it is the place in the country with the strongest representation HEIs, relevant governmental intuitions and private sector representatives. This choice will naturally not draw a complete picture of the situation in Mozambique, but will to a higher degree treat the frontiers of the country. The ideal would have been to carry out field studies from different provinces of the country to give a more balanced picture, this was however not possible with the limited time available for field studies.

The interviewed people were chosen on the basis of Dahlman's (2007) grouping of actors in the national system of innovation:

1. Institutions of higher education: Universities, polytechnic schools, research institutions. The interviews with this group will primarily seek to uncover the constraints the HEIs face to comply with the new challenges. It is also the incentive to uncover the relations of the HEIs with the other actors of the innovation system.
2. Government institutions: Ministry of Education and Culture (MEC), Ministry of Science and Technology (MCT) and the Ministry of Labour. Interviews with this group seek to map the activities and initiatives on the side of the government with relation innovation and the development and use of knowledge and skills.
3. Private sector: Non governmental organisations of interest of Industry. This group is relevant to the thesis in order to understand the private sector's view upon the skills and knowledge of graduates as well as the system of higher education in general, but also to get an idea about the constraints that the sector meets in fostering innovation and development.
4. Other stakeholders: This group includes agents such as bi-and multilateral donors, NGOs and expert interviews. The interviews conducted with this thematic group give 'an outsider's' point of view on the Mozambican situation.

Common for all interviews is that they seek to answer questions concerning all three research questions, although the emphasis naturally will be differently divided depending on the kind of information the informant is able to provide.

The empirical data collected during the field study will be analyzed according to the analytical framework and discussed in relation to the theories treated in the theoretical chapter.

## 2.3 Analysis Structure

The analysis is structured around the supply and demand side of knowledge and human resources in the scope of the problem statement. The focus is on the articulation between the two sides. Thus, the analysis will be divided in two main sectors treating respectively the matters of the private sector and to higher education. Furthermore will be a chapter dedicated to policy initiatives aiming at strengthening the position of the country in matters related to the knowledge economy. This covers research question A. The policies will be discussed according to theory and along the analysis where relevant. Research question B and C will be addressed in the two main parts of the analysis.

The *first* part of the analysis has the purpose of highlighting the characteristic of the Mozambican economy, the private sector and the labour market. As it is assumed in this thesis that it is private sector that transform knowledge, ideas and skills into economic asset (Dahlman 2007:3), it is important to understand its character, as well as its potential and weaknesses. Candidates of higher education remain of limited value to the economy if there is no capacity in the private sector to both absorb the highly skilled human resources and make efficient use of their expertise for innovation. It is therefore relevant to include the conditions of the private sector in the analysis whereas is it estimated that a good business environment will enforce the innovation process as well as the demand for highly skilled people and new knowledge (Ndulu 2004:16). The private sector also plays an important role as a key representative of the demand side for human resources. It is furthermore important to investigate the character of the labour market to understand under which conditions the articulation between the HE system and the private sector functions.
Thus, the main subjects that will be treated in the first part of the analysis will be:

1. The economy
2. The private sector and the business environment
3. The labour market
4. Skills and knowledge needs

The *second* part of the analysis concentrates on the HE system which practically contributes to development through two areas; the production of human resources and the production of knowledge. Both areas will be addressed in the analysis and compared to skills and knowledge needs identified in the first part. In relation to the functioning of the HE system it is essential to understand its history and composition as well as the enabling environment and institutional setting in which it operates and that are dominant to its performance conditions. Influential factors such as the articulation of the HE system with the rest of the education system, including the technical and vocational education and training (TVET), relevance and quality of candidates, HIV/AIDS and human capital flight will therefore be included in the analysis.

The central themes treated in the second part of the analysis will be

1. The system of higher education
2. Quality and relevance of production of human resources and knowledge
3. The enabling environment and external factors

## 2.4 Reliability and Validity

According to Kvale (2008) reliability relates to the consistency of the results and validity concerns the degree to which the researcher actually studies, what is expressed as intended (Kvale 2008:95,231-32, Bjereld 1999:102).

In the assessment on the validity of the research results, it is central to evaluate the empirical data on which the analysis is based. For this thesis is used both secondary and primary empirical data.
In all, the reliability of the primary data must be estimated as relative. Doing field work in a limited period of time does not always give the possibility to interview all stakeholders of interest, whereas the right people not always are easy to find or to get in contact with. This must especially be emphasized in the case of Mozambique, where it often requires inside knowledge and a broad personal network to get in contact with people of relevance. The group of interviewed stakeholders does therefore not correspond completely to the ideal, but it is however assessed as being representative enough to the scope of the thesis. Moreover, the objectivity of the information gathered through interviews is highly depended on the character of the person interviewed. In relation to some interviews it was the impression that many things where being kept unsaid or that answers were not being expressed fully according to the truth. To counterbalance for this aspect, statements were questioned in different interviews. An important aspect of the validity of the statements is that there was a relatively common consensus on many aspects treated in the interviews and that many of the interviewed persons independently claimed the same statements. This is a very important feature in the assessment of the validity for the collected data (Kvale 2008:180).
The application of secondary data on Mozambique intends to compensate for the relative lack of reliability in the primary data as well adding more detailed information especially in form of statistical data. The documents used for secondary data are from a broad range of authors such as bilateral and multilateral agents and government institutions such as strategies and reforms as well as statistical data and reports. The documents are in general assessed as of high quality and the diversity of authors and nature of data act in accordance with the multifaceted and holistic approach that the thesis tends to adopt.
The combination of diversified secondary and primary data leads to the conclusion that the overall picture of the applied data can be categorized as reliable.

Concerning the matter of reliability, it is estimated that the problem statement has been answered to the expected degree. The problem statement is answered as a general estimation of the constraints of Mozambique for becoming a player in the global knowledge economy and the role of the system of higher education in this challenge. It can thus be said that the problem statement calls for a more vague answer in the form of an assessment of the Mozambican case and not a uniform response. However, as the analysis is based on a strong fundament of data which in general terms points in the same direction, it must be estimated that this emphasizes the validity of the final estimations.

## 3. Human Resources and Economic Development

This chapter has the purpose of providing a brief overview over some of the economic thinking that forms the fundament to the ideas on which the knowledge economy is based. It covers fundamental ideas on the role of human capital in economic growth, describes the weaknesses of the approach but also underlines why the argument that skills is important to economic growth can set the framework for the thesis.

During the last couple of decades growth has become more and more dependent on the capacity of the economy to create knowledge, human capital and innovation capabilities (Romer 1990, Abdelkader 2003). The debate on human capital's role in economic development has however been dominant in the literature on economic theories for many years. In fact, Dosi (1996) argues that economic theory in an abstract sense always has been about interdependencies in knowledge-intensive systems (Dosi 1996:81). The fundamental idea of human capital proposes that an individual who invest in education or training and thereby gains supplementary knowledge and skills often are associated with improved likelihood of occupation accomplishments and economic success. In broad terms, human capital refers to the skills, knowledge and abilities of an individual that can be profitable on labour market (Strayhorn 2008:31)

While both trade theories and economic growth theories recognize the importance of human resource development in competitiveness, there are several different ways of explaining the theoretical reasoning behind the postulate. It is not the purpose here to go through the whole body of literature on the matter; however a quick outline is relevant in providing a framework for understanding why it is important to engage in the subject of human resource development for Mozambique's socioeconomic development.

A significant author on this matter is Romer (1986, 1990) who presents a growth model where long-run growth is driven by the accumulation of knowledge which is assumed to be an input in production that has increasing marginal productivity. His argument is established on three premises. The *first* premise draws several lines of conformity with the Solow's (1956) model[2] and assumes that technological change provides incentive for capital accumulation and therefore is central to economic growth. The *second* premise highlights that the market plays an essential role in the process of converting new knowledge into goods with practical value. This is because technological change to a large extend occurs due to action taken by people who responds to market incentive. In relation to this it is however important to notice that this does not mean that everyone who contribute to technical change are driven by market incentives. The *third* and according to Romer (1990) the most important premise, emphasizes that instructions

[2] The Solow growth model is a model of long-run economic growth within the scope of neoclassical economics. It is also known as the 'Exogenous growth model' or the 'Neo-classical growth model'. It works with different kind of capital and assumes that new capital is more valuable than old capital whereas capital is produced on the base of technology and because technology is improving. For more information, see Solow (1956)

(knowledge) for working with raw material are inherently different from other economic goods whereas they can be reused over and over again with no additional costs (Romer 1990: 72).
These premises are not only worth mentioning in order to understand Romer's model, they are also relevant whereas they appear in implicitly in many approaches of knowledge in economic growth.
While the main implications for the studies by Romer and other scholars such as Azariadis and Drazen (1991) and Stokey (1991) are that investments in human capital are crucial for economic growth, other scholars link human capital investment to foreign trade (Wood (1994) and Godfrey (1997)) and a third set of scholars such as Koike (1996) and Kuruvilla (1996) relate skill development to general levels of development, not through trade, but through foreign investment and argues that nations with plentiful stock of skills will attract greater foreign investment (Kuruvilla & Chua 2000:13-14).
Regardless the consensus in the literature on the importance of human resources, there is a lack of empirical findings to support this perception. Kuruvilla & Chua (2000) points to two major factors that demonstrate the problems of supporting the theories with empirical studies. The *first* is conceptual and points to fact that even thought theories agree on the importance of human resources in economic development, there are several examples of countries and regions with poor economic performance despite high investment in skills as for instance the Philippines and Sri Lanka. These examples can easily lead to the postulation that development in human resources tends to follow economic growth rather than leading it. The *second* is empirical and is largely rooted in the problems of measuring human resource development. In many studies, human resource accumulation is equated with education, however human resource development involves much more than basic education (Kuruvilla & Chua 2000:14).
Despite of the weaknesses of lack of empirical examples supporting the theories on human resources essentialness to economic growth, the importance of knowledge and skills is so widely accepted as a vital determinant of competitiveness that it is considered a valid assumption to constitute the fundamental presumption of this thesis. Furthermore, the new growth theories and the knowledge economy add another dimension of arguments to the matter as will be explained in the following section.

## 4. The Knowledge Economy

The dominance of a global knowledge-based economy is, as previously stated, a presumption of this thesis, for which reason it is essential to establish an understanding on the premises of the discourse of the knowledge economy. The chapter gives an example on how the structure of the KE can be viewed, how the concept can be interpreted and in which theoretical framework it is rooted.

The concept of the 'knowledge economy' is embedded in the discourse of the New Growth Theory

that seeks to establish an understanding of the current turn away from a resource-based economy to a knowledge-based economy. As in opposition to the theories mentioned above, New Growth Theory does not only recognize the importance of knowledge and human capital to economic growth, it goes a step further and points to knowledge as the main driver of growth and states that the process which creates and diffuse new knowledge is critical in determining the economic development of communities, nations and firms. New Growth Theory is also called 'endogenous growth theory', because it includes technology into a model of how markets function in opposition to traditional models of growth as the one by Solow (1956) that adds knowledge as an exogenous factor. Where knowledge and technological progress previously was considered a product of non-market forces or barely taken for given, it is in New Growth Theory regarded as a product of economic activity (Cortright 2001:2 Conceição & Heitor 1999:41.42). It is thus important to understand in which way knowledge differs from ordinary commodities and how it interferes in the knowledge economy, whereas as argued by Stiglitz (1999), these differences have essential implications for the ways a knowledge economy should be organized and consequently, fundamental implications for public policy (Stiglitz 1999:8).

There is a great variation in the conceptualizations of the 'knowledge economy' though many focus merely on information and communication technology (ICT) or high technology. Smith (2000) has identified four broad approaches on how the concept is put forward in the literature.
The first approach is constituted on the belief that knowledge is quantitatively and to some point qualitatively more important than before as an input to production. The second builds on the idea that knowledge is in some way more important as a product than it has been hitherto and that there in relation to that appears new forms of economic activities based on the trading of knowledge products. The third approach adapts the view that codified knowledge to some extend is more important as a component of economically- relevant knowledge bases. Lastly, the fourth basic approach embraces those who argue that the knowledge economy rests on technological change in ICT whereas these changes also alter both psychical constraints and costs in the collection and dissemination of information (Smith 2000:4-5).

Another approach to the knowledge economy emerges with the focus on learning which by Lundvall (1992) is identified as the most important process in the knowledge economy (Lundvall 1992:1). He argues that what is really new in the current economic development is rather the speed of learning and forgetting than the actual use of knowledge. In this perspective emerges the concept of the 'learning economy', which emphasizes that the success of organizations and countries today is not only reflected in the accumulated knowledge they hold at a specific moment, but the capability to learn (Lundvall et. al. 2003:6). The fundament of this argument rests on the recognition of an acceleration of the speed of technical and economic change. This means that the life cycle of new products becomes shorter and that new production processes are diffused much more rapid than before. As a consequence, access to specific knowledge becomes less important to economic success while the ability to rapidly acquiring new competences

becomes the key to achievement (Lundvall 2006: 4). An illustration of this tendency can be found in a German study that estimates that the 'halving time' of what have been learned in the education system is in average eight years after graduation, while the time decreases in more specialized areas to merely three years to only one years for computer engineers (Ministry of Education 1998:56).

As a result of the varieties of conceptualizations of the KE, there is a general lack of clear definitions of the term of the knowledge economy in the literature. As argued by Smith (2000) the notion is more often used as a widely-used metaphor rather than a exact concept ( Smith 2000:3). An example of the problem clear definitions can be found in the notion used by OECD that defines knowledge economies as "economies which are directly based on the production, distribution and use of knowledge and information" (OECD 1996:7). As all economies to some extend are based on knowledge, this definition seems to cover both everything and nothing and at the same time it is hard to imagine an economy that it directly based on knowledge if this refers to the production and distribution of knowledge.

In the analysis of the African context it is however also important not to make use of a too narrow definition. The idea of using the concept in this thesis is to identify a direction in which the economic outlook is moving, that developing countries also are recommended to follow. Not necessarily to draw a clear picture on a specific kind of society that must be reached. For this reason this thesis will adapt a broad definition, which states that "*A Knowledge Economy is one that creates, acquires, adapts, and uses knowledge effectively for its economic and social development"* (WBI 2004). An example on what such economy is constructed will be presented in the following section.

The lack of clear definitions is not the only weakness of the concept of the knowledge economy. Another disadvantage relates to the lack of empirical evidence on human resource's importance to economic development as previously mentioned. This leads Smith (2000) to question whether the obvious point that knowledge accumulates over time and that it changes the quality and quantity of output is sufficient to state the claim that we are in the era of a new knowledge-economy. However, he also adds that this does not mean that the aspect of knowledge is without importance and he still believes that knowledge is at the core of the economic process (Smith 2000:9).

Although research on the knowledge economy mostly relies on models based on examples from developed countries, Kuruvilla & Chua (2000) argue that human resource development is relevant for both developed and developing economies. By quoting Streeck (1988) they stress that given that the comparative advantage of advanced nations is embedded in technological innovation and capabilities, high skills are the only route through which developed countries can sustain themselves but also to developing countries, upgrading high skills becomes relevant whereas their comparative advantage of low labour costs rapidly erodes (Kuruvilla & Chua 2000:12). In agreement with this argument, Lall (2001) adds that there is no other way to improve competitiveness than raising skills. He argues that it is only possible for a short period to enhance

competitiveness by relying on cheap and unskilled labour and that rising wages in low technology activities calls for more advantaged skills for a nation to maintain a competitive edge (Lall 2001:129). Just as Gibbons (1998) additionally stresses that the international competition creates the need for knowledge workers of all kinds (Gibbons 1998:9).

An example that supports these arguments can, according to Stiglitz (1999) be found in what has been called the 'miraculous growth' of several East Asian economies. He argues that the economic development of these countries largely was attributed to their ability of closing the knowledge gap[3] (Stiglitz 1999:3). Three main factors are often emphasized in the explanation on how these countries managed to overcome the knowledge gap: Firstly, they invested heavily in a foundation for technological learning through investments in basic infrastructure such as roads, water, schools, sanitation, irrigation, heath centres, energy and telecommunication. Secondly, they nurtured the development of small and medium enterprises (SMEs), which required developing local operational, repair and maintenance expertise as well as plenty of local technicians. Thirdly, institutions of higher education (HEIs) was nurtured, funded and supported together with academies of engineering and technological science, technological associations and industrial and trade associations (Juma & Agwara 2006:219). Thus, the issues of knowledge and skills development has played an important role in the success of countries such as Singapore and South Korea, which thirty years ago where poorer than many African countries.

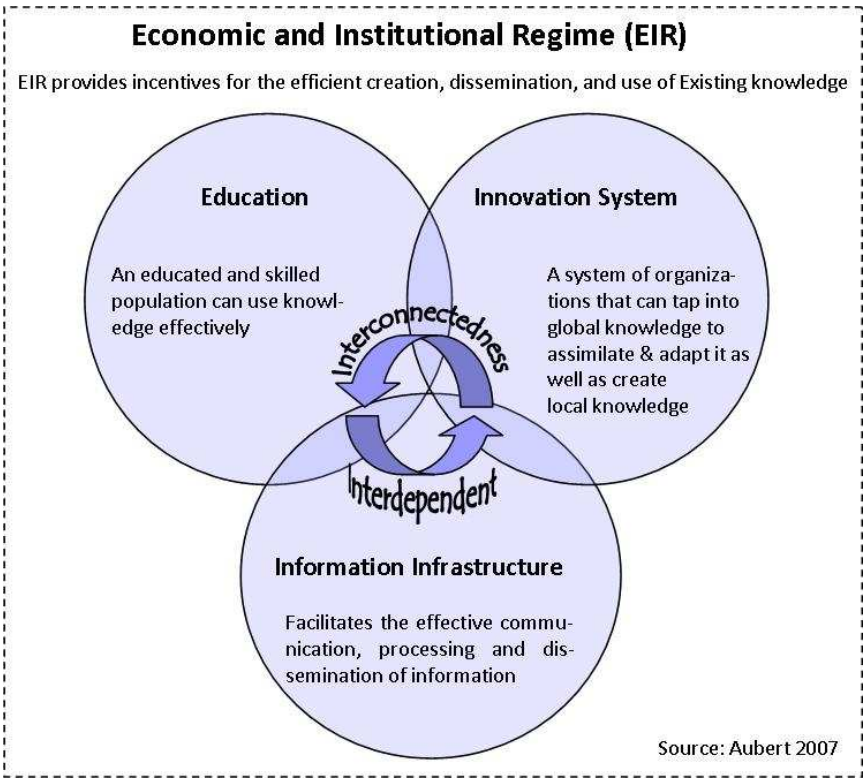
## 4.1 Four Constituting Pillars of the Knowledge Economy

Due to the difficulties in conceptualising the knowledge economy, a model over the constituting pillars can be helpful in understanding the ideal framework of operations of the knowledge economy. The four constituting pillars of the KE presented by WBI are based on studies which, in line with the findings from the success of the East Asian countries, indicate that a successful transition to KE usually involves long-term investments in education, innovation capabilities, modernization of the information infrastructure and possessing an economic environment that is conductive to market transactions (WB 2007:8). The pillars are:

*1) A sound economic incentive and institutional regime* that provides incentives for the efficient use of existing and new knowledge and the flourishing of entrepreneurship. 2) An educated and creative population that can create, share and use knowledge well. 3) *A dynamic information infrastructure* that can facilitate the effective communication, dissemination, and processing of information, and lastly, 4) an efficient innovation system of firms, research centres, universities, think tanks, and other organizations that can tap into the growing stock of global knowledge, assimilate and adapt it to local needs, and create new technology (Aubert 2007, WBI 2004). For a more detailed description on the content of each pillar, refer to appendix 1

[3] The knowledge gap refers in this case to the gap between the more developed and less developed countries in the knowledge about how to transform inputs into outputs (Stiglitz 1999:3)

Figure 4.1: Interconnectedness of the Four Pillars of the Knowledge Economy




As the KE is a complex and multi faceted notion that cannot easily be captured, the pillars should most of all be perceived as convenient facets through which the concept can be examined. What, however is important to notice in the figure is the interdependence and overlap between the pillars and their interaction and dependence on upon the economic and institutional regime, which can both nurture and hinder the development of the KE (WB 2007:10).

## 4.2 The Conceptual Framework: Knowledge and Learning

To create a deeper understanding of the role of knowledge in economic development, it is necessary conceptualise knowledge and understand its interaction with the economy.

### 4.2.1 Defining Knowledge

First of all, it must be underlined that the literature presents no coherent definition of knowledge. In fact, much literature applies no kind of definition or has merely a weak characterization of the notion in epistemological and cognitive terms. Smith (2000) states that "knowledge is in most forms of discourse a highly differentiated and to some extent hierarchical concept" (…) and that it "normally has to do with understanding, with the resolution of perplexity (…) It may involve explicit theoretical concepts or principles, data generation procedures, canons of evidence and so

on, all linked into some kind of explanatory structure" (Smith 2000:3). This thesis will adopt the definition set by Conceição & Heitor (1999) who define knowledge as 'what it is not', thus, understood in the way that what is 'not human' is not knowledge. 'Not human' comprises in this context all kinds of objects such as psychical goods and infrastructure, natural resources and raw material. In other words knowledge is, what is immaterial (Conceição & Heitor 1999:41).

In the analysis of the role of knowledge and knowledge creation in the economy, it is however not only relevant to distinguished between what is knowledge and what is not, it is also essential to distinguish between different kinds of knowledge. A relevant taxonomy presented by Conceição & Heitor (1999) and Nelson & Romer (1996) divides the concept in *'Ideas'* and *'skills'*, or in the terminology of Nelson & Romer in *'software'* and *'wetware'* that stand in the opposition to *'hardware'* which is their way of labelling inputs in production that is *not* knowledge.

*Software* ('ideas') is characterized as codified knowledge that can be stored outside the human brain, as for example in text in books, images in a film, data in a computer, etc., while *Wetware* ('skills') is understood as knowledge that cannot be separated from human being and that can only be stored in the human brain. This kind of knowledge is what also has been referred to in the literature as 'human capital' and 'tacit knowledge'. Thus, the conceptual difference between software and wetware is to be found in the degree of codification (Conceição & Heitor 1999:41, Conceição & Heitor 2001:85-86, Nelson & Romer 1996:15). This thesis will refer to the different notions as 'ideas' and 'skills'.

Another and more diversified division of the concept of knowledge is proposed by Lundvall & Johnson (1994). They distinguish between four different kinds; *know-what*, *know-why*, *know-how*, and *know-who.*

*Know-what* refers to knowledge about facts. This kind of knowledge is closely related to information and can be broken down into bits. Examples could be knowledge about how many people that lives in Denmark. *Know-why* refers to understanding of casual relationships such as scientific knowledge of principles of motion in nature, in human mind and in society. The production of this kind of knowledge is normally created in specialized organizations such as universities. *Know-how* refers to the capability to do something, or if referring to the conceptualizing division by Conceição & Heitor (1999) and Nelson & Romer (1996), know-how would be equivalent to 'skills' or 'wetware'. Know-how, which is often kept inside the boarders of the individual firm or organization, will often relate to production but also other types of economic activities. Lastly, *Know-who* refers to the access to knowledge and capabilities of others and comprises a mixture of different kinds of skills that most likely could be characterized as social skills. Know-who contains knowledge on who knows what but also information on social relationships that allows access to useful knowledge (Lundvall et. al. 2003:6, Foray & Lundvall 1996:19-20). Each kind of knowledge has its own learning process.

**Table 4.1: Types of Knowledge and Learning Processes**

| | Know-What | Know-Why | Know-How | Know-Who |
|---|---|---|---|---|
| Type of Knowledge | Codified | Codified | Tacit | Tacit |
| Sources | Fact & Information | Scientific principles and laws | Skills acquired trough experience | Developed and maintained through personal contacts in research groups and production networks |
| Transfer Processes | Formal joint venture patents | Formal<br>Books, journals | Non-Formal<br>Formal<br>Learning-by practicing/producing design.<br>Reverse engineering<br>Apprenticeship | Non-Formal Networking, face-to-face contacts, joint research /production; exchange of personnel; professional association, Apprenticeship |
| Learning Context | Digital libraries<br>Formal Institutions | Digital libraries<br>Formal Institutions | Workplace<br>Research / Training Centres | Workplace<br>Research / Training Centres |

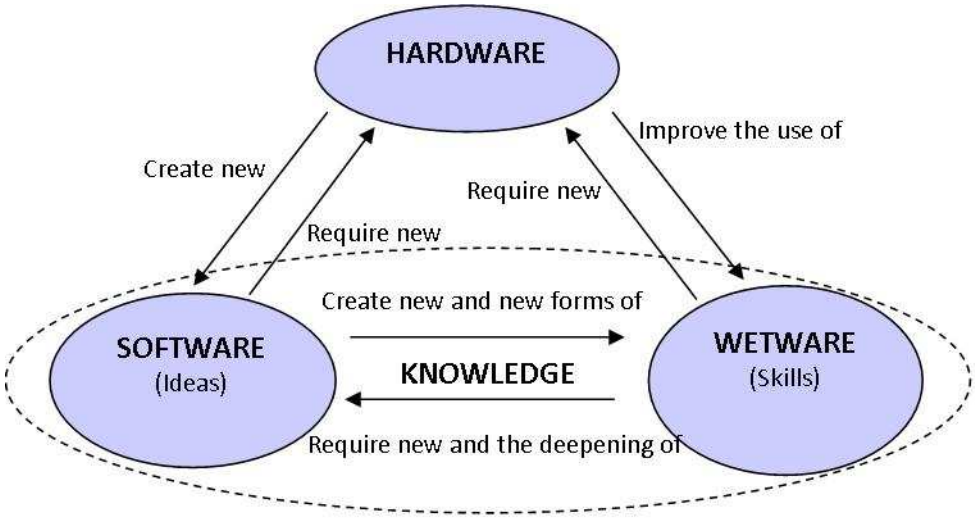
*Source*: Oyeyinka 2004:13

Although being more specialized, the division by Lundvall & Johnson (1994) relies on the same fundamentals as the ones by Conceição & Heitor (1999) and Nelson & Romer (1996), which is, the basic distinctions between explicit and codified knowledge versus knowledge that remains implicit and tacit as well as the distinction between 'information' and 'knowledge' which are separated in the understanding of 'knowing about the world' and 'knowing how to change the world'.
The distinction between 'information' and 'knowledge' is central to economics whereas it opens for different user driven outputs. As Dosi (1996) explains; "a manual on 'how to produce microprocessors' is 'information', while knowledge concerns the pre-existing abilities of the reader to understand and implement the instructions contained therein" (Dosi 1996:84). In other words, we can say that knowledge, as a contrast to information creates a fundament for innovation.

## 4.3 The Role of Knowledge in the Economy

In the analysis of the role of knowledge in the economy, it is crucial to understand in which way the different kinds of knowledge interrelate with each other as well as how they refer to the economy. As previously explained, knowledge is in the new growth theories neither restricted to technology nor exogenous. In contrast, it responds to new ideas and skills in technology as well as in social, legal, political and administrative areas. Figure 4.2 shows with the terminology of Nelson & Romer (1996) how knowledge can be understood as endogenous by illustrating some links between objects and the different kinds of knowledge (Conceição & Heitor 1999:42).

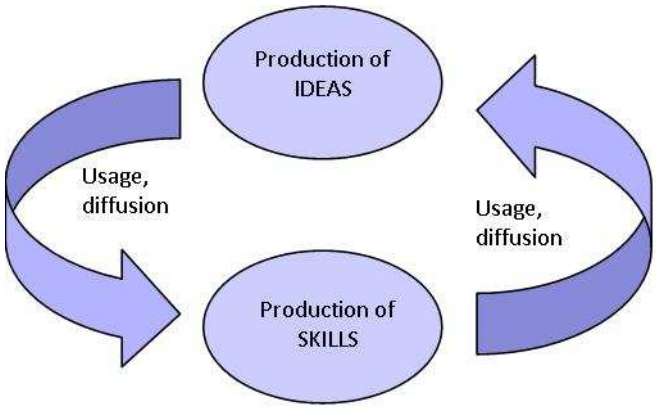
**Figure 4.2: Interactions between knowledge (software and wetware) and objects (hardware) in the new economic growth theories**




Source: Conceição & Heitor 1999:42

It is important to notice the mutual dependency of ideas and skills. Without skills, ideas are irrelevant, and without ideas, there may be no need for new and improved skills. As emphasized by Conceição & Heitor (2001) "The bridge from production of ideas to the usage of ideas is established by producing new skills" (Conceição & Heitor 2001:87). The increased use of an idea will through diffusion lead to the appearance of new skills to handle the idea. It will also foster new ideas that aim at improving and extending the original idea, which again will lead the need for more developed skills. This establishes a self-reinforcing cycle that leads to the accumulation of knowledge. The process is illustrated in Figure 4.3 on the learning cycle below.

**Figure 4.3: The self-reinforcing Learning Cycle Leading to Knowledge Accumulation**




Conceição & Heitor 2001:5

Thus, as the figure shows, learning can be understood as knowledge accumulation that arises as a result from a complex series of learning processes which relies on a fundament of substantial interdependence between the accumulation of ideas and skills.

## 4.4 Use and Distribution of Knowledge

One of the important features in distinguishing between ideas and skills is related to the difference there their production, distribution and usage. The differences have economic implications that are crucial to public policy.

As Romer (1990) noticed, knowledge is characterized by being able to be reused continuously without additional costs. In the taxonomy of knowledge, it is nonetheless merely 'ideas' that posses this quality. Furthermore, can they be used simultaneously by an undefined number of people. Contrariwise, can skills only be used by the person who posses them and can therefore not easily be shared.

There is a significant different in the distribution of the two different kinds of knowledge. While ideas are generally easy and inexpensive to distribute, the transmission of skills are mostly expensive, slow and complex (Conceição & Heitor 1999:42, Conceição & Heitor 2001:86). Table 2 summarizes the significant differences between skills and ideas in use and distribution.

**Table 4.2: Differences in the Use and Distribution of Ideas and Skills**

| | **Ideas** | **Skills** |
|---|---|---|
| Use | Non-rival | Rival |
| Distribution | Easy and inexpensive | Complex and Expensive |

## 4.5 Knowledge Production and Skill Development

As a result of the emergence of KE, new and different sets of cognitive and social practices in knowledge production starts to appear. The ability to acquire appropriate knowledge when needed has become increasingly crucial. In other words, the acquisition of disciplinary knowledge per se is not important but rather the application of knowledge and the knowing what to know to do (Kouwenhoven 2003:3).

To illustrate the character of this change, Gibbons (1998) distinguishes between what he names mode 1 and mode 2. The main change he points to is that knowledge production and dissemination (research and teaching) are no longer activities that are carried out in relatively institutional isolation, which is in line with the system of innovation approach addressed below.

The 'traditional' form of knowledge production that most universities operate with has a disciplinary basis. It is an arrangement that provides guideline for researchers about what important problems are and how they should be handled. The disciplinary structure defines both what 'good science' is and what the students should know if they intend to become scientists. Likewise, many consider research that adheres to this framework to be 'scientific' by definition, while what violates it is not. Gibbons (1998) labels this form of *mode 1*.

A growing number of evidences indicate that new mode of knowledge production is emerging. Gibbons (1998) classifies this new type as *mode 2*. It differs from mode 1 in several ways. One of the most pronounced differences is in the framework for the knowledge production process which in mode 2 arises as a product of particular complex problems in collaborative transdiciplinary teams and partnerships situated both within and outside higher education institutions. In mode 1, the context of research is defined by the fundamental norms of academic science, while it in mode 2 is defined by a range of considerations and in the context of application.

Knowledge in mode 2 is first of all produced whereas it is useful to someone, being it industry, government or society. Hence, it is to a large degree driven by a process in which supply and demand aspects can be said to operate. The market is however not the only stimulating factor in knowledge production, it also goes beyond it. In this process, knowledge becomes diffused throughout society for which reason Gibbons (1998) also classifies it as 'socially distributed knowledge. Furthermore can be said that mode 1 is disciplinary and characterized by a relative homogeneity of skills, while mode 2 is transdiciplinary and characterized by heterogeneity in skills (Gibbons 1998: 3-8).

Further details of the differences between mode 1 and 2 will not be presented here. What is relevant in this context is to comprehend the changes the shift to the knowledge economy means for knowledge and skill production. Furthermore, it should be emphasizes that this change also has crucial impact on the economy as such, the division of labour and the local community (Gibbons 1998: 34).

While the change from mode 1 to mode 2 is more advanced in developed countries, Gibbons (1998) argues that it is just as relevant for developing to start adapting to the new tendencies. He stresses that the problem in the developing countries not only concerns the lack of capabilities but also the fact that governments still model their scientific and technological institutions on assumptions that no longer apply to the kind of activities on which their aspirations depends (Gibbons 1998: 35). To universities in the developing world, the change to mode 2 can be as much an opportunity as a threat whereas universities in developing countries are build on the fundamentals of mode 1 and they are often 'locked' into this knowledge production that is based on disciplinary structure, is capital dependent and works with relatively context free problems. In contrast, many universities in the developed countries are heading towards more 'research in the context of application' aimed at understanding complex problems and made in collaboration with experts from other institutions with which capital and costs are shared (Gibbons 1998: 53).

Foray & Lundvall (1996) suggest that the production of knowledge can be regarded in two ways. Firstly, the production of knowledge can be viewed as a separate activity handled by a detached

sector. Agents of this sector could be the education system, universities or R&D functions in firms. Secondly, knowledge production can also be viewed as a by-product of economic activities. Here knowledge production happens in form of learning-by-doing, learning-by-using and learning-by-interaction. In this perspective, broader organizations of society and firms become important actors. The emphasis on the two different kinds differs among scholars, however, none would ascribe merely to one specific branch. Rather, all would support some kind of synthesis (Foray & Lundvall 1996:13).

Likewise, Lall (2001) points to two different processes in the development of skills, 1) skill development through formal education and training and 2) capability formation through technology-based experience. The requirements of both kinds differ by the country's level of development. Basic schooling can be sufficient to absorb simple industrial technologies while tertiary education and advanced schooling become important to tackle more complex knowledge and to cope with sophisticated technologies (Lall 2001: 138-141).

## 4.6 Knowledge Needs

In the production of knowledge and skills it is important for a country to have understanding of its primary knowledge needs. This is essential in making the knowledge and skill production relevant to the economy.

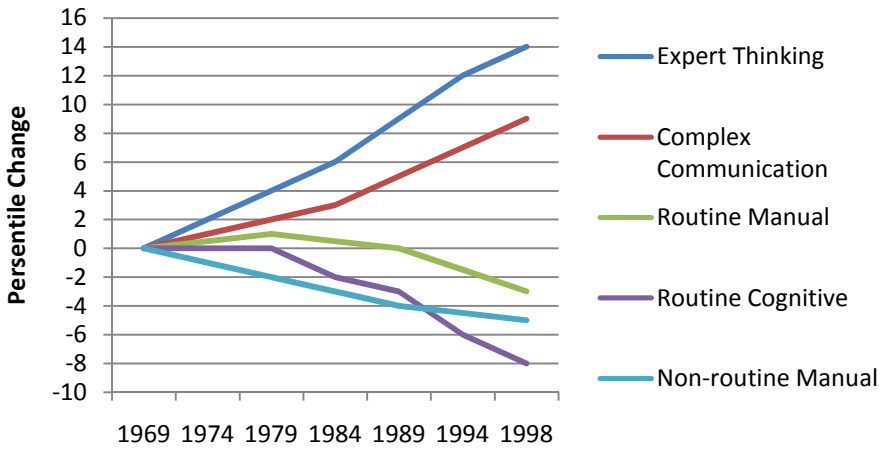
Levy & Murnane (2004) has researched on skills requirements for the tasks performed in the US labour market and the development of the needs of the different skills through two decades time. They divide the performed tasks into five broad categories:

*1) Expert thinking:* solving problems for which there are no rule-based solutions as for instance diagnosing a patient whose symptoms are not common. 2) *Complex communication*: Interacting with others to explain or acquire information or to persuade others of its implications for action

*3) Routine cognitive task:* mental tasks that are properly explained by logical rules, such as maintaining expenses reports. 4) *Routine manual tasks*: physical tasks that are well described with rules, such as installing windshields on new vehicles. 5) *Non-routine manual tasks:* physical tasks which cannot be described by rules and that are difficult to computerise because they require optical recognition and fine muscle control as for instance driving a truck.

Figure 4.4 demonstrates the evolution of the skills needs from 1969-98. While occupations requiring expert thinking grew continuously during the whole period, tasks of non-routine manual declined throughout the whole period and routine cognitive and manual tasks remained stable during the 1970ies but hereafter declined (Salmi 2006:37-38).

**Figure 4.4: Economy- wide Measures of Routine and Non-routine Task Inputs, Unites States, 1969-98**




Source: Salmi 2006:38, reproduced from Levt and Murnane (2004)

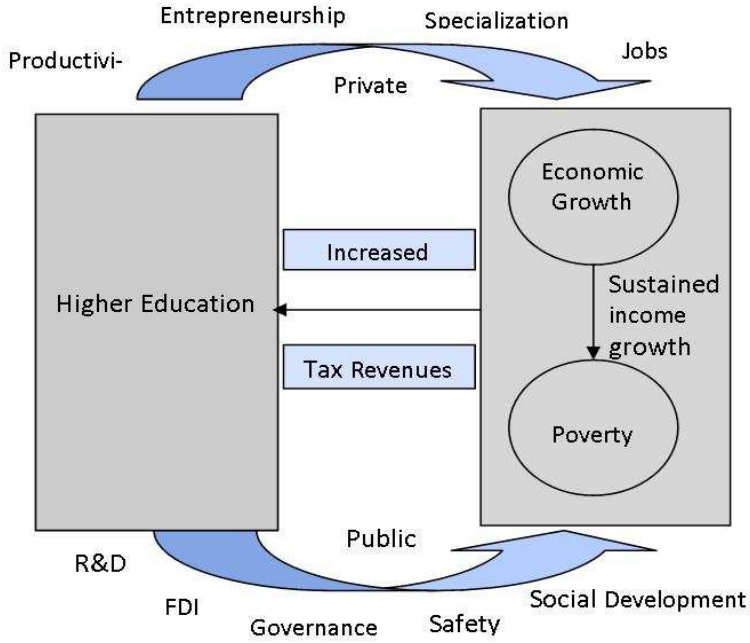
Dahlman (2007) furthermore stresses that knowledge needs are related to the country's economic structure. For developing countries, he stresses that it often is the agricultural sector that absorb the most labour, but as countries increase agricultural productivity, many workers will move to the industrial sector and the service sector which at first will be dominated by commerce and low skilled sectors such as construction but in the long run will more directed towards the knowledge incentive sectors. This process is however *not* linear and even poorly developed countries with high employment rates in the agricultural sector need knowledge of how to improve productivity of industries. Moreover, he claims that it in some cases is possible for countries to leapfrog straight from agriculture to services without having to pass through a vast phase of industrialization (Dahlman 2007:6-7).

Lastly and with reference to the 'learning economy' the knowledge economy forces an emergent importance on what can be named 'methodological knowledge and skills', meaning the ability to learn autonomously. The focus thus moves from memorizing specific information to learning to learn, learning to transform information into new knowledge and learning to transfer new knowledge into applications (Salmi 2006:39-40).

## 6. Tertiary Education in the Knowledge Economy

The importance of knowledge to economic growth implies a need for higher education institutions (HEIs) to be more innovative and more responsive to the competitive and changing needs of the labour market for skilled labour (Benneh & Awumbila 1999:1). The importance of universities in economic growth which can be illustrated as in figure 6.1, has been plentifully documented.

**Figure 6.1: Higher Education's Contribution to Economic Growth**




*Source:* Day 2006

Most see the main role of universities to educate people and carry out research, however, many HEIs have recently started to commit themselves to a range of additional activities, which can be headed under the term 'links with society'. At the same time, many firms start to 'invade' the role as knowledge producers, which previously was primarily ascribed to universities and research institutions. In this perspective, Conceição & Heitor (1999) anticipate a breakdown of the institutional boundaries between companies and universities. They relate the tendencies to two particular forces: Firstly, the creation of wealth and added value is increasingly linked to the production of knowledge, which makes companies looks at the functioning of the universities to get inspiration of how to perform creative tasks. Secondly, universities have often difficulties in finding sufficient funds for the teaching a research tasks, which makes it naturally for them to learn how companies obtain commercial benefits from intellectual goods (Conceição & Heitor 1999:48).

While these factors mostly relate to the research function of HEIs, the teaching function is just as relevant in the KE which stresses the importance of creation of skilled human capital. This is emphasized by Thulstrup et. al. (2005) who argue that it is not enough only to create capacity. If development shall occur, higher education must be useful for society and lead to good employment possibilities for graduates, which mean that HEIs must be part of the surrounding society. This also calls for the need to provide graduates with the appropriate skills, in particular

learning skills (Thulstrup et. al. 2005:23). An essential problem in this context is that universities cannot be expected to foresee employment demands five or six years in advance. This problem can however be addressed through a diversified HE system that includes various institutions with different vocations. A diversified system can help to ensure flexibility capable of providing society with the relevant tools to treat instability in employment needs as well as changes in technology and market needs (Conceição & Heitor 1999:48).

The diversification of the HE system can occur both vertically and horizontally. Vertically in the way that institutions multiply and traditional research universities are being joined by polytechnics, professional schools, institutions that grant degrees but without conducting research and community colleges. When the diversification process occurs horizontally, new institutions are being created which are operated by private providers such as philanthropic and nonprofit organizations, religious groups or for-profit units (WB 2000:29). Horizontal differentiation is normally driven by increased demand for higher education, while vertical differentiation is a response to demand for greater diversity of graduates (WB 2000:32).

## 6.1 Tertiary Education in Developing Countries

As previously explained, higher education is also an essential to growth in developing countries. Without sufficient provision of higher education it is unlikely that African countries can become significant actors in the generation of knowledge (Ng'ethe et al. 2006:1). This is emphasized in the Unesco Declaration about Higher Education in Latin America and the Caribbean:

> "Without adequate higher education and research institutions, developing countries cannot except to adopt and apply the most recent development. And warning, likewise, that it would be even less feasible for them to make contributions of their own to development and to close the gap that keeps them away from industrialized nations" (Unesco 1996:2)

In comparison with the developed countries, the response of HEIs in developing countries has been slow or even absent, which have led to an increasing gap between the teaching of the students and the knowledge and skills required by the job market (Kouwenhoven 2003:37) As previously emphasized by Gibbons (1998) this need for change gives serious challenges to African universities that cannot keep on operating as in the past. The nature of operation of the universities has to change to respond to the changes in the global economy. For instance does the necessity of 'knowledge sharing' in KE mean that those who have useful knowledge (e.g. good HEIs) must share it with those who need it (e.g. industry or the public sector). Many developing country universities are completely unprepared for such demands, and even local knowledge users, for example industry, are frequently very hesitant to let students invade their facilities (Thulstrup et. al. 2005:24).

Challenges to HEIs in developing countries are many and divers. Salmi (2006) points to a range of yet unsolved challenges that many systems of tertiary education in the developing countries face. These are, a sustainable expansion of tertiary education coverage, the reduction of inequalities of access and outcome, the improvement of educational quality and relevance, and the introduction of more effective governance structures and management practices (Salmi 2006:34). Furthermore, do large numbers of students not necessarily lead to economic progress and increased competitiveness. Graduates must also be able to act as 'agents of change' and participate actively in the development and likewise, they should be enabled to do so by the surrounding society. This requires that the HE system is able to create knowledge and students with a locally relevant expertise (Brito et. al 2007).

Another perspective on the effects of the changes on African tertiary education is added by Prewitt (2004) who points to the risk that the market –derived measures will erode the public good tradition in higher education which in the long term not is feasible for African countries (Prewitt 2004: 42, 54).

There is no doubt that developing countries face an enormous task in meeting the requirements of the knowledge economy. However, this does not mean that it is impossible for poor countries to build a way forward for caching up, which several examples from Asia shows (Thulstrup et. al. 2005:21).

## 7. The Innovation System Approach

As illustrated in the four pillars of KE, the innovation system is an important component in KE.

To better analyze the Mozambican case, it is therefore relevant to include the system that captures the innovative process, namely the systems of innovation.

As already explained, proponents of KE stress that knowledge is no longer created in isolation. This is further emphasised in the approach of 'national systems of innovation' (NSI), which is considered an essential mechanism in the knowledge-based society as explained in the model of the four pillars of KE. The idea of a national system of innovation can be traced back to the thinking of Friedrich List (1841). Most importantly, List acknowledged the economic importance of a broad range of institutions and stressed the value of linking these institutions to the industry. He furthermore recognized the interdependence between tangible and intangible investments (Freeman 1995:5-6, Johnson & Lundvall 2003:13).

'Innovation' is the process in which knowledge is being applied in the economy and transformed to exchangeable economic output and can take form as for instance new production processes, new products, new types of organization and new markets (Lundvall, Muchie & Gammeltoft 2003:2). Schumpter (1934) defines innovation as "the carrying out of new combinations"

(Schumpter 1934:66). It is in this respect fundamental to distinguish 'invention' and 'innovation'. Fagerberg (2005) label the former as "the first occurrence of an idea for a new product or process" and the latter as "the first attempt to carry it out into practice", and stresses that inventions mostly will be carried out in research institutes and universities whilst innovation typically will take place in enterprises and organizations (Fagerberg 2005:4).

There exists no consensus among academics on a uniform definition of NSI (Johnson & Lundvall 2003:14, Edquist 2005:5, Oyelaran-Oyeyinka 2006:240). A broad definition that is suitable for developing countries is here suggested. It defines NSI as:

> "a network of firms and other economic agents who, together with the institutions and policies that influence their innovative behaviour and performance, bring new products, new processes and new forms of organization into economic use".
>
> (Oyelaran-Oyeyinka & Gehl 2007:12)

In other words, a NSI form a synthesis of institutional capacities, communication networks, coordination mechanisms and policies initiatives which foster innovation-led gains in economic productivity and it is from within this web that innovation can grow (Yusuf et al. 2008: 49). It is however not yet clear to scientists exactly *how* and *why* innovation occur, which must be counted as one of the major weaknesses of the innovation system approach. It logically delimits the appropriateness of applying the notion in form of an ex-ante conception as it is done in developing countries that aims at building up their system of innovation (Fagerberg 2005:20). Nevertheless, it is assumed in this thesis that the NSI approach can bring valuable inputs to the analysis as well as to policy design.

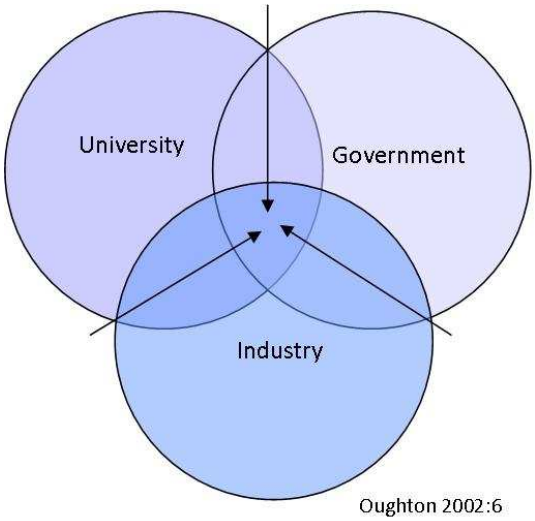
## 7.1 Actors in the NSI

The NSI analysis emphasizes the necessity of understanding core agents from diverse economic and social sectors, their organizational behaviour and the institutional context in which they interact. Institutions that generate knowledge and skills such as HEIs are essential actors in the NSI, but in line with the characteristic of the knowledge economy, these institutions do no longer posses the disciplinary monopoly of knowledge. Also other kinds of actors must be counted in (Yusuf et al. 2008: 49)

Dahlman (2007) divides the key actors of the system of innovation into four groups. These are 1) *the government* – where there should be distinguished between staff of different institutions and policy makers, 2) *the private sector* – where it often is useful to distinguish between foreign investors and the domestic private sector, 3) *the academic community* – which plays an essential role both as part of the research system but also as a part of the education and training system, and lastly 4) *the civil society at large* (Dahlman 2007: 10).

In this context should be emphasised the interrelationship between three main groups of actors which are becoming increasingly interdependent in the context of the knowledge economy, namely the industry, government and universities. The interaction between these three entities is described in line with the philosophy of the innovation system approach in the 'triple helix model' as can be seen in figure 7.1 below

**Figure 7.1: Triple Helix Model**




In the model, each part interacts with one another recurrently and each can relate to the two others. It represents a knowledge infrastructure in terms of overlapping institutional spheres with each part assuming the functions that was previously the area of the other and with hybrid entities formed at the interfaces. Thus, the model builds on the hypothesis that knowledge flows in two directions (Zheng & Harris 2007: 257).

A common assertion in the literature on innovation systems is the importance of institutions in the system. It is argued that as the carriers of knowledge, institutions play an important role to economic development whereas the factors which foster growth such as investment in human and psychical capital and technological advance are deeply shaped by institutions (Oyelaran-Oyeyinka 2006:240). The conceptualization of institutions can be both narrow and broad, but in both circumstances, they carry the function of the management of uncertainty and conflicts, the provision of information and the provision of trust among groups. Oyelaran-Oyeyinka & Barclay (2003) highlights two reasons for which institutions are necessary for innovation. First, innovative activities are characterised by uncertainty. Institutions provide stability and act to regulate the actions of agents, and to enforce contractual obligations. Second, knowledge creation and learning, validation and distribution are prerequisites of modern economic change mediated by institutions as organisations and as rules (Oyelaran-Oyeyinka & Barclay 2003:95).

## 7.2 NSI in Developing Countries

While the concept of NSI was developed on the basis of empirical findings from Western economies, the approach can however make sense in the African context if some important factors are being regarded. First of all, it must be clear that it can not be used in its original form as the 'ex-post' concept as it was developed when it in the South will be applied as an 'ex-ante'. Johnson and Lundvall (2003) point to four crucial elements that need to be regarded in the adaption of the approach to the African context. *Firstly*, it is important to include all sectors in the analysis. Low tech is as important as high tech and agriculture, services and manufacturing need to be incorporated. Second, all aspects of innovation must be included such as diffusion, imitation and the like. *Third*, the focus of analysis needs to be changed from the reproduction of the system to the actual making of the system. And, *fourth*, the broad living conditions and how they affect innovation must be taken into account (Johnson & Lundvall 2003:24).

# 9. Promotion of HE, Knowledge and Innovation in Mozambique

Mozambique has in the recent years taken several important steps towards obtaining a development based on the creation and use of knowledge and skills. Especially two are fundamental, namely the Science, Technology and Innovation Strategy (MOSTIS) and the Strategic Plan for Higher Education (PEES). These strategies recognise that focusing on matters of science and highly skilled human resources in the context of the global knowledge economy is essential for Mozambique's development. It is the purpose of this chapter broadly to describe the content of the strategies as well as assessing how they line up with the theories on the KE.

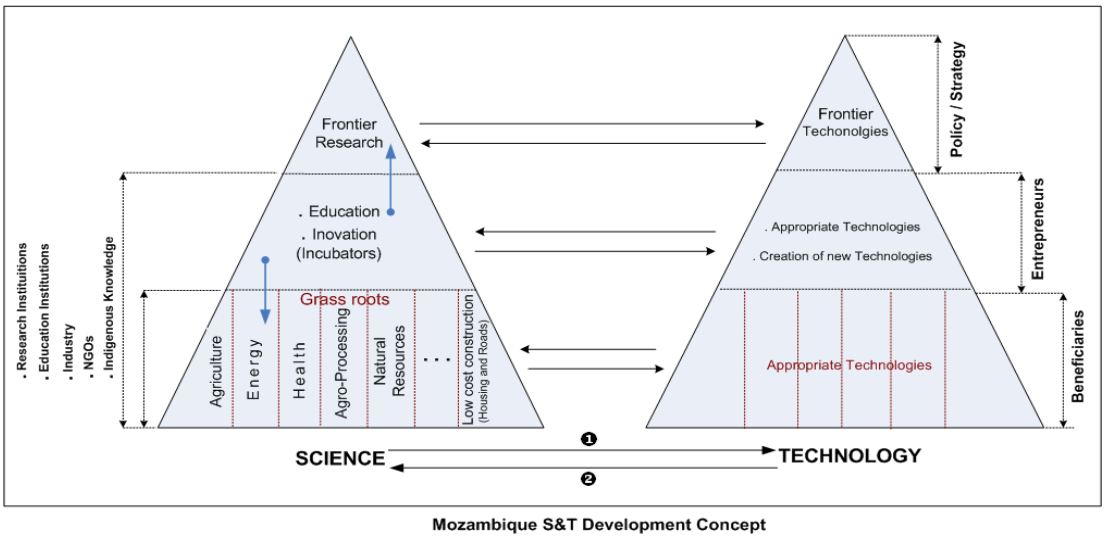
## 9.1 Science, Technology and Innovation Strategy

The 'Mozambique Science, Technology and Innovation Strategy' (MOSTIS) was approved in June 2006 by the Council of Ministers and has since started the enormous task of building the national system of innovation and bringing the affairs of science, technology and innovation (STI) to Mozambique's development agenda . The strategy is coordinated and implemented by the Ministry of Science and Technology (MCT) which was formed in 2005 after being separated from the 'Ministry of Higher Education, Science and Technology' (MESCT). The MOSTIS is an ambitious strategy which in the time scope of ten years has ten objectives for ten specific strategic areas as well as five crosscutting areas as shown in appendix II. The strategy aims at using STI for both economic growth and poverty reduction. In line the PARPA (II), it has the vision of:

> "The ubiquitous and equitable availability and use of Science, Technology and Innovation and ICTs as a right of all Mozambicans, in order to accelerate poverty reduction, wealth creation and the improvement of their social wellbeing" (MCT 2006:7)

The MOSTIS must be considered as an essential step in adapting Mozambique to the challenges of the knowledge society by enhancing the adaption of knowledge in the entire country and building up important mechanisms of the innovation system. In line with Conceição & Heitor's (1999) understanding of the interaction between knowledge and hardware as explained in figure 9.1, the MOSTIS is guided by a similar, however only two dimensional model, which explains the relationship between science and technology on which the strategy relies. The two arrows in the bottom of the figure named 1 and 2 illustrate the interaction between knowledge and technology, which can be translated into Conceição & Heitor's (1999) knowledge and hardware.

**Figure 9.1: Relationship between Science and Technology in the MOTIS**




Source: MCT 2006:15

The strategy clearly adapts the knowledge characteristics of Gibbon's 'mode 2' where knowledge primarily is produced to be useful in the context of the society and is in principal driven by a process with aspects of supply and demand (Gibbons 1998: 3-8):

> "The quest for this new knowledge may be driven by some practical problem directly related to human need, or the primary driver may simply be the desire to advance human knowledge. In either case, the knowledge thus generated may be applied to solve a practical problem related to, for example, society, the economy, or a community, though the development of appropriate technology."(MCT 2006:15).

What is noticeable about the MOSTIS is that it does not actively address the system of higher education as a tool for introducing STI, which is estimated as a great weakness. In stead of merely creating new mechanisms for the introduction of STI, it should instead make use of the available structure and help reinforce it.

Furthermore, the broad aim of the strategy is assessed as too being too ambitious for the current capabilities of Mozambique. As stressed by Brito, the focus should be narrower and in terms of sector only focus on few key important sectors such as agriculture and fisheries (Brito).

## 9.2 Tertiary Education Reform

The Strategic Plan for Higher Education (PEES) 2000-2010 was developed on the basis of a baseline study on the situation of HE in Mozambique that was carried out in 1997 after the recommendations of a national seminar on higher education. The mission statement of the strategy is that:

> "*Higher Education in Mozambique shall guarantee equitable access and participation of all citizens; it shall respond to the needs of the Mozambican society to ensure its capacity of facing the great challenges of the Country's social, economic and cultural development*" (GoM 2000:2)

The mission statement is specified in a more detailed list of visions and guiding principles that indicate how the objectives will be reached, they can be seen found in appendix III
One of the main focuses of the strategy is to secure "increase of access and of regional and gender equity, the decrease of unit costs per student and the improvement of internal efficiency of the whole sub-system". (GoM 2000:5). It was however also recognized that an expansion in graduates exclusively would not be sufficient to spur development. The range of education possibilities also had to be divers in order to comply with the various need of the country, which in this case was defined in collaboration with the productive sector (Chilundo). Thus, the strategy aims at creating "diversity and flexibility of institutions, courses, curricula and methods of delivery, to ensure responsiveness to changing social, cultural and economic demands" (GoM 2000:3) and it recognizes that the expansion of higher education implies institutional differentiation by stressing that it "is necessary to define other types and forms of higher education institutions, such as higher institutes, polytechnics, and higher schools, amongst others" (GoM 2000:6). This is in line with the recommendations of Conceição & Heitor (1999) and the World Bank (2000) as described in the theory chapter.
According to Chilundo (2008), the dialog with the productive sector, highlighted the need for expanding the system in form of polytechnic schools, as they are more adapt to educating candidates relevant to the market and the productive sector. Likewise, the strategy is acquainted with the necessity of being articulated and related with policies, strategies and plans of other subsystems such as the ones of pre-university and technical-professional levels.

The PEES operates to a large extend in within the framework of the general ideas of the knowledge economy, for instance by focusing on enhanced interaction of the HE sector with other stakeholders as illustrated in the triple helix model and the NSI approach. However, many more focus areas should be adopted to be more in line with the 'new trends' in reforming higher education. The PEES is mostly focused on increasing the human resource base both in terms of quantity and quality and does only to a lesser extend address the issues of reforming methods of learning and the knowledge creating process. Similarly is the issue of knowledge production in terms of research not addressed.
For both strategies, it is assessed that they are lacking coordination and a common focus.

## 10. Private Sector and the Labour Market

In the estimation of Mozambique's preparedness of responding to the KE and the strategies and

reforms, it is essential to get an overview of the economy in general as well as the characteristics of the private sector and the labour market.
Ndulu (2004) points to the understanding of the virtuous circle where better skills leads to higher growth and higher growth in return leads to increased demand for skills. He points to the importance of demand for high skills in the economy and identifies in this context two main sources for expanding opportunities for profitable application of skills which are professionalization of the public sector and private sector growth (Ndulu 2004:16).

## 10.1 Recent Socioeconomic History

The recent history of Mozambique has been marked by drastic changes. The independence from Portugal in 1975 was followed by a 15 yearlong civil war between the socialist ruling party, Frelimo and the revolutionary group, Renamo that endured until the assignment of the peace agreement in 1992. In 1994 the first free elections were held and Frelimo went back to being the ruling party and has been it since (Svarre 1996:50-64). The socialist leadership after the Portuguese introduced economics of central planning which endured until 1984 where it, after joining the World Bank (WB), the International Monetary Fund (IMF) and the Lomé Convention started to open up for mechanism of the market-based economy. In 1987, the government adopted an 'Economic Rehabilitation Plan' (PRE) which give emphasis to market based economic policies, including private investments, market determination of prices and rationalization of public expenditure and fiscal balance (USAID 2004: 1-2).
After the long years of war and destruction, Mozambique experienced a substantial recovery with sustained growth, increased literacy level and decline in poverty rates from 69.4 percent in 1997 to 54.1 percent in 2003. The annual average of growth in GDP in the period from 2000-2006 was of 8.0 percent. The efficient recovery can be explained through several influencing factors such as the Mozambican government's (GoM) stabilization and structural reforms, donor's support and a significant catch-up in agricultural production as well as an increase in agricultural exports and expansion in the tourism, construction and some manufacturing sectors.
However, the biggest contribution to the growth in GDP has been the so-called mega-projects and the large inflows of donor's support, which counts for half of the government expenditures (WB 2005:xi, Brück & Broeck 2006: 5, AfDB / OECD 2008:461). The fast recovery and the high economic growth rates has contributed to a significant reduction in poverty, from 69.4 percent of the population in 1997 to 54.1 percent in 2003, where the last household survey was done (AfDB/OECD 2008472). Still, Mozambique remains one of the world's poorest countries with a GDP per capita of 340 USD (Day 2007:3, WB 2007).

Real GDP growth decreased moderately from 8 percent in 2006 to an estimated 7.2 percent in 2007 because of the increase in oil prices and a downturn in traditional exports. It is nevertheless estimated that Mozambique will in the short term maintain a robust economic expansion with

expected growth rates in GDP of 7 percent and 6.8 percent in 2008 and 2009 respectively (AfDB / OECD 2008:461).

## 10.2 The Private Sector in Mozambique

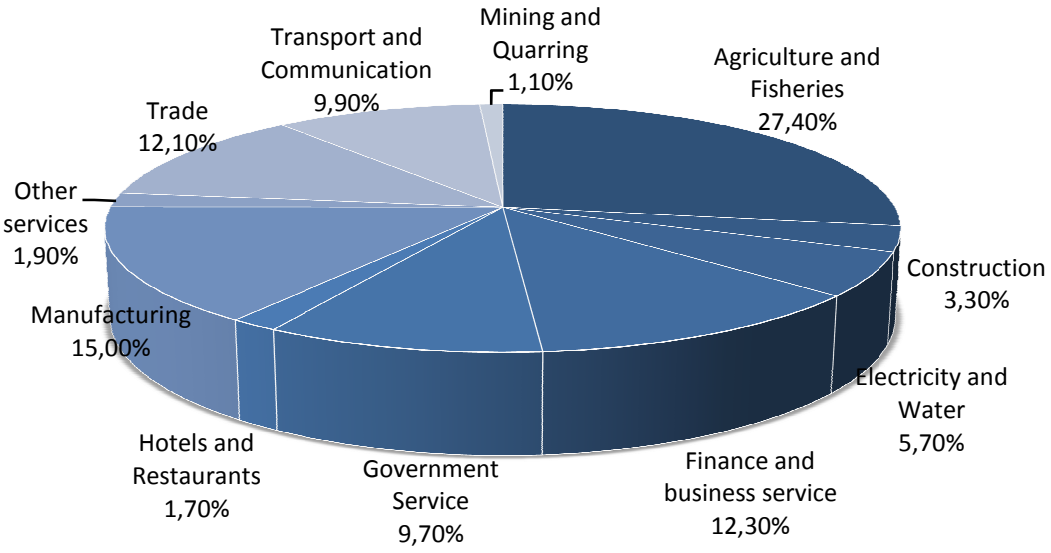
The formal private sector in Mozambique is in general small and has, according to the Mozambique Investment Climate (2003), furthermore experienced a substantial slowdown in growth after the initial rebounding in the mid-nineties. It is characterized by having low total factor productivity in comparison with the regional average, which has affected negatively essential subsectors. For instance have the textile, garment and footwear sectors which have functioned as a springboard for expansion in the export sector in many developing countries, had severe difficulties in Mozambique as a consequence of international competition due to low labour and capital productivity (Nasir et al. 2003:49, WB 2004:10-11)

Data from 2002 show that the formal business sector consists of 28.870 companies which in total employs approximately 301.000 people. 85 percent of these are individually owned companies and 105 of the companies are public, parastatal or cooperatives (WB 2004:9). The majority of the formally registered enterprises are small and microenterprises with less than ten persons in staff, they account for 90 percent of the total amount of enterprises and account roughly for 20 percent of the work force. The medium sized enterprises account for 9 percent of the total and employ around 23 of the formal employment which roughly corresponds to 70.000 people. The group of large enterprises, which is made up by approximately 400 companies are the largest consumer of labour force with 57 percent of the total employment. They basically also represent the market and demands for skilled labour. Among others, the large companies include financial institutions, public utility companies and transport and construction companies (ADEA 2008:4, WB 2004:9).
In terms of share of GDP, the economy has experienced quite extensive structural changes as a result of the rapid economic growth. Especially has industry expanded significantly during the last ten years, though this is largely due to some few mega-projects which will be addressed further below. It is expected that industrial output will expand further in 2008 and 2009 with two large projects of an oil refinery and a bio-ethanol fuel. The agricultural sector, which provides the livelihood to two-thirds of the population, has had a remarkably relative decline in the last decade with a significant fall in share of GDP from 30 percent in the mid nineties to less than 20 percent in 2001. Nevertheless did it experience an increase in real terms during the same period, which is estimated primarily to be caused an increase in the rural labour force due to the return of refugees and a improved access to inputs and markets (AfDB / OECD 2008:463, WB 2004:7).

Sector wise, the Mozambican economy is mainly dependent on agriculture and fisheries. Traditional products for export include shrimps and marine items, sugar cane, cashew nuts,

tobacco and cotton (Salmão). In the manufacturing sector which has very little diversity, the major areas are food and beverages (38 percent), tobacco, aluminium (23 percent), textiles and footwear while the service sector is dominated by construction, tourism, energy, transport, communication, real estate, banking and consultancy (Bila 2006:5, WB 2004:7).

**Figure 10.1: GDP by Sector in 2006**




*Source*: Estimates by AfDB/OECD 2008 after INE

### 10.2.1 Foreign Direct Investment (FDI)

Theories of skills development stress that one of the ways to spur demand for high skilled people and at the same time increase growth in the private sector is through foreign direct investment (FDI). The link between FDI and increased demand for skilled resources is connected to the productivity growth and technical progress (Ndulu 2004:16). In the analysis of the economic miracle of the Asian Tigers, FDI is often pointed to as an important aspect of economic development in relation to the demand for skilled people. In the successful case of Singapore, Kuruvilla and Chua (2000) argue that the single most important and rapidly influencing factor in the success of Singapore's system of skills development was the model of technology transfer that effectively linked skills development to participation of the private sector and FDI[4] (Kuruvilla & Chua 2000:25). However, according to interviews, the are no apparent knowledge transfer emerging from FDI initiatives in Mozambique (Rafica).

[4] For further information refer to Kurvilla & Chua (2000) "How Do Nations Increase Workforce Skills?"

As previously mentioned, one of GoM's key strategies for economic growth are large-scale capital-intensive projects financed by foreign capital. In this context was created the mega projects as the 'Mozal' aluminium smelter, the hydro electric facility of Cahora Bassa, natural gas and titanium mining. The projects, which have been running since 1998, have generated substantial interest among foreign investors and there are plans of more mega projects than most African countries. They have led to a dramatic boost in exports, while the effect on the payments balance has been much less due to the projects' extensive imports (Nasir et al. 2003:10, USAID 2004:8).

Brito (2005) stresses that the positive outcome of major investments projects such as the Mozal aluminium smelter has been among other things been due to the expansion of the education system. Both the implementation of the project and the recruitment of the national skilled labour has been faster than planned (Brito 2005:3) Nevertheless, the mega-projects are receiving many critiques for generating very few jobs in comparison to the projected investments (Simbine). The expectations in 2003 was that the projects, which invested about 10 billion USD – more or less two and a half times GDP at that time, would generate around 20.000 jobs - 5000 within the involved companies and more 15.000 among suppliers and service providers. This amount represent less than one percents of the 3.7 million new workers estimated to enter the job market every year until 2010 (Nasir et al. 2003:10). Furthermore, their linkage to the rest of the economy is minimal and there is very little spill-over effect in terms of for instance the blossoming of a rage of associated SMEs in related industries (Day 2007:4).
Despite critiques, another 186 FDI projects worth 7.5 billion and the potential of generating another 20.000 jobs where approved in 2007. The sectors that received the largest volumes of FDI were minerals, industry, tourism, services, agriculture and agro-industry (AfDB / OECD 2008:464).

In relation to transfer of technology and the enhancement of qualified skills, the impact of FDI in Mozambique also seems to be rather limited. The only example that was found of a contribution was the case of the National Institute for Employment and Vocational Training (INEFP) in Maputo that has managed to venture into training agreements with several of the mega projects. The institute leased out the rehabilitation of the "Centro de Formação Profissional Electrotécnica" (CFPE) to Mozal and thereafter entered in collaboration of training of Mozal's technicians but the daily management is no longer influenced by Mozal. Numbers from CFPE indicates that technicians from Mozal make up 64 percent of the beneficiaries of the programme. Although others also benefit from the investments of Mozal, it appears that the firm mostly tends to comply with own training needs (WB 2004: 28, CFPE 2008:6).

### 10.2.2 SMEs

Small and Medium Enterprises (SMEs)[5] form the majority of Mozambique's economic activities and constitute the main source of employment. Of the 28.870 companies that exist in Mozambique, 28.474 are considered SMEs (Borgarello & Marignani 2004:6)

With reference to the limited developmental impact of the mega-projects SMEs constitute the prospects of development for the country both in terms of economic growth and employment (A.Dias, Simbine). It can furthermore be argued that SMEs also face the direct challenges of engaging in continuous processes of innovation in order to keep up with the competition diffused through trade liberations, which in the case of Mozambique primarily means the Southern African Development Community (SADC) free trade area.

However, SMEs in Mozambique face severe constraint for development, in particular in terms of access to credit. The need for investment in human resources seems to be of less concern and SME's lack of willingness to invest in staff point to a lack of understanding of the benefits of training (WB 2004:30).

The government has recently become more aware of the important role of the SMEs and their struggling created as a result in October 2008 the Instituto para a Promoção das Pequenas e Médias Empresa (Institute for the promotion of Small and Medium Enterprises) under the Ministry of Industry and Commerce (MIC) that has the mandate of mobilizing funds for the promotion of SMEs (A Tribuna Fax 2008). This enhanced focus on the SMEs can hopefully help to boost business activities in a more effective way than through the introduction of FDI. As previously mentioned, only very few Mozambican firms have managed to benefit from the linkages with FDI- projects and those who have, mostly succeeded because they has associated themselves with foreign partners (Bila 2006:14). The support to SMEs was essential to stimulate an innovative environment as was shown in the example of the Asian Tigers (Juma & Agwara 2006:219)

### 10.2.3 The Informal Sector

The Mozambican economy is as in many other developing countries characterized by having a large informal sector[6]. It is estimated that it represents roughly 40 percent of the Mozambican

[5] There is no uniform definition of SME. The most common indicators are: scale of operation, number of employees, annual profit. In Mozambique three commonly used definitions has been found, with reference to the number of employees.

| Agency/Institution | Small | Medium |
|---|---|---|
| Instituto Nacional de Estatística (INE) | <10 | 11-50 |
| Ministério de Indústria e Comércio | 25-124 | 125-249 |
| GAPI (a NGO) | 10-50 | 50-100 |

*Source*: Borgarello & Marignani 2004:6

[6] The concept 'informal sector' refers in this study to all kinds of economic activities that are carried out without being officially registered as a company.

economy and up to 90-95 percent of the workforce (WB 2004:9). However, there are no exact figures to confirm this but on the basis of the house hold survey from 2003 it is estimated that 7-8 million of the approximately 9 million people of the work force depend on the informal sector. Most people have agriculture as their main foundation of income and works through self employment or unpaid family labour in smallholder farming. The most dominant informal non-agricultural form for activities is commerce, traditional artisan activities and petty services such as repairing bicycles. It is not unusual that informal companies have 5-6 employees and some even have 10-15 people employed. The larger firms are normally more strongly represented in the urban areas (WB 2004:12-13).

The strong presence of the informal sector in commerce is estimated largely to be caused by high taxes and tariffs which puts a considerable pressure on prices and competition. Formal firms that do business on the domestic market complains about competition from smuggled goods and feel disadvantaged because they must pay high duty on legally imported goods, while the government does very little to stop business of smuggling (Rodriguez 2004:16). The informal sector should therefore be an issue of focus to the creation of economic growth and a better environment for the private sector.

## 10.3 Business Environment

A broad private sector-led growth is a crucial element in strengthening the country's capacity to respond to the challenges of the global market as well as to foster economic growth for poverty reduction as state in the PARPA. The challenge of fostering adequate skills and knowledge for increased productivity must be seen in relation to the ease of doing business in general. If firms are too occupied with surviving in a highly constrained environment, the visions of strengthening the level of human resources for improving productivity are remaining limited, which shows to be the situation in Mozambique as the moment (Patel).
Mozambique has several important competitive advantages for investments (Salmão). With its geographical location on the coast of the Indian Ocean, the country serves with its harbours as a corridor for the neighbouring countries with no sea access. Mozambique also has important reserves of natural resources including forests, minerals, water resources, natural gas and marine resources (Bila 2006:7). However, competitive advantages are not enough to foster business and economic growth. A range of other factors needs to be in place such as for instance a healthy business environment.

During the last couple of years, Mozambique has taken several initiatives to improve the business environment. In 2008, the country moved to number 134 from number 140 in 2007 out of 178 on the World Bank's annual 'doing business index'. The improvements was mainly gained through two factors relevant to the doing business index, that is 'protecting investors' and 'starting business'. The latter is estimated as having being reduced from 113 to 29 days, which have great significance for entrepreneurs (WB 2008, AfDB/OECD 2008:469). Even though there has been improvements in relation to the doing business index, firms still face a range of difficulties in doing business in Mozambique, which increase the risk of investing significantly. It should furthermore be noticed that the basis on which the calculations of the index is calculated not necessarily matches very well the characteristics of the Mozambican private sector for instance due to differences in the representative firm [7]

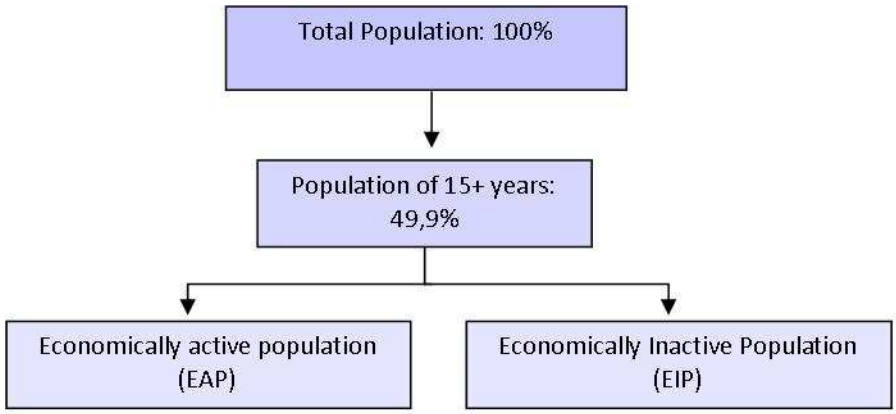
The constraints to especially SMEs can be divided in to the financing side and the business support side. On the financing side there can be pointed to the lack of credit and high- risk loans and insufficient instruments to support SMEs on the part of the government and the financial system. On the side of the firms can be pointed to poor record keeping and financial management, which also impedes the ability to take loans for investments. On the business support side can be mentioned low-level investments in infrastructure, regulations that favour only big business, low quality of the legal system, highly bureaucratic procedures, ridged labour law, and corruption. Practically no surveys or reports assess the lack of qualified skills among the constraints for doing business (Thomas 2005:4, WB 2004:18).

## 10.4 The Labour Market

To plan adequately the creation and use of human resources, is it not only enough to understand the demand side, it is also a prerequisite to know the size and characteristics of the labour force. The latest numbers on the labour force is from the IFTRAB 2004/05 and estimates that 91,8 percent of the population aged 15 years and above are economically active as shown in figure 10.2 (INE 2006:17)

[7] The representative firm employed by the World Bank is 100% domestically owned with five owners, operating in the most populous city, with 10 times per capita income as start-up capital, performing general industrial or commercial activities, receiving no investment benefits and with 201 employees (DNEAP 2006)

**Figure 10.2: Active and inactive population 2004/2005**




*Source: INE 2006*

The figure shows a very young population where more than half is aged under15 years. This underlines the necessity of creating a adequate system of education at all levels that is capable of absorbing the huge amount of young people.

Sector wise only 5-6 percent are active in the formal sector. The majority of the workers are engaged in the agricultural sector, primarily working informally as subsistence farmers. They account for around 70 percent. Service and trade counts for 18 percent while the manufacturing sector only accounts for 1.25 percent and together with mining and construction sectors merely occupy 5 percent of the total labour force (ADEA 2008:3-4). It is furthermore estimated that 60.2% of the workers are self-employed without employed workers.

The division of the occupation shows that agriculture and fisheries occupies 77, 4 percent while service and salesmen employ the second largest percentage with 8, 4 percent and non-qualified workers the third largest with 4,4 percent (INE 2006: 25-26). For more details see table 10.1

**Table 10.1:**

**Distribution of the occupied population per geographical area and sex according to occupation**

| Occupation | **Total** | | | **Urban** | | | **Rural** | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | Men | Women | Total | Men | Women | Total | Men | Women |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Public administration, managers | 0.9 | 1.5 | 0.4 | 2.6 | 3.7 | 1.4 | 0.3 | 0.6 | 0.0 |
| Specialist of intellectual profession and scientists | 0.4 | 0.7 | 0.2 | 1.5 | 2.0 | 0.9 | 0.1 | 0.1 | 0.0 |
| Technicians and professionals with medium level education | 2.4 | 3.6 | 1.4 | 6.0 | 7.7 | 4.4 | 1.1 | 1.9 | 0.4 |
| Administrative staff and similar | 0.9 | 1.2 | 0.7 | 3.1 | 3.6 | 2.6 | 0.1 | 0.2 | 0.1 |
| Service staff and salesmen | 8.4 | 10.3 | 6.9 | 23.5 | 22.7 | 24.4 | 2.9 | 5.0 | 1.1 |
| Farmers and qualified workers of | 74.4 | 66.1 | 87.0 | 39.1 | 23.7 | 55.0 | 91.6 | 84.2 | 97.5 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| agriculture and fisheries | | | | | | | | | |
| Workers, handcraft workers and similar | 4,1 | 7,8 | 1,0 | 10,1 | 17,3 | 2,8 | 1,8 | 3,7 | 0,4 |
| Installation and machinery workers | 0,9 | 1,8 | 0,1 | 2,5 | 4,6 | 0,3 | 0,3 | 0,6 | 0,0 |
| Non qualified workers | 4,4 | 6,8 | 2,4 | 11,3 | 14,4 | 8,2 | 1,8 | 3,6 | 0,5 |
| Others | 0,1 | 0,1 | 0,0 | 0,2 | 0,4 | 0,0 | 0,0 | 0,0 | 0,0 |

*Source*: Adopted and translated after INE 2006:25

An interesting observation related to employment rates in Mozambique is that unemployment increases with the level of education as shown in table 10.2. With 95 percent, employment rates are highest for people with only 1st level of primary education and lowest for the group with secondary or more, with 79.2 percent. No numbers exist exclusively for the population with tertiary education. These numbers indicates that the character of the Mozambican economy is very centred on low skilled activities – primarily in agriculture. This is naturally also an important factor to have in mind when designing the system of tertiary education in Mozambique.

**Table 10.2: Distribution of EAP according to level of education**

| Selected Characteristics | Activity Conditions | | |
|---|---|---|---|
| | **EAP** | **EIP** | **Total** |
| Level of Education | | | |
| None | 94.1 % | 5.9 % | 100.0 |
| Primary, 1st level | 95.0 % | 5.0 % | 100.0 |
| Primary, 2nd level | 85.9 % | 14.1 % | 100.0 |
| Secondary or more | 79.2 % | 20.8 % | 100.0 |

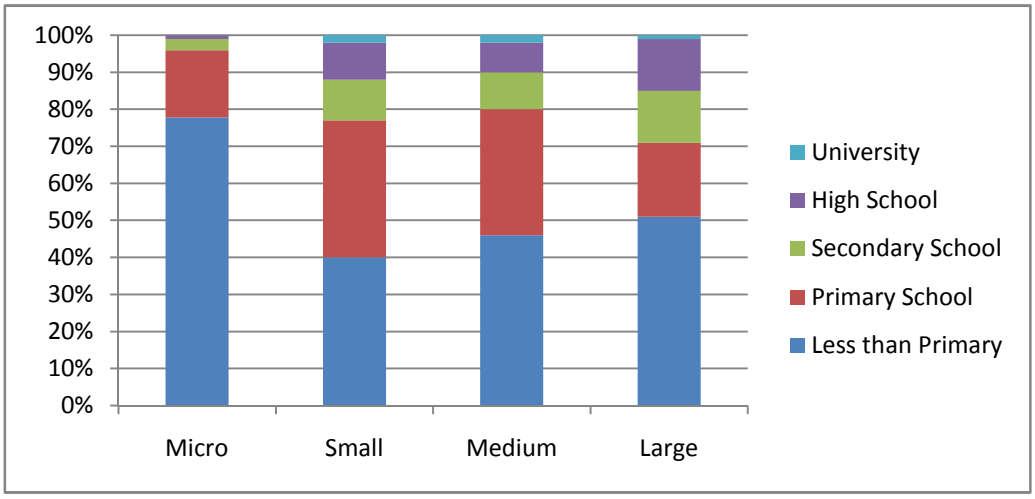
*Source*: Adopted and translates from INE 2006:18

Overall in Mozambique, the labour force is characterized by being poorly educated and possessing limited skills which is identified as one of the major constraints to further economic growth and investment in the country (ADEA 2008:3-4). Numbers from INE 2006 shows that more than half of the economically active population – 54, 8 percent, divided with 67, 3 percent in the rural area and 27, 6 percent in the urban area are analphabets (INE 2006: 19), more than 75 percent have only 5 years or less of schooling, 8.5 percent have managed to achieves secondary or tertiary education and merely 1 percent of the total enrolment pass through the system of technical education. Furthermore, the prospects for a significantly better educated workforce in the future seem to be somewhat limited regardless of increased access to primary education. Still, less than one-third of an age group reach grade 7, less than ten percent get to grade 10 and less than 3 percent achieve to complete 12 years of education (ADEA 2008:4). These numbers are essential to have in mind in the analysis of how to create high skilled human resources for the need of the country, whereas it

is important to have technical qualified persons with the skills to support and implement the produced 'ideas' as stressed by Conceição & Heitor (1999).

A survey on manufacturing firm shows that only a very small proportion of the workforce has a university degree. This counts in general for all firms of all kinds and sizes, though large firms have the highest share of high school graduates, reaching 13 percent of staff. Figure 10.3 shows how the majority of employees have only primary school or less. Thus, 78 percent of the workers in micro-enterprises did not complete the seven years or primary school or have received no formal education at all. This is compared with 40 percent of the workforce in small firms, 46 percent in medium firms and 52 percent in large firms (DNEAP 2006:22).

**Figure 10.3: Education Level by Firm Size**




Source: DNEAP 2006:22

In relation to the strengthening of higher education's connection to the system of innovation it is furthermore worth to notice that only 400 companies really constitute the base for the demand market for skilled workers. To this should be added that about 80% of the employment of the formal sector is made up by trade and services (including public administration, health, social services and education) and more than half of these are concentrated in the capital and the province of Maputo (ADEA 2008:4).

With reference to the HEIs responsiveness to the productive sector and the increased interaction that the theories of innovation systems and gibbons 'mode 2' stress, both the small amount of people employed in the formal sector as well as the limited base of demand for skilled labour constitutes a limitation to the HE system for developing a response to the demands of the knowledge economy.

### 10.4.1 The Labour Law

It is not only the composition of the labour force that is relevant to higher education's role in the economy, also the labour law is worth to include as it regulates the dynamic of the formal labour market which mostly is where there is demand for skilled people.
The Mozambican labour law has often been criticized for complicating the ease of doing business by being rigid, dysfunctional and highly protective of the Mozambicans employed in the formal sector. Among other things, the labour law requires rigid procedures for hiring and firing as well as high redundancy payment requirements. The result is that only few businesses can afford to hire workers on formal terms with the consequence that only 8 % of the workforce is protected by the law (eiu.com). To this should be further added that due to the high growth rates, the labour market demand is so substantial that local firms often have difficulties in attracting and retaining trained and qualified staff (NORAD 2002:31-32). Additionally, it is very difficult and expensive to bring skilled expatriates to work in Mozambique. Obtaining work permits for expatriates is a slow process that requires the approval of the Ministry of Industry and Commerce (MIC) and normally takes around three to six month, in some cases even more to process (Sarkar 2000: 25- 29). These two factors have resulted in a significant raise in cost to levels that exceed those of other countries in the Southern African region which can be damaging for the country's competitiveness of the country.

### 10.4.2 Recruitment Procedures

An aspect that was highlighted in both interviews and informal conversations was that the procedures and culture of recruitment also plays a significant role in bridging graduates with the labour market (Ribeiro). The Mozambican society is highly influenced by what can be entitled as nepotism, or with the Portuguese phenomenon '*cunha*', that favourites relatives and friends for jobs, based upon that relationship, rather than on an objective assessment of the candidate's capacity.
The survey on manufacturing firm states that 77 percent of companies use recruitment through allocations by local authorities as the principal recruitment method. The second most popular method, which is used by 65 percent of the firms, is to use recommendations from friends and family (DNEAP 2006:23).
According to Ribeiro, the consequences of these more informal recruitment methods, or 'cunha', are that unqualified people often occupy important jobs while the qualified are left with jobs that have less connection to their education or maybe even as unemployed.
Additionally, most firms do not have any kind of human resource management (HRM) strategies. However, Ribeiro has experienced examples of firms that increased productivity significantly after having applied a human resource (HR) policy and changed unqualified workers with skilled and professional workers. He believes that HRM schemes can help to fight the downsides that the

'cunha factor' imposes on firm performance (Ribeiro). This assessment furthermore emphasises the positive impact qualified workers can have on productivity.

## 10.5 Skills and Knowledge Needs

Whilst the problem of low labour productivity and limited innovative potential often is emphasized in reports on investment opportunities in Mozambique, studies dedicated to map the concrete skills and knowledge needs are largely non-existing. This should however be the first step before initiating reforms in the education system and was in relation to the PEES carried out through dialogue with the productive sector. It has only been possible to find general observations that emphasize low levels of technology and productivity and an insufficiently skilled labour force (WB 2004:15-16).

Within the framework of skills categorization of Levy & Murnane (2004), the analysis of the Mozambican economy points primarily to an economy dominated by non-routine manual tasks and routine manual tasks. It can though be estimated that with the current economic growth that Mozambique is experiencing, the labour market demands will increasingly be requiring more skilled workers that dominate routine cognitive tasks, complex communication and expert thinking (Salmi 2006:37-38). For example is a significant part of the new jobs created by the mega projects in the gas, metal and telecommunication industries[8] for people with medium to high skills. The mega- projects push up the demand for skilled labour and do little to absorb the unskilled labour (WB 2004:7). This change in the skill profile has increased the return to post-basic education, especially by workers with limited or no education and skills (ADEA 2008:5). This draws a scenario in the long run where workers who lack education and skills will fall gradually more behind and remain trapped under the poverty line.

In relation to this, it is however important to remember that the amount of people employed and required by the mega-projects is a relatively small part of the total workforce. According to all interviewed questioned on this issue, the area where Mozambique can make the most use of enhanced skills and knowledge is in agriculture. It is both the sector where most people are employed and that have good potentials for development. The focus should therefore be on increasing the productivity and quality of the products as well as adding more value before exporting (Patel, Brito, Salmão).

Another matter that should also be taken into account in the assessment of skills and knowledge needs is that Mozambique has both the formal and informal labour markets and that education policies ideally should be able to respond to both in a way or another. On the one hand there must be good opportunities for upgrading human resources for the small, but growing formal sector where the skills and knowledge demands are increasingly led by the FDI run projects and on the other hand there must also be taken care of people with none or very limited skills that are

[8] Here are referred to the Sasol gas pipeline, MOZAL I and II (aluminum smelter), new coal and sand mining projects as well as infrastructure upgrading projects in Maputo and Beira industrial development corridors.

often employed in the informal sector (ADEA 2008:23). This study will be focused towards the needs of the formal sector, however it is important to point out that the rest of the work force cannot be completely excluded whereas the right composition of the work force also is of high relevance if skills and knowledge are to be of proper use. As emphasized by Conceição & Heitor (1999) and the World Bank (2000), these circumstances points to the importance of a vertically diversified system of tertiary education that can ensure the necessary flexibility required by society in terms of employment needs as well as coping with the changes in technology and market requirements posed by international competition and operators (Conceição & Heitor 1999:48, WB 2000:29).

# 11. The System of Higher Education

An important aspect of the analysis of the HE system that became clear during the field trip was that the dynamics of higher education and its contribution to the society is strongly dependent on the mechanisms of the entire system of education. It is important to understand the situation of the area of technical and vocational education and training (TVET) whereas many of the labour and education needs of the Mozambican economy is related to this field as concluded above. Furthermore, it is primarily within this field that answers to help the complicated employment situation can be found (Chilundo). The articulation between the TVET sector and the HE system is essential. They supply each their section of human recourse needs and are strongly interdependent as also illustrated in the theories on the relation between ideas and skills Conceição & Heitor (2001, 1999). In this context, 'skills' are mostly produced in the TVET system while 'ideas' are produced in the general education system. The usefulness of the ideas of an engineer decreases strongly if there are no trained technicians to implement them and on the other hand, technical expertise has less value to society if there is no supply of ideas added. These as well as other issues will be discussed in this following chapter, but first, a short introduction of the history of higher education in Mozambique is to be presented. The system is clearly a product of its own history so to understand the HE system it is essential to know its history.

## 11.1 Brief History in Higher Education in Mozambique

The system of higher education in Mozambique can largely be explained through three major phases: the end of the colonial era, after independence and during the civil war and after the peace agreement (Kouwenhoven, 2003:17). The history of higher education in Mozambique starts in 1962 with the founding of what was to become Mozambique's first university, at first with the name 'Universidade de Lourenço Marques, which after independence, in 1976 turned into 'Universidade Eduardo Mondlane'. Higher education was at that time considered as being

primarily a privilege for children of the Portuguese colonialists and elite of the 'assimilados' – that is Mozambican who where assimilated to Portuguese culture. As a result, only around 40 black Mozambican students, less than two percent of the student body attended the university at the time of independence (Kouwenhoven 2003:41, Beverwijk 2005:15, Fry & Utui 1999:1-2, Enemark 2005:4). The capacity after 1975 also diminished significantly after a large percentage of not only the student body but also the staff had left for Portugal. Student number fell from 2.433 on 1975 to 750 in 1978 and the teaching staff was reduced to only ten persons (Brito et al. 2005:2).

With the new Marxist-Leninist form of government, the university changed perspective to a more utilitarian position having the central mission of training the critical mass of highly educated staff that the country needed to build the new republic (Brito 2003:1-2). This led to the closure of courses that was estimated as being less relevant and few students. These where biology, chemistry, physics, geology, mathematics, geography, history, modern languages and educational sciences. Furthermore, a faculty of Marxism-Leninism was inaugurated to make instructions available to all university students and a faculty for Combatants and Vanguard Workers was established for management for party cadres. During these years personal careers were also subject to central planning and the Ministry of Education assigned students to what was considered appropriate courses to them and after finishing university, they were similarly put in the positions within the government and party settings.

The civil war naturally had a major impact the university. Government revenues declined and the university lost every opportunity for conducting research outside Maputo and laboratories, buildings and other facility fell gradually more into disrepair (Fry & Utui 1999:3-4, Enemark 2005:4).

By 1989 focus turned to strengthen higher education and to modify the university to respond to the political and economic setting of that time which for instance included seeking funds from international donors. This led to the development of a five-year development programme which focused on five main problem areas: 1) the difficulty of training and retain qualified Mozambican staff and the necessity of reducing dependency on expatriates; 2) the low number of student admissions and a significant regional imbalance between students from the south and the center/north of the country; 3) a excessive student drop-out rate and low rate of graduation; 4) a scarcity of research and outreach activities; 5) and a inefficient, unmanageable and over-centralized administration (Fry & Utui 1999:5).

The choice of these specific problem areas where not chosen at random. By 1990, one-third of the teachers consisted of expatriates of which many were provided by the donor community without much regards to the needs of the university. Moreover, low salaries made it difficult to maintain Mozambican staff and to attract young Mozambicans. Many of those who worked in the university were obligated to have a second job in order to earn enough for a living. Other critical features concerned the division of students both in terms of geography and gender. A surplus of the students, 61 percent came from the more developed southern regions and less than 25 percent of them where women. Furthermore, the university had a high dropout rate. Only 50 percent of the students completed their courses and of these, less than half managed to do so in the allocated

time. The research carried out at the university was very limited, except for the social sciences and the educational standard of the teaching and administrative staff was very low. A significant l progress was achieved with the five-year development plan, but many problems still maintained and the management of the university was as inefficient as always (Fry & Utui 1999:6-7).
After the peace agreement in 1992, many changes occurred in Mozambican system of education.
It became clear that the system of higher education could not meet the demands of the society. The system was inherently inefficient as a result of each HEI developing its own policies and the lack of system characteristic such as quality assurance mechanisms and credit transfer systems. Also there was a general agreement that the sector had to expand and diversify whereas there were not enough graduates to fulfil labour market requirements (Costa & Nooijer2006:30).
As the multi-party democracy became a reality, the monopoly of the public institutions decreased. Several private HEIs were established in this period and have been expanding since. The upgrading of the HE system also led to a higher degree of geographical diversification. HEI was until 1990 concentrated in the capital but expanded to being offered in seven provinces out of ten in 2005 and with more to come (Brito et. al. 2005:3).
The expansion in the HEIs was naturally followed by an increase in the student body from approximately 4.000 students in 1990 to almost 17.000 in 2002. Nevertheless, students still represent a very little segment of the Mozambican population. Numbers from 2002 show that merely 0.16 percent of the age cohort aged 20-25 attend university. This corresponds to 40 out of every 100.000 inhabitants, which is significantly lower than the numbers from the neighbouring countries of Zimbabwe and Botswana that educated respectively 638 and 596 university students for every 100.000 inhabitants (Brito 2003:2-3).

## 11.2 HE in Mozambique Today

In the law 5/2003 HE is broadly described as “including all post secondary education (after successfully concluding grade 12 or equivalent), including universities, polytechnics, teacher training institutions, institutes for medical training and agriculture (and other fields), distance education centres, and research centres and institutes” (Chilundo et al 2007:27). In comparison, the 1992 law defined HE as “the level of education that trains high qualified technicians and specialists in the most diverse domains of scientific knowledge, for the needs of the country’s development” (Chilundo et al 2007:14).

Today’s system of Higher Education in Mozambique is a result of a growing demand for higher education and accordingly the substantial expansion that has taken place during the last couple of years. Between 2002 and 2006 the number of students in higher education has more than tripled from 13.752 in 8 HEIs in 2001-2002 to more than 43.233 pupils in 2006 divided between 23 HEIs (Chilundo et al 2007:28, MEC 2008a: 3).

According to the Ministry of Education (MEC) (2008b) Mozambique has currently, 29 institutions of higher education, divided between 13 private and 16 public institutions and spread over the whole country (MEC 2008b).[9] Nevertheless, there is not enough space in universities for the demand posed by the increasing number of secondary graduates. Numbers from the two major public universities confirm this. In 2006, the number of candidates for UEM was 15.197 for merely 2.338 places which give six candidates for each available place and in Universidade Pedagógica (UP) there were 13.333 candidates for 2.048 places meaning 5.5 candidates for each place (Chilundo et al. 2007:7).
The rapid expansion has been so significant that some are talking about a so-called 'massification' of higher education which has lead to concern for the quality of the education (Chilundo et al. 2007:10). The biggest preoccupation of the government is however to improve equity in access by targeting a gender and regional balance for the whole country as emphasised in the PEES. The expansion of the system addresses this issue, for instance do all provinces at the moment have at least one HEI (Chilundo et al. 2007:28).

Part of reforming the HE system was to redefine the degree structure, which now means that Mozambique operates with four different types of degrees, being: Bachelor degree (three years), 'Licenciatura' degree (four or five years, to be defined individually by the HEI), Master degree (two years) and Ph.D degree. Additionally, students can also obtain academic diploma's which are provided by both universities and polytechnics (Costa & Nooijer 2006:33). Currently, only Polytechnic schools can provide Bachelor degrees however, UEM has recently started to adopt its degree system to the European model of the Bologna process with three years bachelor degree and two years master degree, independently from other HEIs. This change is subject to critical debate and many disagree with the transformation (Chilundo, C.Dias, Alberto). The cristique is concentrated on two issues: The first refers to the process of regional integration and questions whether it is not better for Mozambique to be in alignment with the neighbouring countries, which have four- years for a 'licenciatura' as it is currently the case in the major part of the Mozambican HE system (C.Dias). The second raises concern of the consequences of a three year bachelor in relation to the quality of the graduates, as explained by C.Dias:

> "With reference to Bologna, what is happening is that in Europe, the students enter the university prepared, here it is not like that. We know about the difficulties that exist in the secondary schools. The students come with many gaps in the education, so that the university has to compensate these gaps and has to do some kind of preparation, at least the first year so that they manage to take the course. This aspect cannot be ignored. (…) (In three years) they are not going to manage to do anything, they are not going to have any kind of skills. For this reason, the programme was five years in the beginning, because the first year in practice was a

[9] For an overview over higher education institutions in Mozambique, see Appendix IV

> secondary program, it was about levelling the students with the knowledge that they should already have know at entering the university."(C.Dias 2008, 17:06)

Thus, the issue of years of studies is first of all related to the concern of quality. As will be explained in the following, the matter of quality in higher education in Mozambique is in fact a severe problem that is also emphasised by the private sector. It is therefore critical that a HEI independently can make so big changes without any prior form of discussion. This also points to a lack of central coordination.

## 11.3 Quality

The lacking quality of graduates is one of the most criticized points from the private sector. It is stressed that candidates of HEIs have such a low academic level that they are hardly useful and that they have a heavy lack of practical sense towards tasks. The private sector is thus far from satisfied with the HE graduates. As stated by Chilundo; "At this moment we are having thousands and thousands of graduates without quality and thus a frustration for the market" (Chulindo 2008; 06:41). Especially the issue of practical skills is often underlined. They emphasize that graduates have very little knowledge of how to work in an enterprise and that they often have certain arrogance towards being an employee. Many graduates consider that they should be employed in leader positions due to their high degree of education and are not aware of the necessity of keeping learning.

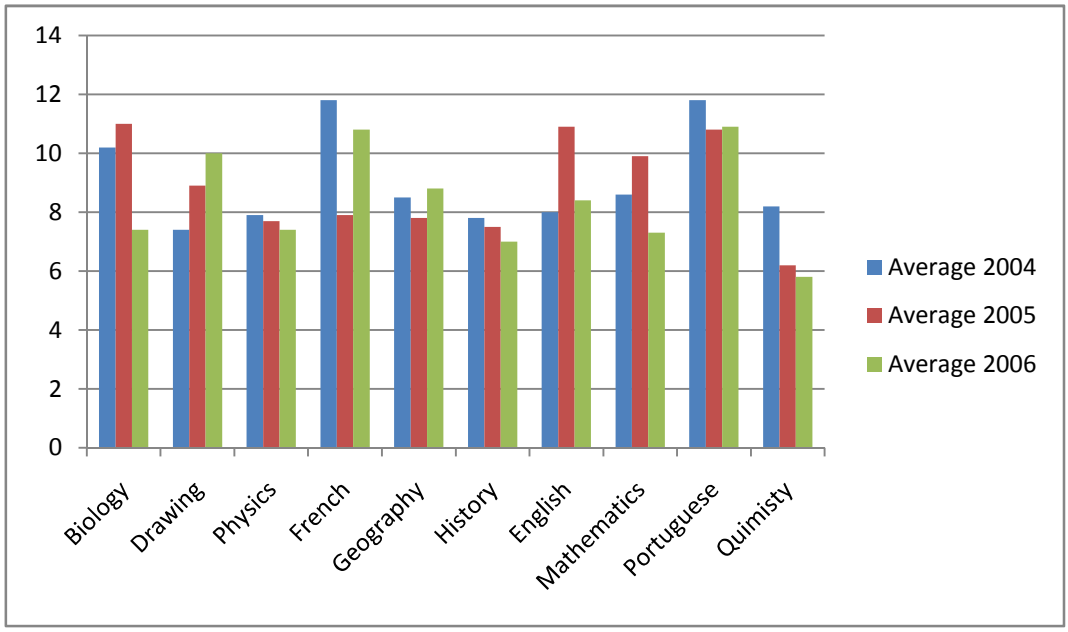
The issue of 'attitude' or 'working culture' is thus important to have in mind. It seems that young Mozambican have the perception that a degree of higher education is the direct provider of power and money without having to do further efforts. While this might was closer to reality in the colonial times, it is not the case of Mozambique today and the self-important attitude clearly has a negative impact on graduates' performance in the labour market. As pointed out by Novais and Cabral, this formation of attitudes needs to be nurtured in the education system already from the primary school (Simbine, Ribeiro, Patel, Novais, A.Dias, Cabral).

While the lack of quality is not being neglected by HEIs, they tend often to pass on the blame to secondary education by pointing to the fact that quality of the students entering the university is extremely low and that many do not possess the skills required to begin tertiary education, as explained in C.Dias' quote above (Cabral, C.Dias, Quilambo, Brito). In relation to this should be emphasized the previous mentioned small number of admitted students to universities in relation the amount of applicants. The issue is thus not necessarily weather too many students are admitted to tertiary education. The situation merely underlines the severity of entering students low education level.

This lack of quality in secondary schools is being confirmed from various sources and additionally, there are evidences that the quality of the secondary students is decreasing. This especially shows in the admittance exams to the university. The evaluations of the results of the admittance exams

in UEM from 2004, 2005 and 2006 shows both that scores are extremely low and that they in most subjects has been falling from year to year. Chemistry, Physics and History are the subjects with the lowest scores while none of them even reaches the average of 8 scores[10]. In fact, the only subjects that manage to maintain a positive average (10 and over) are French and Portuguese (Chilundo et al. 2007:36-37).

**Figure 11.1 - Average scores by subject from UEM, 2004-2006**




Source: Chilundo et al. 2007:37

It is thus relevant to include the situation in secondary schools in the discussion of quality of HE. The issues that are regarded as causing the problems in secondary schools are similar to those mentioned in relation tertiary education. These are for instance unqualified teachers, outdated curriculums and, in relation to science subjects lack of installations. Likewise, an argument from the point of view of the secondary education is that students are not well enough prepared from primary school and that many have exaggerated little capacity.

Cabral (2008) criticizes curriculums in the secondary school for being filled with subjects of less importance and for the general expectance in society that the schools should provide an encyclopaedic knowledge. While this earlier might could be justified, she argues that today's possibilities for access to information, for instance through the internet, should encourage a higher degree of individual study. However, Mozambique still maintains the paradigm that the teacher is the one that teaches and that the student is the one that learns by repeating the teacher. Thus, in the terminology of Lundvall & Johnson (1994), the knowledge transferred in the

[10] Mozambique has the same score scale as Portugal. It goes from 1-20 and from 10 and above is approved.

education is restricted to 'know-what' and does not imply the more useful 'know-why'. With reference to the argumentation of the 'learning economy', this is highly critical, whereas the very most important thing that students should learn in the labour market of the knowledge economy is in fact to learn independently, and to understand the value of learning. This aspect is far from being promoted in the Mozambican education system. Another relevant issue is the matter of corruption in the schools. Many children pass examinations without actually knowing the material or even how to read and write and should therefore not be able to pass on to the next level (Cabral).

While these issues relate to the secondary level, observations and interviews from the field trip gave a strong impression that the situation is highly similar in higher education.

As a response to the increasing concern on the quality of education, the government has used almost four years time to develop a credible 'Quality Assurance and Accreditation System' (QNAC) as proposed by the PEES, which was approved by the council of Ministers the 31th of December 2007 (GoM 2007). The system is developed on the basis of studies made of systems in other countries and adopted to the Mozambican context. The core objective of CNAQ is to monitor and help raise the quality of education through two subsystems; self-evaluation and external evaluation (Chilundo et al. 2007:39). However, an approval is not yet sufficient for enhancing the quality in education. In fact, is the creation and approval of the system often the easiest part, while the implementation and the functioning habitually seems to be a slower and more difficult process to sustain in the Mozambican government, naturally depending on the political emphasis on the matter. In the case of CNAQ, there seems to be a lack of political will to put the system into practice, as noted by Chilundo (2008): "The National Commission for Quality (CNAQ) was approved in December last year and yet there is no board of direction. This is a clear message that there is no priority from the Government" (Chilundo 2008, 08:10). As put by Salmão "Many times I think that we here (red: in Mozambique) have a great capacity of thinking, imagining and even writing. But when it comes to the moment of implementation, well… we forget to implement." (01.20.42)

Moreover, the question can be raised whether the implementation of CNAQ can solve the actual problems of lacking quality in the Mozambican education system merely by adopting evaluation mechanisms. The matter of quality in Mozambican HE is namely closely linked to the capacity of the teachers, which in many cases is very low. As stated by several interviewed, the expansion of HE system has caused a lack of qualified teachers. The few university teachers there are, often work in several universities and teach in areas where they are not completely qualified because it is not always possible to find better qualified that are available. This often means that teachers do not have time to do research or update and specialize their knowledge because their time schedule is filled with giving lessons, which again is related to the low salaries of the teachers. Having more jobs means better possibility for acquiring a good middle class life with the material needs which it implies (Quilambo, Cabral). In this way, the expansion of HE is thereby contributing to lowering the quality of the education. With reference to the already low educational degree of university teachers as can be seen in table 11.1 this tendency is naturally very unhealthy for the

level of quality generated in the HE system. The table shows that among 11 public HEIs there are merely 209 internal teachers with a PhD degree with 163 of those employed at UEM and 272 with a master degree, similarly with the majority employed at UEM. The situation in private HEIs is even worse while here can only be counted 22 PhDs and 57 with master degrees in 10 HEIs.

**Table 11.1: Teachers by type of contract and level of education, 2006**

| Institution | Internal teachers | | | | | | Part time teachers | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bachelor | Licenciatura | Diploma | Master | PhD | Subtotal | Bachelor | Licenciatura | Diploma | Master | PhD | Subtotal | Total |
| **Public** | | | | | | | | | | | | | |
| ACIPOL | 0 | 10 | 0 | 0 | 0 | 10 | 0 | 57 | 0 | 8 | 4 | 69 | 79 |
| AM | 3 | 23 | 1 | 13 | 0 | 40 | 0 | 14 | 0 | 3 | 1 | 18 | 58 |
| ESCN | 12 | 6 | 0 | 4 | 0 | 22 | 0 | 13 | 0 | 11 | 3 | 27 | 49 |
| ISAP | 0 | 1 | 0 | 1 | 1 | 3 | 0 | 11 | 2 | 7 | 1 | 21 | 24 |
| ISCISA | 1 | 6 | 4 | 0 | 0 | 11 | 2 | 16 | 10 | 0 | 0 | 28 | 39 |
| ISPG | 0 | 7 | 0 | 0 | 0 | 7 | 0 | 0 | 0 | 4 | 2 | 6 | 13 |
| ISPM | 0 | 7 | 0 | 1 | 0 | 8 | 0 | 3 | 0 | 1 | 0 | 4 | 12 |
| ISPT | 0 | 4 | 0 | 0 | 0 | 4 | 1 | 1 | 0 | 1 | 0 | 3 | 7 |
| ISRI | 0 | 11 | 0 | 17 | 6 | 34 | 0 | 39 | 0 | 7 | 0 | 46 | 80 |
| UEM | 2 | 447 | 8 | 188 | 163 | 808 | 1 | 281 | 10 | 70 | 34 | 396 | 1204 |
| UP | 0 | 177 | 0 | 48 | 39 | 264 | 0 | 225 | 0 | 6 | 1 | 232 | 496 |
| **Sub total** | 18 | 699 | 13 | 272 | 209 | 1211 | | | | | | | |
| **Private** | | | | | | | | | | | | | |
| ISC | 1 | 2 | 0 | 3 | 1 | | 1 | 1 | 0 | 1 | 0 | | |
| ISCTEM | 0 | 8 | 0 | 3 | 2 | 13 | 0 | 95 | 0 | 49 | 9 | 153 | 166 |
| ISET | 2 | 6 | 0 | 9 | 0 | 8 | 0 | 4 | 0 | 1 | 0 | 5 | 13 |
| APOLITECNICA | 0 | 11 | 0 | 9 | 4 | 24 | 0 | 123 | 0 | 83 | 15 | 221 | 245 |
| ASUTC | 0 | 5 | 0 | 0 | 5 | 10 | 0 | 62 | 0 | 6 | 6 | 74 | 84 |
| UCM | 46 | 55 | 2 | 35 | 6 | 144 | 31 | 104 | 0 | 22 | 2 | 159 | 303 |
| UDM | 0 | 11 | 0 | 0 | 2 | 13 | 1 | 139 | 0 | 22 | 5 | 167 | 180 |
| UJPM | 0 | 4 | 0 | 4 | 1 | 9 | 0 | 40 | 0 | 6 | 5 | 51 | 60 |
| UMBB | 0 | 4 | 0 | 1 | 0 | 5 | 0 | 50 | 0 | 5 | 2 | 57 | 62 |
| USTM | 0 | 7 | 0 | 2 | 1 | 10 | 0 | 96 | 0 | 20 | 6 | 122 | 132 |
| **Sub Total** | 49 | 113 | 2 | 57 | 22 | 236 | | | | | | | |
| **Grande Total** | 67 | 812 | 15 | 329 | 231 | 1447 | | | | | | | |

Source: MEC 2008a, (data gathered from HEIs in 2007)

Many interviewed point to the use of internship as a solution to the lack of practical skills among graduates. They however, also emphasize that it is very difficult to find internships in the private sector. First of all, it is not very big and can not manage to absorb all students. Secondly, the SMEs lack capabilities to have interns and the big companies are much closed. It is also stressed that clear guidelines are needed from HEIs to make sure the student will not end up learning nothing, which is estimated as being very likely (Quilambo, Ribeiro, Rafica,Patel, Simbine).

## 11.4 Relevance of Candidates and Knowledge Production

While the issue of quality in education is essential for fulfilling the needs of the productive sector, it is just as necessary that the candidates have the professional qualifications which match the needs of the economy. This was especially emphasised in interviews with private sector representatives, who criticises the variation of the supply stating that there are a unequal spreading between people with higher and medium education with a predominance of the former(Simbine, Ribeiro, Alberto, Patel). Furthermore, critiques point to that many programmes

and courses are out-of-date and of limited relevance which means that they do not manage to live up to the specific requirements posed by for instance emerging sectors or individual provinces.

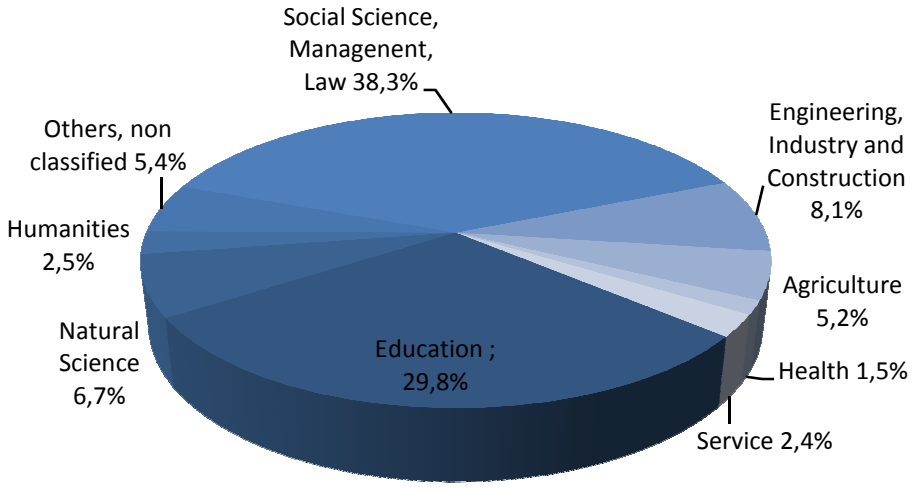
According to the information found, there are at this moment no existing organizational mechanisms that have the mandate of gathering information about labour market needs with reference to higher education. This means that there does not exist any clear definition of the demand for highly skilled resources nor any kind of vision about in which area highly skilled people will be needed in the future. This is however not due to a lack of acknowledgment of the importance of such information. This was already stated in the base line study made prior to the development of PEES:

> "It is necessary for the system to develop and monitor the tendencies of the demand of qualified persons. It is necessary to act with flexibility both in terms of level of admission of graduates as well as in changes in curricula and in the revision of the content of the courses, thus answering to the necessities that are constantly changing." (MESCT 2000:65 – own translation from Portuguese)

Due to lack of statistical data, the private sector is often involved as dialogue partners in decision-making process as it was the case in the preoperational exercise for the formulation of the PEES. The outcome of the dialog showed an urgent need of people with practical and technical skills, which led to the priority of expanding the system of higher education with polytechnic schools. Three polytechnic schools were hereby opened in the provinces of Gaza, Manica and Tete (Chilundo 2008). The consequences of the shift of focus concerning the expansion of the education system from more polytechnic schools to more universities has led to a surplus production of candidates with minor relevance to the urgent needs of the Mozambican economy (Quilambo, Ribeiro, Alberto, Patel, Chilundo)

Latest numbers of student per field of study (2006) show a clear overweight on the subjects of social science, management and law which counts for 38,3 percent of the student body, while engineering, industry and construction that holds candidates to sectors of great importance to the Mozambican economy only counts for 8,1 percent and agriculture which is the sector where more than 70 percent of the population is employed only counts for 5,2 percent of the total amount of students, as showed in figure 11.1(MEC 2006).

**Figure 11.2: Numbers of University Students According by Field of Study (2006)**




Source: MEC 2006

With reference to Prewitt (2004) who points to the risks of the market –derived HE, the image shows the result of a HE sector that is dominated by free market mechanisms with limited restrictions and is a clear sign of the impact of the expansion in private HEIs whereas they normally are dominated by these fields of study that are in majority. Furthermore it points to the fact that fields that requires specific equipment such as laboratories and machineries is poorly represented, which must be related to the high cost of acquiring and maintaining the equipment. Finally, the picture also shows the effort that has been made in the recent years for increasing the quantity of teachers as a part of the millennium development goal of 'creating education for all' (ADEA 2008:5).

The numbers of graduates according to field of study is nonetheless not only related to the available types of education. Students' preference of study is also a relevant factor. Statistics of admittance from UEM show that the search for certain fields of study has high prevalence in comparison with others. Whereas the data from private HEIs is difficult to gather, it has not been possible to obtain data on the candidates for admission in all HEIs and thus to catch the complete picture (Chilundo 2007:30). The numbers from UEM, though sketch a picture of the situation.
The popular fields are those of social sciences and humanities while programs such as Chemistry, Geology, Physics and Meteorology and Mechanics are so out of favor that there were fewer candidates than vacancies in the university (Chilundo et al. 2007:7). There are no specific estimates on why the preferences of students are divided in such way, but an explanation might be found in the lack of equipment for conducting appropriate teaching in science subjects in secondary schools as well as a lack of qualified teachers.

According to MESCT (2000) there are two strategies by which the system of higher education better can respond to the demand of the labour market. On one hand there is need for introducing a higher degree of flexibility of curricula and courses and on the other hand it is compulsory to follow the development of the labour market closely as previously emphasised (MESCT 2000:65-66). However, as mentioned, the fact that the necessity for establishing a system to gather data on labour market demands for high level skills was recognized many years ago does not yet seems to have encouraged any kind of activity for improvement in the area.
While there seem to be no direct initiatives of regulating the amount and types of fields of studies in the Mozambican HE system, the importance of a such regulation can not be overestimated, which the example of Sri Lanka shows. Here, the need for expanding the HE system to create better opportunities for the young generations was recognized many years ago. However, most of the new education opportunities were created in low-cost subjects, especially in humanities, which did not lead to employment. As a result, the country now has almost 30.000 underemployed and unemployable university graduates, while still being in lack of engineering, which has not helped to create political stability or economic development (Thulstrup, Hansen & Gaardhøje 2005:23).

### 11.4.1 Pedagogical Approach

Another relevant area that should be addressed in order to comply with the critiques from the private sector is concerning the pedagogical matter and the formation of students in general. As already emphasised is one of the most common critical points from the private sector that students have very little clue about how to work in 'real' life and lack the sense of 'working culture' and 'the right attitude' as described above (Patel, Cabral, Alcino C.Dias, Simbine).

As noted by Lundvall (1992) learning is the most important process in the knowledge economy (Lundvall 1992:1) and subsequently is the type of learning process central to the knowledge and skills outcome. This argument is being underlined in the Mozambican case where the private sector is asking for candidates with innovative and problem solving skills, that is, the know-why type of knowledge, while the education system with traditions of rote learning and know-what knowledge is producing candidates which is far from innovative and problem solving (Costa & Nooijer 2006:35). This thus points to a need for change in the pedagogical approach.
This is also being confirmed in the baseline study made prior to the development of the PEES. It states that "the quality of the teaching methods is very weak: rarely computers or new technologies of communication and information are used, the students' access to the Internet is very limited and the principles of 'learning to learn' are not considered (MESCT 2000:48 – own translation from Portuguese).
Some scientist proposes the method of problem based learning (PBL) as a way of enhancing innovation and creative competences of students. PBL is a not a specific method of teaching but

shall rather be classified as “a philosophical idea based on a certain conceptual perception of learning and a set of core principles” (Dahms & Stentoft 2008:2). In brief, PBL, which is very much in line with Gibbon’s ‘mode 2’, is a student centred approach where focus is shifted from teacher teaching to the students learning and where the learning is centred on solving real life problems. Emphasis of the knowledge creation process in PBL is on equity and hierarchy and positions are not respected. In this process, the teachers thus have the task of supporting students in their learning and “setting up situations in which a motivated learner cannot escape without having learned” (John Cowen in Dahms & Stentoft 2008:3). The PBL approach has been tried implemented in some HE studies in Mozambique, including branches of the Catholic University and the medicine faculty at UEM. However, it has shown not to be an easy task to implement and opinions about the success of introducing PBL at HE in Mozambique are various.

According to C.Dias (2008) most teachers in higher education are not prepared to use the methods of PBL. She even estimates that it can have negative consequences for students to be taught with the methodology of PBL without a properly prepared and motivated teacher. She furthermore stresses that this aspects of PBL is being ignored in the designing of problem based curriculum (C.Dias 2008). Thus, the fact that the introduction of PBL seemingly has been very top –down and has not involved the teachers has not resulted in a success for PBL in the Mozambican context. This however does mean that it is an inappropriate teaching method, it more points to the importance of introducing it right and of being aware of the conservatism concerning teaching methods on part of teaching staff. This does though not only relate to PBL. In general, the pedagogic level of teachers in higher education is very poor. UEM has experimented with pedagogical courses for university teachers, but there was not much willingness and understanding from the teachers on the necessity of acquiring pedagogical skills and consequently, not much changed occurred in the teaching methods although highly needed (C.Dias 2008).

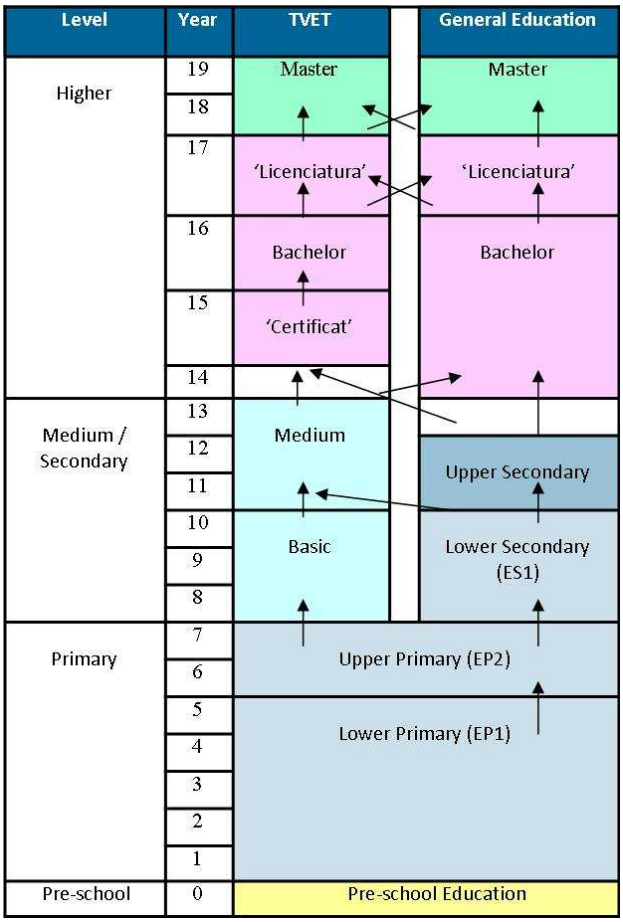
## 11.5 Articulation within HE, with Subsystems and the Broader Education System

As previously mentioned, results produced in the HEIs both in terms of knowledge and human resources are strongly depended on the rest of the education system, in the analysis of the functioning of the HE system, it is therefore essential to include the articulation with other subsystems.

The general criterion for attending an institution of higher education is to have completed 12$^{th}$ grade or equivalent. Further, the HEIs are allowed to define individual criteria with the basis of professional experience of the candidate. The criteria though have to be approved by the Ministry of Education and Culture (MEC) (Chilundo et al 2007:29).

An illustration of the entire Mozambican education can be seen in figure 11.2

**Figure 11.2 – The Mozambican Education System**




Source: Chilundo et al (2007)

As already described, one of the critiques from HEIs to the other components of the system is primarily aimed at the teaching quality at the secondary and primary level. It is an overarching weakness of the entire system, which affects all levels of the system and in the end also the performance of in the labour market and the country's ability to sustain development.

GoM has done a huge task to reach the millennium development goals and the target of 'Education for All' has lead to significant improvement in primary school enrolment and completion rates. During the first half of 2007, enrolment in primary school reached 94.1 percent of school-age children. The improved conditions at the primary level are however causing problems at the post-primary level and many children are without possibilities for continuing education due to lack of schools and teachers. It is estimated that on an annual basis, more than 160.000 primary school graduates cannot find places in secondary schools.
Furthermore, the political focus on the primary level has taken place at the expenses of the development of post primary education. This counts in particular for the secondary level, where

new schools are opened without all teachers and especially lacking teachers for science subjects. This has resulted in an increased pressure on technical education to receive the growing number of pupils from the primary school (ADEA 2008:5, AfDB/OECD 2008:472, Chilundo et al. 2007:36).

### 11.5.1 Technical and Vocational Education and Training (TVET)

As illustrated in the figure 11.2, the Mozambican education system contains both general education and TVET. The TVET is fundamental to include, whereas it is essential in the development and upgrading of skills complementary to the Mozambican economy. The importance of developing skills is emphasised in the theories on KE, where the production of new skills is assessed as establishing the bridge from the production to the usage of ideas (Conceição & Heitor 2001:87). Furthermore, the development of local technicians was one of the focus areas in the Asian countries' success in closing the knowledge gap. It is therefore essential for Mozambique to have a system of skills creation that is flexible and has the capacity to adapt to changing circumstances.

It is within TVET, that most immediate needs of the economy are attained and according to Brito (2008) it is this system that should be most flexible to the change of labour market demands (Brito 2008). As figure 11.2 demonstrates, TVET institutions offer equivalency to academic qualification and students should be able to shift from one system to another. The pathway to facilitate this is however not always straight forward and there exist no mechanisms to recognize previously-acquired learning (ADEA 2008:6). This must be estimated as a crucial function in enhancing interconnectedness between ideas and skills as illustrated in figure 2.4 and the designing of the tertiary education system adaptive to the knowledge economy (Conceição & Heitor 2001:87).

TVET in Mozambique has been dominated by a supply-led approach disconnected from industry needs and has been very slow at responding to the changing demands of the labour market (AfDB/OECD 2008:270). Furthermore, the TVET system is suffering from many of the same diseases as the general education system. One of the major problems is its fragmentation and the uncoordinated way in which each subsystem is managed and administrated as a result of the lack of an overall institutional framework. This is further complicated by the many different actors that are involved in the system, counting several ministries and private sector partners. In terms of funding, TVET is highly under-resourced in comparison to the education and training systems in the neighbouring countries. In 2003 the government spent 0.2 percent of GDP, or 2.3 percent of the education budget on TVET. (ADEA 2008:5-6, AfDB /OECD 2008:471). The lack of qualified teachers also has critical effects on the system. It is estimated that approximately 60 percent of the teachers employed in technical education schools are either not qualified or under-qualified to conduct courses in the existing curriculum and additionally that 90 percent have no practical experience of prior work in commerce or industry (Machin & Sparreboom 2005: 325).

In short, the provisions are of poor quality, the curricula are outdated, facilities are rundown, there is a lack of good teachers and good management and the sector is in general under-

resourced. Thus, the system is far from being able to meet the minimum requirements for providing quality TVET for the modern economy (ADEA 2008:5-6).

In recognition of the need for improving the TVET, the 'Integrated Vocational Education Reform Programme' (PIREP) was launched June 1st 2006 to transform TVET in line with the needs of a market economy (PIREP 2006:1). The key instrument in enhancing the employability of graduates from through TVET is the linking of public and private stakeholders in a jointly managed and funded system. It is assessed that private sector involvement should improve the economic sustainability of the system (Machin & Sparreboom 2005: 324).
The reform is very ambitious and many things need to be in place in order to carry out the objectives as for instance elemental matters such as better funding and better human capacity, especially in the management of TVET institutions which currently is very low and undermines the ability to introduce the new initiatives from the reform (ADEA 2008:23).
The implementation is moving very slowly and little progress has been made so far in important initiatives of introducing a new competency-based curriculum and training of qualified teachers. Also on the institutional level, the reforming process is very slow. After two years of the start of the PIREP, there is yet no progress in the planning processes of different ministries under a single institutional umbrella and no unified framework for qualification and accreditation (AfDB /OECD 2008:471, Martins).

## 11.6 Research

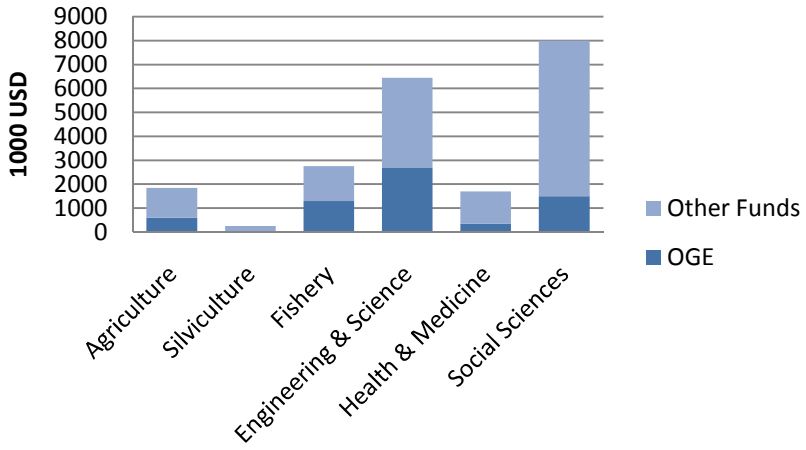
As explained in the theory chapter, KE assess the creation and use of knowledge as the driver of economic development (OECD 1996:3, World Bank 2002:7, Salmi 2006.32, Dahms & Stentoft 2008:13). This naturally poses more emphasis on the issue of research, which is also emphasized in the MOSTIS:

> "Foundational to the S&T system are the research functions that generate new knowledge through R&D, both to address problems in Mozambique that require unique solutions based on local research and to acquire exiting technologies and adapt them for local use" (MCT 2006:3)

Mozambique has sixteen public scientific and technological research institutes (IPPCTs) which are listed in appendix V. They have together the mandates of research, engineering and extension. The general public budget for research is equivalent to approximately 0.2 percent of GDP (MESCT 2003:42, Iritz, MCT 2006:3). Almost no research is carried out in the universities, where there are no specific lines of credit for the purpose either (Sandes, Alberto)
According to C.Dias (2008) the public funds are only enough to pay for equipment and participation in conferences and seminars for the researchers, but is not sufficient to cover the

cost of the actual research. This area is mostly covered by external funds, primarily from bilateral donors which have a considerable influence on the type of conducted research (C.Dias, MCT 2006:4). Figure 11.3 confirms the fact that most funding for research in Mozambique comes from external donors.

**Figure 11.3: Financing Public Research Institutes (2002)**




*Source:* MESCT 2003:42

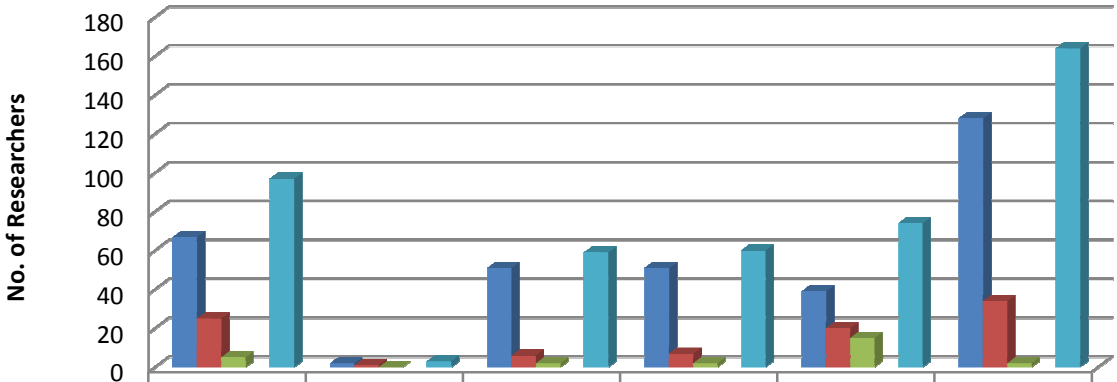
The main areas of public research funds are engineering, physical science and agriculture and fisheries, while forestry and health receive least resources. Social science receives most external funds, mostly through the National Institute of Statistics (INE) and the Centre of Juridical and Judicial Education (CFJJ) (MESCT 2003:42). The focus of the research conducted in the IPPCTs is mainly on applied research and extension, while some institutions, mostly those working with exploration of natural resources also engage in monitoring research. Research carried out in public universities predominantly focus on applied research, followed by basic research and extension (MCT 2006:3-4). This is very much in line with the trends described in Gibbons mode 2, but is more likely due to donor involvement than awareness of new research trends, although proposed in the MOSTIS. The result is a lack of attention to basic research, which has severe consequences on the HE system as explained by Iritz:

> "Because of the donors, the basic science; mathematic physics, biology were totally neglected and not supported, and of course the level of the basic education in the university went down, but this is because of the donors. Donors can provide money, the government doesn't have money and donors promote this applied research, but to get good quality of the applied research you need the basic (…) this is short term thinking" (Iritz. 49:40)

Measured in terms of international publications, there has been an increase in scientific production from less than 5 per year in 1972 to 45 in 2001. Many publications are carried out in collaboration with foreign partners, especially with partners from Portugal, Sweden, Great Britain, South Africa and the United States and almost half (48.8 percent) of the publications are from scientists belonging to UEM, followed by the National Institute of Health and hospitals which contributed with approximately one fourth (23.3 percent) (MESCT 2003:44-45). Besides of publications in international journals, most dissemination of research results comes about in internal journal or booklets whereas there are very few scientific journals in Mozambique (MCT 2006:4)

The level of education among scientist is very low. Of the 2000 people employed in research institutions, just about 25 percent can be classified as scientists even though only 4 percent have a PhD degree. The division of researchers per sector (excluding HEIs) and according level of education are demonstrated in figure 11.4 (MESCT 2003:40-41).

**Figure 11.4: Researchers According to Level of Education per Sector (2002)**




| | Agriculture | Forestry | Fisheries | Engineering & Science | Health and Medicine | Social Science |
|---|---|---|---|---|---|---|
| Lic/BA | 67 | 2 | 51 | 51 | 39 | 128 |
| Master | 25 | 1 | 6 | 7 | 20 | 34 |
| PhD | 5 | 0 | 2 | 2 | 15 | 2 |
| | | | | | | |
| Total | 97 | 3 | 59 | 60 | 74 | 164 |

Source: MESCT 2003:41

According to the MOSTIS, the amount of researchers, when compared to levels in countries that are performing process in S&T, is highly inadequate. Even in comparison with the base line in

South Saharan Africa, where there are more than 200 researchers per million inhabitants, the number is very low. According to these standards there should be around 4000 researchers in Mozambique. The MOSTIS therefore aims at enhancing the number of researchers until reaching the goal of 6595 researchers in 2025 (MCT 2006:23). It is however not explained how it is intended to reach this goal.

## 11.7 The Institutional Setting

As previously mentioned, the focus on higher education, science and technology has been more explicit in Mozambican since 2000, where the Ministry of Higher Education, Science and Technology (MESCT) was established and the PEES was initiated. The Ministry was however abolished in 2005 in relation to organizational change imposed by a new government. The component of higher education now belongs to the Ministry of Education and Culture (MEC) and the component of science and technology has its own ministry, namely the Ministry of Science and Technology (MCT) (Brito et. al. 2005: 6-7). This reorganization could be perceived as an initiative to strengthen articulation with the education sector and provide better possibilities for increased student mobility between the various subsystems (Costa & Nooijer 2006:34), however, according to Brito et al. (2005) it is more likely that it is related to the following factors:

That the current government is more concerned the middle tier of the education system and in especial TVET as a mean to enhance student's possibilities in the labour market, and consequently tertiary education plays an inferior role.

- The relatively small size of the HE sector. For instance, primary schools counts for more than three million pupils compared to 'merely' 20.000 in higher education
- The relatively small quantity of direct influence from the government on HEIs, as they are either autonomous or private (Brito et al 2005: 13).

The separation of ministries was widely criticized by the interviewed people as they experience a decrease in political attention to higher education (Brito, Chilundo). According to Chilundo (2008), the people working in the sector were not consulted about the change and the functionality of the organization was not considered. He stresses that in terms of coordination in HE, this change has worsened the situation:

> "What is happening is lack of management on the level of the government. Before we had a ministry of higher education, science and technology and we had a minister who was exclusively dedicated to the matters of higher education, now it is not like that. Now everything was gathered here in one big mess and higher education is not a priority (...) in this way, the institutions have more autonomy, which not is bad, but

each one does what it wants now. (…) There is a weak coordination at the central level." (Chilundo 2008, 19:01)

Alberto (2008) further adds that many HEIs are indeirectly controlled by GoM though involved people with 'double roles' (Alberto).

In relation the HEIs, the sector has a high level of institutional autonomy within what can be regarded as a light steered governance approach, thus the role of the ministry is largely seen as a coordinating one, while the HEIs are free to create courses, define the areas of research and methods and teaching (Chilundo et al. 2007.27). Yet, the degree of autonomy can be discussed as stated by Chilundo (2003) "although the Law on Higher Education states that higher education institutions are autonomous, the precise degree of autonomy has often been a matter of dispute."(Chilundo 2003:465 in Ng'ethe 2006: 57).

The matter of political attention to issues of higher education is also relevant to mention. The impression from the interviews is that there has been a significant decline in the political interest in higher education. For example, the lines from the PEES are not being followed which for instance comes clear in relation to the expansion of the HE system, which by the PEES was recommended primarily to be in form of polytechnic schools, but now rather is in form of universities in the provinces, public as well as private (Chilundo 2008). To this follows that the institutional capacity in Mozambique for the most part is very weak. The theories of NSI emphasises the importance of institutions to the system of innovation as stabilizers. This is not the case in Mozambique, where the system depends much on the capacity of single individuals and their personal contact to other stakeholders (Cabral, Iritz).

## 11.8 Human Resources Loss

While the HE system is struggling with its own limitations and the challenges of creating better articulation with the other subsystems and improving the output to, the system is also facing very serious external problems which are both influencing the performance of the system itself and the of the labour market and the economy in general.

This subchapter address the two major factors that affect the system and underlines hereby the importance of viewing the challenges of the HE system broadly.

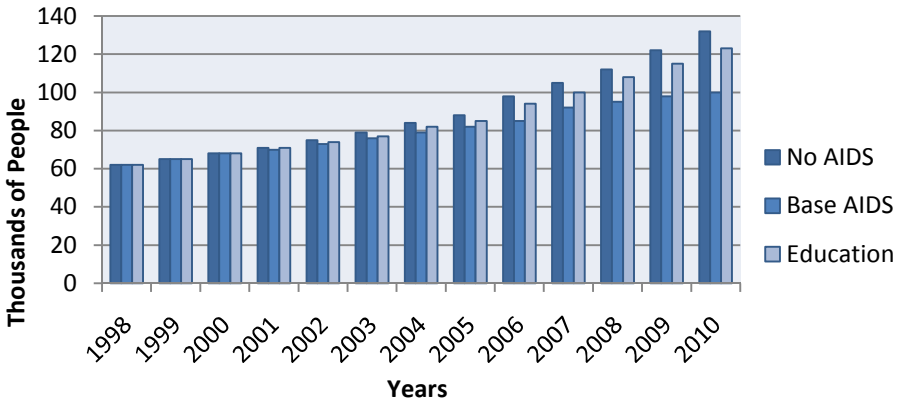
### 11.8.1 HIV/AIDS

In relation to human capital, one of the significant threats to the economy is the impact of HIV/AIDS. The incidence rate in Mozambique was in 2004 estimated to be so high as 16.2 percent of the adult population and the Ministry of Health assesses that it has moved very little the last couple of years (AfDB/OECD 2008: 472). Several studies on the impact of HIV/AIDS find a strong

negative connection between adult HIV prevalence and per capita growth in GDP (Bonnel 2000). Most studies of HIV/AIDS focus on physical capital accumulation but there are also good reasons for being concerned with the impact on the education system and on the development of human resources (Arndt 2003:4).

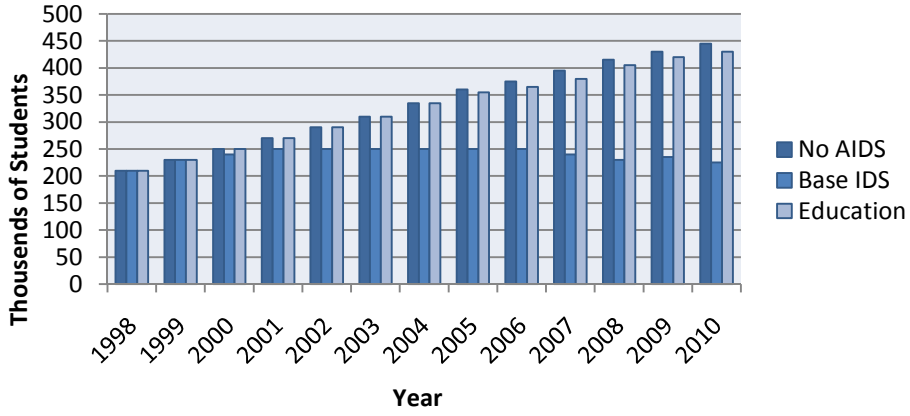
Arndt (2003) has developed a calculation on the evolution of human capital accumulation in Mozambique depending on different scenarios of HIV/AIDS. Figure 11.5 presents estimates of the impact of the scenarios on the evolution of the highly skilled labour force and figure 11.6 presents estimates of enrolment in the second level of primary education (EP2). The first scenario named 'Base AIDS' represent a situation with increase in the death rate, increase in the probability of transitioning from lower schooling levels to the unskilled work force, reduction in the probability of transitioning from secondary to tertiary education level, increase in the probability of transitioning from tertiary education to the category of skilled labour (as in opposition to highly skilled) and lastly a reduction in the probability of staying in school at all education levels. The second scenario is labelled 'Education' and here the demographic effects of AIDS are assumed to be stabilized and a there is a strong policy effort to maintain enrolments and education quality, furthermore, children are just as likely to remain in school and to transition to higher levels (Arndt 2003:8-9).

**Figure 11.5: Estimates of the Evolution of the Highly Skilled Labour Force**




Source: Arndt 2003:9

**Figure 11.6: Estimates of Enrolment in EP2**




Source: Arndt 2003:10

The calculations clearly shows that combating HIV/AIDS is an important factor in the upgrading of a highly skilled work force as well as maintaining the student's transition to higher levels of the education system. Furthermore, the education scenario illustrates the significance of maintaining access and quality in the education system (Arndt 2003:10-11).

As the development of teachers is also is hampered by HIV/AIDS, it might not be as straight forward to realise the scenario drawn by the 'education scenario'. An example from a TVET training institution illustrates the severity of the problem. In one training institution employing 14 trainers in 2004, six trainers have already died and three others are absent from work with the sickness (ADEA 2008:22). This example naturally represents an extreme case, but it is nevertheless an illustration the excessive impact the problematic of HIV/AIDS has on the education system.

### 11.8.2 Human Capital Flight

Another critical factor in building qualified human resources is the problems of retaining skilled and professional personal in the country, a phenomenon called 'brain drain', which refers to the emigration of skilled and professional people from developing countries to advanced industrial countries (Miyagiwa 1991: 743).

While the issue of brain drain and its real impact of economic growth can be discussed, the traditional approach treats brain drain as a negative externality imposed on the population left behind in terms of slower economic growth and living standards (Ndulu 2004: 4). It has not been possible to find any sort of updated estimation on the level of human capital flight and its implication for the Mozambican economy and the education system. Table 11.1 nonetheless shows that more than half of the immigrated people from Mozambique to the United States in 1990 had the background of tertiary education, which actually is among the lowest percentages of

the region. However, taken the low amount of people with a tertiary education there was Mozambique in 1990, the number of highly skilled immigrants to United States indicates possibilities for a high number of highly skilled migrant in general.

**Table 11.2 Migration to the USA by Education Attainment for Selected African Countries 1990**

| Country of Origen | Total | Schooling Level | | | Secondary + tertiary | Secondary + tertiary as % of total | Tertiary as % of total |
|---|---|---|---|---|---|---|---|
| | | Primary or less | Secondary | Tertiary | | | |
| **Kenya** | 8272 | 40 | 1420 | 6912 | 8332 | 100 | 82.56 |
| **Lesotho** | 160 | 0 | 20 | 140 | 160 | 100 | 87.50 |
| **Malawi** | 381 | 0 | 120 | 261 | 381 | 100 | 68.50 |
| **Mozambique** | 920 | 80 | 280 | 560 | 840 | 91 | 60.87 |
| **South Africa** | 22.678 | 200 | 4980 | 17298 | 22478 | 99 | 77.16 |
| **Zambia** | 1613 | 0 | 340 | 1273 | 1613 | 100 | 78.92 |
| **Zimbabwe** | 3162 | 20 | 420 | 2721 | 3141 | 99 | 86.08 |

*Source:* Selected countries from Carrintong & Detragiache 1998:15

In the context of the global knowledge economy, brain drain must be estimates as being an increasingly severe problem to developing countries with a small knowledge base. The issue does however not seem to worry the Minister of Science and Technology, Venâncio Massingue. When questioned on how the country tackles the brain drain problem, he answers that he prefers "to talk about our scientists' mobility. It is important to expose people to what is going on in the world and also within the country. For scientists to develop they need to be able to move between institutions, but also to go abroad for a time" (Campbell 2008).

While it naturally is important for students and scientists to discover what the world outside the country has to offer, it is also a fact that most brain drain occurs when people leave to study abroad and that the skills lost in that process are not easily replaced given both the limited capacity of higher education and employment posibilities as well as the paucity of the means for acquiring the same from another place. Improving the higher education would therefore help both to delimit the level of brain drain as well as make the country less vulnerable of lost skills (Appleton & Teal 1998:17, Ndulu 2004:6).

## 12. Summing Up

After having acquired a broad understanding of the economy, the private sector, the HE system and the respective area's situations, it is now time to sum up the most essential to assess Mozambique's preparedness for participating in the global knowledge economy for continuous and sustainable economic growth.

There is a clear mismatch between the demand and supply side of skills and knowledge usage / production both in terms of the spreading of branches of the general education, the division of candidates from the two systems and of different educational levels. However, a certain degree of concordant between demand and supply side is essential in creating an innovative environment where knowledge and skills play an active role in development. The analysis of a country's readiness for overseeing knowledge and skills for the sake of innovation and economic growth therefore requires an overview over the two sides.

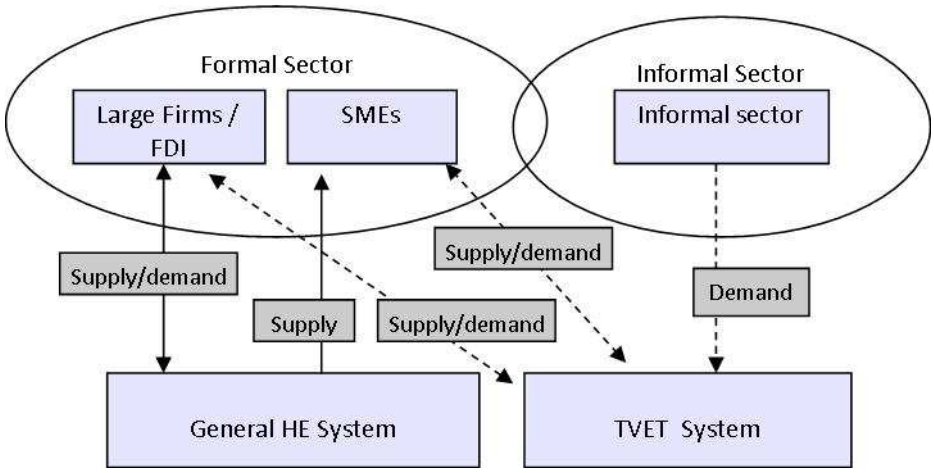
On the basis of the analysis, the following observations can be drawn on the case of Mozambique:
On the **demand side**, the economic actors of Mozambique's private sector can be divided into three categories belonging to the formal and informal sector;
1) *SMEs*, which occupy the biggest part of the formal sector and where approximately 90 percent are small and micro enterprises with less than 10 employees. This group counts for approximately 29 percent of the work force, 20 percent in the small and micro companies and 9 percent in the medium companies
2) *Large and FDI-related firms*, which are merely around 400 companies and occupies around 57 percent of the labour force and basically the whole market for highly skilled people
3) *Informal sector*, which represent 40 percent of the economy employs 90-95 percent of the work force and comprises for the most the agricultural sector.
In general the sector faces critical problems which impede innovation. While the constraints are many, the most severe in this context are lack of financing possibilities and lack of openness.

On the **supply side**, we find a dual system of education presented by
a) *the general system of (higher) education*, which has been expanding drastically during the last decade dominantly through supply-led growth, and that is characterized by a significant overweight of studies in social science, management, law and education, poor teaching quality due to lack of qualified teachers, lack of facilities, lack of innovative pedagogical methods and limited research activities.
b) *the system of technical and vocational education and training* (TVET), which comprises many subsystems and has a uncoordinated character, suffers from a lack of qualified teachers, facilities and good management
The system seems to suffer from most of the unsolved problems that are prescribed to HE systems in developing countries, as those mentioned by Salmi (2006). Thus, Mozambique must be estimated as presenting a typical example of higher education in developing countries (Salmi 2006:34). Furthermore does the system seem to suffer from the same problems as was identified already back in the late 1980'ies, which again points to the lack of implementation abilities rather than lack of awareness. The system seems to be caught in a self-perpetuating cycle, where poor education quality at the secondary level leads to poor quality of university students, which in the end creates badly qualified teachers in both tertiary and secondary education that will worsen the situation for the following generations.

While there is consensus about the need for improving the system, it is not clear in which way. Broadly, two wings of opinions can be detected. The first wing is proponent of adopting tendencies related to KE. It strongly advocate for PBL, applied research and innovative constellations such as university collaboration with the broader society. The other wing is not necessarily against the advocacy for the first wing, but argues that the Mozambican HE is not yet ready to take these steps that imply indispensable changes in both pedagogical and structural terms. They therefore advocate a stronger focus on building up a solid knowledge-base centred on more basic research that can help qualifying university teachers and consequently HE student in order to break with the negative self-perpetuating cycle. To this follows that universities should keep their 'original' academic form (Gibbons mode 1) and a more diversified HE structure with strengthened TVET that should be able to respond to the requirements of the economy.

What is most critical is that the HE system does not manage to live up to the knowledge and skills needs of the private sector. Not only are graduates of poor quality and lack of practical skills and problem solving 'know-why' knowledge. The field of studies is also highly inadequate spread provoking a lack of engineers and scientists and an overweight of humanities and social science.
The match / mismatch between supply and demand side can be illustrated as in figure 12.1

**Figure 12.1: Map of Supply and Demand of Human Resources in Mozambique**




In general it must be concluded for the analysis that both the demand and supply side of human resources face a great deal of internal constraints as well as lack of concordance. At the same time that the focus on knowledge and skills for development possibly can help to surpass several of these constraints, the degree of primary problems faced by the different agents also risks to limit the functioning and effectiveness of these initiatives.

# 13. Conclusion

A quote by the Chinese philosopher Lao Tzu says that "if you give a man a fish you feed him for a day but if you teach a man to fish you feed him for life". While this idea is praised and attempted applied in multiple development perspectives, the ideas of making the creation and application of knowledge and skills primordial to development as presented in the ideas of the knowledge economy go a step further than teaching the man how fish. It builds on the idea of creating a system that reinforces the learning cycle and helps the fisherman train new fishermen and to apply new knowledge for increasing the catch, adding value to the production and lead to new inventions on the fish market. While this without doubt is an ideal development scenario, the application can in reality show to be more complicated. The case of Mozambique examined in this thesis show that building such mechanism requires more than a handful of expert-led knowledge economy based strategies to show the way. As a minimum, a strong and adjustable-friendly fundament needs to be in place before a successful transformation can be accomplished.

With reference to the systems of innovation, the usage of knowledge and skills for a country's development requires a certain degree of interconnectedness and collaboration between different groups of actors, especially the producers and user of knowledge and skills. While there seem to be an increasing awareness of this in Mozambique on the central level, it seems yet to be a while before performance in the Mozambican context will start being comparable with the ideal picture drawn in the triple helix model and other KE-scenarios. This is primarily assessed to be due to weak capacity of the main agents of the innovation system and the combination with a culture where knowledge-sharing and collaboration is far from prevalent. The type of knowledge that flows in the Mozambican economy illustrates the problems. With reference to Lundvall and Johnson's (1994) classification of different kinds of knowledge it can be said that the system of education mainly produces 'know-what'- knowledge and that the labour market and to some degree also the private sector is highly conducted by knowledge of 'knowing-who', while the challenges from the knowledge economy demand a higher degree 'know-why'.

The central role of higher education in the attainment for a knowledge driven development is unquestionable. The example of Mozambique emphasises this point by showing the negative consequences of a system of higher education characterised by low quality and inconvenient knowledge and skill production. There is no doubt that Mozambique needs to focus more on the issues of tertiary education if the country shall be able to maintain the impressive growth rates and reach economic independence of foreign aid and foreign- led mega projects with limited economic contribution to the broader society.

The question on the kind of reform needed in order to make the HE more responsive to the knowledge economy is a highly complex issue to which no uniform answer can be expected. While opinions of Mozambican stakeholders on the matter are divers, the conclusion of this thesis is that a middle course between the two wings must be found. While a strong knowledge fundament that can break with the negative circle of the education system clearly is needed, it is also essential to

begin the process of bringing in new teaching methods that can produce more diversified types of knowledge into the system. Results from the analysis clearly show that this is not an easy task. It must therefore be a carefully prepared introduction, for instance through profound teacher training of open-minded university teachers and pilot classes or projects. Results of the analysis also call for a higher degree of coordination at the central level.

Reforming the HE system is however not sufficient to attain greater responsiveness towards the tendencies of the knowledge economy. It is just as necessary to encourage innovative activities and collaboration on the side of the private sector, whereas it is the in the sphere of interaction within this pillar that the steps towards a knowledge-based economy really will be taken. In relation to this it is therefore also clear that measurements must be taken to relief the business environment for some of the most severe constraints. For instance is the access to risk capital which should be provided in the new SME initiative essential to move the private sector into an innovative environment where companies will be able to establish long term investments that include new knowledge for the gaining sustainable development and international as well as regional competitiveness. In terms of sector-focus, it is most obvious to focus on agriculture and fisheries, whereas it is in these sectors that the major part of the population is employed and consequently where the greatest developmental benefits can be achieved. This however requires that the same focus is reflected in the HE system in terms of investments in research and teaching.

In all, it is estimated that the primary concern for the adaptation to knowledge- led initiatives is to is to strengthen primary key agents such as the HE system and the private sector and their interrelation. Systemic synergy among stakeholders is highly essential and only little innovation can be expected to occur if there is no interconnectedness between the central groups of actors. Another big challenge is to foster an innovative and creative environment that breaks with the conservative mentality that often is found both among teachers, business men and politicians.

Reform strategies like PEES and MOSTIS temp to create a fundament for a responsive environment for the knowledge economy. Unfortunately they are highly uncoordinated and seek more towards creating new instalments instead of strengthening the capacity of the existing. Therefore does the main challenge for Mozambique lye in strengthening the founding pillars that are to carry initiatives. If these are not in place, initiatives like innovation funds, research strategies, etc. will only have limited impact on the development, if they succeed to be correctly implemented at all.

When this is said, it is also clear that Mozambique needs to take action on some of the central points put forward by the knowledge economy. After some turbulent years of war and changes of political systems, the country now has found it feet so much that it is time to think in long term plans. The idea of development led by knowledge and skills is an obvious approach to adapt for this purpose. This is not a question. The question is rather how to approach it.

# Bibliography


A Tribuna Fax (2008): “MIC tutela PME’s”, news published 9th of October 2008

Abramovitz, Moses & David, Paul A. (1996) “Technological Change and the Rise of Intangible Investments: the US Economy’s Growth- Path in the Twentieth Century” , in ‘Employment and Growth in the Knowledge-based Economy”, OECD Document

ADEA (2008): “Beyond Primary Education: Challenges and Approaches to Expanding Learning Opportunities in Africa - The Challenges of TVET Reform in Mozambique: Goals, Options and Constraints”, Working Document, Prepared for the Biennale on Education in Africa, Maputo, Mozambique, May 5-9 2008

AfDB / OECD (2008): “African Economic Outlook - Mozambique”

Appleton & Teal (1998):” Human Capital and Economic Development”, a background paper prepared for the African Development Report 1998

Arndt, Channing (2003):” HIV/AIDS, Human Capital, and Economic Growth Prospects for Mozambique”, Africa Region Working Paper Series No. 48

Benneh, George & Awumbila, Mariama (1999): ”Introduction” in ‘African Universities, the Private Sector and Civil Society’, published for the Counsil of the International Association of University Presidents (IAUP), Accra

Beverwijk, Jasmin M. R. (2005): ”The Genesis of a System – Coalition formation in Mozambican Higher Education, 1993-2003”, Phd. University of Twente

Bila, Alberto (2006): ”Competition Scenario in Mozambique”, Consumer Unity & Trust Society, (CUTS International)

Bjereld, U., Demker, M., Hinnfors, J. (1999):”Varför vetenskap?”. Studier i Politik/Göteborg Studies in Politics, nr. 62, Studenterlitteratur, Lund

Bloom, David , Canning, David, and Chan, Kevin (2006): ” Higher Education and Economic Development in Africa”, Harvard University

Borgarello, Andrea & Marignani, Debora (2004) ”What Hinders Small and Medium Entrepreneurs in Mozambique?”, I Quaderni della Cooperazione Italiana, N. 7/2004

Brito, Lídia (2003): “The Mozambican experience: Initiating and Sustaining Tertiary Education Reform”, a case study prepared for a Regional Training Conference on Improving Tertiary Education in Sub-Saharan Africa: Things that Work!, Accra, September 23-25

Brito, Lidia et. al. (2005): “Policy Development in the South and its International Dimension: The Mozambican Experience”, Nuffic Conference ‘A Changing Landscape’, The Hague, 23-25 May 2005

Brito, Lidia, Brouwer, Roland and Menezes, Ana (2007): „Managing Fast Growth“, D+C, 2007/09, Focus,

Brück, Tilman & Broeck, Katleen van den (2006): "Growth, Employment and Poverty in Mozambique", Issues in Employment and Poverty, Discussion Paper 21

Campbell, Carol (2008): "Q&A: Mozambique's science for the people", Science and Development Network, 29 October 2008

Carrington, William & Detragiache, Enrica (1998): "How Big is the Brain Drain?", IMF Working Paper

CFPE (2008): " Perfil do Centro de Formaçao Profissional de Electrotenica (CFPE) do INEFP", internal paper from CFPE

Chilundo, Arlindo (2006): "Capacity building in higher education in Mozambique and the role played by co-operating foreign agencies: The case of the World Bank, UNESCO Forum Occasional Paper, Series Paper no. 12, Paper Commissioned by the Regional Scientific Committee for Africa, June 2006

Chilundo, Arlindo et al. (2007): "The Articulation between Upper-Secondary and Higher Education in a war-torn society: The Mozambique case study

Conceição, Pedro. & Heitor, Manuel V. (1999): "On the Role of the University in the Knowledge Economy", Science and Public Policy, vol. 26 no. 1, Beech Tree Publishing, England

Conceição, Pedro. & Heitor, Manuel V (2001):"Universities in the Learning Economy: Balancing Institutional Integrity with Organizational Diversity"

Cortright, Joseph (2001) "New Growth Theory, Technology and Learning - A Practitioners Guide" Reviews of Economic Development, Literature and Practice: No. 4, Impresa, Inc. Portland

Costa , João G. Q., & Nooijer Paul G. de (2006)" VLIR-UOS Programming mission report, Mozambique, Eduardo Mondlane University" IUC Programme, Institutional University Cooperation

Dahlman, Carl (2007): "Innovation in the African Context", Issues Paper prepared for the Forum of Policy Makers – 'innovation in the African Context', Dublin, March 6-8, 2007

Dahms, Mona & Stentoft, Diana (2008): "Problem Based Learning in Engineering Education – a Development Option for Africa?, Department of Development and Planning & Department of Education, Learning and Philosphy, Aalborg University, Denmark

Day, Bob (2007): "Innovation in Mozambique", Non-Zero-Sum Development, Pretoria

Djeflat, Abdelkader (2003):" Innovation Systems in Capacity Building in Maghreb Countries", in 'Putting Africa First – the Making of the African Innovation Systems' (ed. by) Lundvall, Bengt-Åke, Muchie, Mammo & Gammeltoft, Peter

DNEAP (2006):"Enterprise Development in Mozambique: Results Based on Manufacturing Surveys Conducted in 2002 and 2006", Discussion papers, No 33E, Oct 2006, revised January 2007, National Directorate of Studies and Policy Analysis (DNEAP), Ministry of Planning and Development, Republic of Mozambique

Dosi, Giovanni (1996): “The contribution of Economic Theory to the Understanding of a knowledge-based Economy” in Employment and Growth in the Knowledge-based Economy, OECD Document

Edquist, Charles (2005): “Systems of Innovation – Perspectives and Challenges”, in the Oxford Handbook of Innovation, 2005, Oxford University Press, Oxford

Enemark, Stig (2005): ”Capacity Building for Higher Education in Developing Countries – A Part of the Western World University Portfolio?”, Capacity Building in Higher Education and Research on a global scale, Unesco International workshop, Copenhagen 17-18 may 2005

Fagerberg, Jan (2005): “Innovation: a guide to the literature”, in the Oxford Handbook of Innovation, 2005, Oxford University Press, Oxford

Foray, Dominique & Lundvall, Bengt-Åke (1996): “The knowledge-based Economy: From the Economics of Knowledge to the Learning Economy” in ‘Employment and Growth in the Knowledge-based Economy”, OECD Document

Freeman, Chris (1995): “The ‘National System of Innovation’ in historical perspective, Cambridge Journal of Economics, 1995, 19 5-24, Academic Press Limited

Fry, Peter & Utui, Rodrigo (1999): “Promoting Access, Quality and Capacity-Building in African Higher Education – the strategic planning Experience at the Eduardo Mondlane University”. A report of the ADEA Working Group on Higher Education

Gibbons (1998):”Higher Education Relevance in the 21st Century”, paper prepared as a contribution to the Unesco conference on Higher Education, Paris, France October 1998

GoM (2000): ”Strategic Plan of Higher Education in Mozambique 2000-2010”, Ministry of Higher Education, Science and Technology, Republic of Mozambique, Maputo, August 2000

GoM (2001): “Action Plan for the Reduction of Absolute Poverty (2001-2005) (PARPA I)”, Strategy Document for the Reduction of Poverty and Promotion of Economic Growth, Final Version Approved by the Council of Ministers, April 2001, translated from original text in Portuguese

GoM (2006): “Action Plan for the Reduction of Absolute Poverty (2006-2009) (PARPA II)”, Final Version Approved by the Council of Ministers on May 2, 2006

GoM (2007)” Boletim da Republica – publicação oficial da Republica de Moçambique”, I serie – Número 52, segunda feira 31 de Dezembro de 2007

INE (2006): “Inquérito Integrado à Força de Trabalho (IFTRAB 2004/05) – Relatório Final”

Johnson, Björn & Lundvall, Bengt-Åke (2003)” National Systems of Innovation and Economic Development”, in Lundvall, Bengt-Åke, Gammeltoft, Peter, Gammeltoft & Muchie, Mammo (ed. by) (2003): “Putting Africa First – the Making of African Innovation Systems”, University Press, Aalborg

Juma, Calestous & Agwara, Hezekiah (2006): ”Africa in the global knowledge economy: strategic options”, Int. J. Technology and Globalisation, Vol. 2, Nos. 3/4, 2006

Juma, Calestous & Yee-Cheong, Lee et al (2005):"Innovation: applying knowledge to development", UN Millennium Task Force on Science, Technology, and Innovation, Earthscan: London and Sterling, VA.

Kapur , Devesh & Crowley, Megan (2008): "Beyond the ABCs: Higher Education and Developing Countries", Center for Global Development, Working Paper Number 139, February 2008

Kouwenhoven, Wim (2003):"Designing for competence in Mozambique: towards a competence-based curriculum for the Faculty of Education of the Eduardo Mondlane University", Thesis University of Twente, Enschede

Kuruvilla Sarosh & Chua, Rodney (2000):" How do Nations Increase Workforce Skills? Factors Influencing the Success of the Singapore Skills Development System"

Kvale, Steiner (2008): " Interview – en introduktion til det kvalitative forskningsinterview", Hans Reitzels Forlag, København

Lundvall, Bengt-Åke (ed.) (1992): "National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning, Pinter Publisher, London

Lundvall, Bengt-Åke & Johnson, Björn (1994): "The Learning Economy", Journal of Industry Studies. Vol. 1 No. 2

Lundvall, Bengt-Åke, Muchie, Mammo & Gammeltoft, Peter (2003): "Introduction: African Systems of Innovation and Competence Building" in Lundvall, Bengt-Åke, Gammeltoft, Peter, Gammeltoft & Muchie, Mammo (ed. by) (2003): "Putting Africa First – the Making of African Innovation Systems", University Press, Aalborg

Lundvall, Bengt-Åke (2006)" The University in the Learning Economy", DRUID Working Paper No. 02-06

Machin, Alastair & Sparreboom, Theo (2005):" National Policy and Planning Regarding TVET for Sustainable Development : a case study of Mozambique", Orientating T V E T for Sustainable Development, Quarterly Review of Comparative Education, v35 n3 p317-329 Sep 2005

Ministry of Education (1998): "National kompetenceudvikling: Erhvervsudvikling gennem kvalifikationsudvikling", Undervisningsministeriet, København

MCT (2006): "Mozambique Science, Technology and Innovation Strategy (MOSTIS)

MEC (2008a): "Dados Estatísticos sobre o Ensino Superior em Moçambique 2006", Maputo, Abril 2008

MEC (2008b): "Instituições de Ensino Superior em Moçambique"

MESCT (2000): " Plano Estratégico do Ensino Superior em Moçambique para o Período 2000-2010 – Análise da Situação Actual do Ensino Superior em Moçambique, Maputo, Julho de 2000"

MESCT (2003): "Indicadores de Ciência e Tecnologia em Moçambique"

Miyagiwa, Kaz (1991): "Scale Economies in Education and the Brain Drain Problem", International

Economic Review, Vol. 32. No. 3. August 1991

Nasir, John et al. (2003): ”Mozambique Industrial Performance and Investment Climate 2003”, Pilot Investment Climate Assessment , Confederaçao Das Associaçoes, Economicas de Moçambique (CTA), Centro De Promoçao De Investimentos (CPI), Regional Program on Enterprise Development (RPED), Africa Private Sector Group, The World Bank

Ndulu, Benno J. (2004): “Human Capital Flight: Stratification, Globalization, and the Challenges to Tertiary Education in Africa”, JHEA/RESA Vol. 2, No. 1, 2004, pp. 57–91, Boston College & Council for the Development of Social Science Research in Africa

Nelson, Richard R. & Romer, Paul M. (1996): “Science, Economic Growth, and Public Policy” in B.L. R. Smith and C.E. Barfield (eds.) Technology, R&D and the Economy. Washington DC, Brookings

Ng’ethe, Njuguna; Subotzky, George & Afeti, George (2006): “Differentiation and Articulation in Tertiary Education Systems: A Study of Selected African Countries”, Association for the Development of Education in Africa, Working Group on Higher Education, France

Norad (2002): “Study on Private Sector Development in Mozambique”

OECD (1996):”The Knowledge-based Economy”, Head of Publications Service, OECD, France

Oughton, Cristine, Mikel Landabaso and Kevin Morgan (2002): “The Regional Innovation Paradox: Innovation Policy and Industrial Policy”, Journal of Technology Transfer, 27 (1), 97, Kluwer Academic Publishers, The Netherlands

Oyelaran-Oyeyinka, Banji & Barclay, Lue Anne (2003):” Human Capital and Systems of Innovation in African Development” in Lundvall, Bengt-Åke, Gammeltoft, Peter, Gammeltoft & Muchie, Mammo (ed. by) (2003): “Putting Africa First – the Making of African Innovation Systems”, University Press, Aalborg

Oyelaran-Oyeyinka, Banji (2004): “Learning and Local Knowledge Institutions in African Industry”, Discussion Paper Series, INTECH, United Nations University

Oyelaran-Oyeyinka, Banji (2006): “Systems of Innovation and Underdevelopment: An Institutional Perspective”, Science Technology Society 2006; 11;239, SAGE Publications

Oyelaran-Oyeyinka, Banji & Gehl Sampath, Padmashree (2007): “Innovation in African Development – Case studies of Uganda, Tanzania and Kenya”, A World Bank Study, Marts 2007

PIREP (2006): “Programa Integrado da Reforma da Educação Profissional”, Comissão executiva da Reforma da Educação Profissional – COREP, Republica de Mocambique

Prewitt, Kenneth (2004): “Higher Education, Society. And Government: Changing Dynamics”, Boston College & Council for the Development of Social Science Research in Africa, Vol. 2, No. 1, 2004

Rodriguez, A.E. (2004) ” Competition Policy in Mozambique - An Assessment with Recommendations”, Submitted to USAID by Nathan Associates Inc.

Romer, Paul M (1986) “Increasing Returns and Long-Run Growth “, The Journal of Political Economy, Vol.

94, No. 5, (Oct., 1986), pp. 1002-1037 Published by: The University of Chicago Press

Romer, Paul M (1990) "Endogenous Technological Change", The Journal of Political Economy, Vol. 98, No. 5, Part 2: The Problem of Development: A Conference of the Institute for the Study of Free Enterprise Systems ,published by: The University of Chicago Press

Salmi, Jamil (2006): "Developing Countries and the Global Knowledge Economy: New Challenges for Tertiary Education", in Capacity Building in Higher Education and Research on a Global Scale, Published by Danish National Commission for UNESCO

Sarkar , Soumodip (2000): "Moçambique Too Can Compete! - In Labor Intensive Manufactured Exports", A Consultancy Report for the Gabinete de Estudos, Ministério do Plano e Finanças, Maputo.

Schumpeter, Joseph A. (1934):"The Theory of Economic Development – An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle", Harvard University Press, Cambridge, Massachusetts

Smith, Keith (2000):" What is the 'knowledge economy'? Knowledge-intensive industries and distributed knowledge bases", Paper presented to DRUID Summer Conference on the Learning Economy – Firms, Regions and Nation Specific Institutions., June 15-17 2000.

Solow, Robert (1956):" A Contribution to the Theory of Economic Growth", The Quarterly Journal of Economics, Vol. 70, No. 1, pp. 65-94

Stiglitz, Joseph E. (1999): "Public Policy for a Knowledge Economy." Remarks at the Department for Trade and Industry and Center for Economic Policy research, London, January 27.

Strayhorn, Terrell L. (2008):"Influences on Labor Market Outcomes of African American College Graduates: a national study" The Journal of Higher Education, Vol. 79, No. 1

Svarre, Karin-Lis (1996) " Mozambique – en politisk og økonomisk oversigt", Danida, Udenrigsministeriet

Thomas, Rosalind H. (2005)"FDI & SME Linkages – The case of Mozal I and II" -Access & Mobilization of Capital & Human Resources for Private Sector Development , Identifying the Research Gaps in the Global South, IDRC Private Sector Development Task Force Conference – 7-8 April 05, SADC-DFRC

Thulstrup, Erik W , Hansen, Jens Aage & Gaardhøje, Jens Jørgen (2005) "Recommendations" in 'Capacity Building in Higher Education and Research on a Global Scale - Proceedings of the International Workshop 17 – 18 May 2005 at the Niels Bohr Institute, Copenhagen. How Can Manpower Needs in Knowledge Based Economies Be Satisfied in a Balanced Way?, Published by The Danish National Commission for UNESCO – 2006

UNECA (2005): "Economic Report on Africa 2005 - Meeting the Challenges of Unemployment and Poverty in Africa"

UNESCO (1996): "Declaration about Higher Education in Latin America and the Caribbean", Regional Conference on Policies and Strategies for the Transformation of Higher Education on Latin America and the Caribbean, Havana, Cuba, 18 – 22 November 1996

USAID (2004): “Removing Obstacles to Economic Growth in Mozambique – a Diagnostic Trade Integration Study”

Yusuf, Shahid et. al. (2008):”Accelerating Catch-up – tertiary education for growth in SSA”, draft, AFTHD and DECRG, World Bank

World Bank (2000): “Higher Education in Developing Countries - *Peril and Promise” ,* Published for the Task Force on Higher Education and Society by the World Bank

World Bank (2002): “Constructing Knowledge Societies: New Challenges for Tertiary Education”

World Bank (2004): “Mozambique - Skills Development in Mozambique: Issues and Options Report No. 29492-MZ , Human Development, Country Department AFCO2, Africa Region

World Bank (2005): “Mozambique Country Economic Memorandum - Sustaining growth and reducing poverty” Poverty Reduction and Economic Management I, Report No. 32615-MZ, Africa Region

World Bank (2007): ”Knowledge for Africa’s Development: Ten Priorities for Africa”, a distillatyion of thr Knowledge for Africa’s Development Conference held in May 2006 and the Knowledge for Africa’s Development follow-up Seminar held in September 2006, Johannesburg, South Africa

World Bank (2008): ”Doing Business 2008 – comparing regulation in 178 countries”,

Zheng, Peijun & Harris, Michael (2007):” The university in the knowledge economy - The Triple Helix model and its implications“, Industry & Higher Education, August 2007

**Slides:**

Day, Bob (2006): “Knowledge for Africa’s Development: Going Forward”, Seminar at INSITE, 2006, Sandton Convention Centre Johannesburg, South Africa *10h00 11h00, Wednesday, 27th September, 2006 – 27th*

Jean-Eric Aubert (2007): Knowledge economy for Africa: Why? What? How?”, Innovation in the African Context: A Forum for Policy Makers, Dublin, 5-8 March, 2007

WBI – World Bank Institute (2004): “Tanzania and the Knowledge Economy: Preliminary Assessment”, Knowledge for Development Programme,

**Websites**

www.eiu.com

http://hdrstats.undp.org/countries/country_fact_sheets/cty_fs_MOZ.html - HDI - Mozambique fact sheet, 2007/2008

## Appendix I - The Four Pillars of the Knowledge Economy

**A Sound Economic Incentive and Institutional Regime**

Competitive environment as stimulus for improved performance
Financial system that mobilizes and allocates capital to its most productive uses
Flexible labor markets including support for up-skilling
Appropriate legal and regulatory system and strong rule of law that support entrepreneurship
Effective safety nets to facilitate adjustment to constant restructuring
Effective, transparent and accountable government Information Infrastructure:
Communications infrastructure (from radio to internet), Telecom issues (competition, pricing, regulation),Digital Divide (access, content, language),Use and applications of ICTs throughout the economy

**Innovation System**

Tapping into Global Knowledge
Creating and adapting knowledge
Disseminating Knowledge
Using knowledge

**Education**

Access to different levels of education
Gender balance
Balance among different levels of education
Quality of educational content (core technical & social skills, relevance, creativity)
Life-long learning opportunities
Role of the ministry of education and its relations with labour, market, and economy
Financing & public and private roles

**Information Infrastructure**

Communications infrastructure (from radio to internet)
Telecom issues (competition, pricing, regulation)
Digital Divide (access, content, language)
Use and applications of ICTs throughout the economy

(WBI 2004)

# Appendix II: Mozambique Science Technology and Innovation Strategy

### Ten Strategic Objectives

1. Foster a culture of innovation throughout Mozambican society
2. Promote grass-roots innovation and the use of S&T-based approaches by poor and disadvantaged communities
3. Promote R&D and innovation within the public and private sectors
4. Promote and Transfer of Technology
5. Promote the use of ICT for good governance and service delivery, and for the diffusion of knowledge, in support of poverty reduction and economic growth.
6. Promote human resource development at all levels in the areas of science, technology and innovation
7. Build and improve the policy instruments, institutions and infrastructure of the S&T system
8. Establish funding policies and mechanisms for research and innovation
9. Review, evaluate and enhance the performance of the S&T system
10. Promote the mainstreaming of S&T within all sectors

### Nine Strategic Areas

1. Human Resource Development
2. Education
3. Agriculture
4. Health
5. Energy
6. Marine Science and Fishing
7. Construction
8. Water
9. Mineral Resources

### Five crosscutting areas

1. Social and Human Science and Culture
2. Gender Equity
3. HIV/AIDS
4. Environmental Sustainability
5. Ethno-botany

## Appendix III: PEES

**Visions**

1. Expanding opportunities of access to higher education in consonance with the increasing needs of labour market and society, so that an increasing proportion of Mozambique citizens will be able to acquire and develop high level knowledge and skills needed for rapid economic and social development.
2. Improving the quality and relevance of teaching and research
3. Responding to changes in social and cultural needs, arising from the country's rich diversity of linguistic and ethnic groups, and to economic and technological transformation arising from a rapidly developing market economy
4. Increasing social, regional and gender equity by promoting higher levels of participation by disadvantaged or under-represented groups in society
5. Ensuring sustainability by promoting an appropriate balance between public and private finance and management of higher education institutions
6. In partnership with Government, the private sector and other stakeholders, supporting the development of the competitiveness of Mozambique in the evolving regional economic block and ultimately at the global level.

**Guiding Principles**

1. Institutional autonomy combined with accountability to stakeholders (Government, employers, students and the local, national and international community)
2. Efficient use of resources, elimination of unnecessary duplication of facilities and reduction in rates of student dropout and repetition
3. Diversity and flexibility of institutions, courses, curricula and methods of delivery, to ensure responsiveness to changing social, cultural and economic demands
4. Equitable sharing of the costs and financing of tertiary education between all relevant partners (higher education institutions, Government, students, families and employers)
5. Effective and transparent criteria and mechanisms of financial support to needy students, to ensure that access to tertiary education is not denied to talented but financially disadvantaged applicants
6. Democracy, intellectual independence and academic freedom
7. Cooperation with and support to other sub-sectors of the National Educations System
8. Regional and gender equity
9. Strengthening of the linkages and cooperation with the productive sector and national, regional and international communities

Source: GoM 2000

## Appendix IV – Overview of Higher Education Institutions in Mozambique

| Name of institution, | Location | Year established | No. of courses | No. of Students |
|---|---|---|---|---|
| **Public** | | | | |
| Eduardo Mondlane Univesity (UEM) | Maputo | 1962 | 22 | 6.800 |
| Pedagogic University (UP) | Maputo and branches in Sofala and Nampula | 1985 | 12 | 2.000 |
| Higher Institution for International Relations (ISRI) | Maputo | 1986 | 1 | 230 |
| Nautical School of Mozambique | Maputo | Upgraded 1991 | 3 | |
| Academy of Police Science | | 1999 | 2 | |
| **Private** | | | | |
| Higher Polytechnic and University Institute | Maputo and branch in Quelimane | 1995 | 8 | 900 |
| Catholic University of Mozambique (UCM) | Beira and branches in central and northern regions | 1995 | 9 | 1000 |
| Higher Institute of Science and Technology in Mozambique | Maputo | 1996 | 7 | 650 |
| Mussa Bin Bique University | Nampula | 1995 | 3 | 130 |
| Institute of Transport and Communication | Maputo | 1999 | 3 | |

(Enemark,

## Appendix V - Public Research Institutions

| Research Institutions | Unit | Working Area |
|---|---|---|
| **Agriculture, Forestry and Fisheries** | | |
| **Institute of Animal Production (IPA)** | Ministry of Agriculture and Rural Development | Animal Production |
| **National Institute of Agronomic Research (INIA)** | Ministry of Agriculture and Rural Development | Agriculture |
| **National Institute of Veterinarian Research (INIVE)** | Ministry of Agriculture and Rural Development | Veterinary |
| **Centre of Forestry Experimentation (CEF)** | Ministry of Agriculture and Rural Development | Forestry |
| **Institute of Small Scale Fisheries Development (IDPPE)** | Ministry of Fisheries | Small Scale Fisheries |
| **Institute of Fishery Research (IIP)** | Ministry of Fisheries | Fisheries |
| **Engineering and Earth Science** | | |
| **National Institute of Normalization and Quality(INNOQ)** | Ministry of Industry and Commerce | Norms, standards and quality control |
| **Laboratories of Engineering of Mozambique (LEM)** | Ministry of Public Construction and Housing | Civil Engineering |
| **National Institute of Meteorology (INAM)** | Ministry of Transport and Communication | Meteorology |
| **National Institute of Hydrography and Navigation( INAHINA)** | Ministry of Transport and Communication | Hydrography and Navigation Security |
| **Health Science and Medicine** | | |
| **Regional Centre of Sanitary Development (CRDS)** | Ministry of Health | Public Health in the environment of PALOP |
| **Hospitals** | Ministry of Health | Medicine and Health |
| **National Health Institute (INS)** | Ministry of Health | Public Health |
| **Social Science and Humanities** | | |
| **National Institute of Educational Development (INDE)** | Ministry of Education | Education |
| **National Institute of Statistics (INE)** | Council of Ministers | Collection and analysis of statistical data |
| **Centre of Juridical and Judicial Education (CFJJ)** | Ministry of Justice | Justice |
| **Institute of Sociological and Cultural Research (IISC/ARPAC)** | Ministry of Culture | Cultural Anthropology and History |

Source: MESCT 2003:39

## Appendix VI – Interview Overview

| Reference | Name | Organization | Position | Outcome |
|---|---|---|---|---|
| C.Dias | Conceiçao Días | Universidade Eduardo Mondlane (UEM) | Responsible for SIDA cooperation, Director for donor collaboration | It is needed to update curriculums and teaching methods. When students come to HEIs they have very little capacity. Many teachers do not have pedagogical capacity. For this reason, Mozambique is not ready for PBL. No data on what the student does after graduating. Most of those who do research do not know how to apply their knowledge to reality. No mechanisms to ensure that research is used.<br>Very little money for research. Research is practically only done with external funding. Donor support to HEIs (research) is not coordinated, all work isolated.<br>Establishment of MCT didn't help. Lack of dissemination mechanisms. |
| Quilambo | Orlando Quilambo | | Vice rector Academic – Research | The market does not always have the capacity to absorb graduates and many end up working in another sector than where they were educated. Internship would be good but not always possible to find. Entrants in HEIs have increasingly worse preparation. Lack of laboratories. UEM does not work much with MCT in research. Gap between results from HEIs and reality. More investment is needed in the technical area. HR is not sufficient for development, also investments in technology. HEIs are very conservative. |
| Ribeiro | Fernando Ribeiro | Universidade Pólitecnica (before ISPU) | Course of Human Resources | Mostly conversation about HRM and how it could help companies' competitiveness. Lack of HRM = graduates don't develop. The 'cunha' problem.<br>Also commented on lack of practice of graduates and the unfavourable division of fields of education.<br>Internships would be good, but there is a high risk that the graduate will not learn anything if no clear guidelines.<br>Lack of linkage between MEC and Ministry of Labour. |
| Alberto | Adalberto Alberto | Universidade Pedagogica | Director of Planning Former Director of Higher Education at MEC | The problem with the expansion with private universities is that they do the courses that are easiest and cheapest, like law, accounting, etc. No natural science and engineering. No control with expansion of graduate courses from GoM. Quality of the courses not is so high in all universities.<br>Very little research done in Mozambique. Universities don't have line of credit for research so the money put aside is very limited.<br>In legal terms the universities are autonomous but in reality they are indirectly controlled by the government through involved people with double roles.<br>Not good with Bologna process in Mozambique. The |

| | | | | |
|---|---|---|---|---|
| | | | | level of the students from secondary schools is too low. There is missing a bridge between the secondary school and the university. |
| Sandes | Patricio Sandes | Associação de Investigação Científica de Moçambique (AICIMO) | President | There is very little research done in Mozambique. Almost non in universities. The private sector in Mozambique is very difficult to work with on scientific research. Many bigger firms in Mozambique are foreign and they have their research department in other countries and are not interested in doing research in Mozambique. GoM should at least use 1 % of GDP on research. Lack of information network of scientists. |
| Rafica | Sr. Rafica | Centro de Pós-Graduaçao e Psquisa Aplicada (CEPPA) | Director | HE system doesn't correspond to the needs of the country. There is a big gap. HR base is very little but new HEIs is not the solution. Few teachers are being used in all HEIs and what makes people develop – the research, is not being done by the teachers because they are occupied. Research makes the development in the universities. No knowledge of MNCs that brought knowledge and research to Mozambique. Private sector does not have the capacity to have interns and is very closed. |
| Patel | Kekoobad Patel | Confederation of Business Association of Mozambique (CTA) | Presidente do Pelouro de Reforma Fiscal /Aduaneira | Private sector is worried for the quality of graduates and with the types of courses. Not enough with only lawyers and economists. Some areas in the pyramid are missing. Private sector looks for people with 5 or 10 years of experience because they don't want to 'educate' graduates. A private sector for internships is missing. Students also have to change their attitude. Many thinks they should receive salary for internships. There should be a 'master plan' for employment and HRD instead of having each ministry trying to solve the problem. |
| Simbine | Carlos Simbine | Associação Industrial de Moçambique (AIMO) | President | Thinks that GoM has noticed the problem of lacking skilled people with the necessary capabilities. Mega projects like Mozal have not created employment like they should – they only increase GDP but does not generate economic activity in the surrounding society. Development lies in the SMEs. They are the ones to create employment and change.<br>Candidates are lacking practical skills and capacity. Should be more practical aspects during studies. Difficult to find firms that will offer internships. Many SMEs do not have capacity and larger companies are much closed. Huge lack of employment, also among graduates. Best thing would be to develop entrepreneurs. Conservative culture in many firms. Lack of willingness to change. |
| Salmão | Eduardo Salmão | The Export Promotion Agency's (IPEX) | Director | Telling about IPEX. Most export is from Mozal, else traditional primary material, (cotton, cashew, fish, etc). Huge export potential, especially in agriculture. Business environment not so good: much bureaucracy, lack of financing. |

| | | | | |
|---|---|---|---|---|
| | | | | HE: University teachers lack specialisation, they are all generalists<br>Mozambique is good at thinking and writing about necessary changes (in strategies, etc) but not so good at implementing them. |
| Chilundo | Arlindo Chilundo | Ministry of Education (MEC) | Advisor to the Minster<br>Associate Professor at UEM | Talked about the PEES. The introduction of the Bologna process does not make sense in Mozambique. There is a lack of management on the level of the government and lack of coordination between HEIs. The division of MESHT to MEC & MCT didn't make sense. HE has very little low priority in GoM. At the moment there is no director of HE in MEC. To enhance quality in HE, the quality of teachers need to be increased. At the moment there is not much relevant research that the private sector can use. Very little money to research. |
| Martins | Zeferino Martins | Programa Integrado da Reforma da Educaçao Profissional (PIREP) | Executive Director | Talking about PIREP. It is a very big reform that is difficult to implement. After two years, many things are still missing to be established. Difficult to get support from donors. They don't believe much in technical education. Difficult to find employment for technicians, a boom the industry is needed. 25 percent of professionals have jobs. Normally take 200 days to find employment. Everyone want HE – more prestige and higher salary than TVET. |
| Francisco | Lauremiro Francisco | Ministry of Science and Technology (MCT) | Director Dep. of Statistics, HR, Training and Development | Due a technical fault, this interview was not recorded. Talked much about the activities of the HR component in the MOSTIS. Giving scholarships for studying abroad (Brazil, Argentina, India). There is not much collaboration with HEIs in the programme. Mostly about information of the programmes. |
| Tamele | Abiba Tamele | National Institute for Employment and Vocational Training (INEFP) | National Director | Talked much about INEFP. It is necessary to educate more technicians. About unemployment: there is no employment but lots of work. INEFP use internships, 70 percent gets job where they where interning. But it is not easy to find internships in firms. To be graduate is not equal to having capacity. There are many strategies on the labour/ education/ training area but no coordination between them. |
| Novais | Adelino Novais | Centro de Fomaçao Professional de Electrotecnia (CFPE) do INEFP | Assessor do Centro | Much of the interview took place walking through the facilities of the center for which reason most of the interview was not recorded. CFPE work very close with industry and make the courses that are demand for. One of the big 'costumers' is Mozal who has also supported the center with machines. Demand is bigger than the center can keep up with and several big firms send their workers to South Africa to be educated. The aspect of 'attitude' is very important, because there is a lack of working and entrepreneurial culture. This needs to start already in the primary/secondary school. One of the big problems for employment in Mozambique is that the country is consuming rather than producing. |

| | | | | |
|---|---|---|---|---|
| A.Dias | Alcino Dias | Ministry of Labour | General Secretary of 'Consultiva de Trabalho' (CCT) | No linkage between necessities of the labour market and HE graduates, no regulating mechanisms. Huge quantity of graduates, but with no quality. Bad attitudes, they all want to be the boss and lack 'working culture'. HE should establish partnerships with the private sector.It is the SMEs that will make the difference in Mozambique both for labour and the economy. |
| Cabral | Zaida Cabral | DANIDA | Consultant on the DANIDA education sector programme. Former employee in the Ministry of Education | There is lack of mechanisms to connect HR with other subsystems. Many managers of secondary schools do not understand the importance of collaborating with other institutions. Both primary and secondary teachers have very low quality. Student can't relate their knowledge to 'reality'. HE system does not help with improving the education system. The best qualified students do not stay in the education system. A big problem is the attitude of the students and in general. People always think they know everything. Institutions are depending on single individuals. |
| Iritv | Zimira Iritv | SIDA | Zimira Iritv | Emphasises the importance of research management systems – there are none in Mozambique. Almost 200 PhDs but it is very little and quality is low. Difficult to find MA students to study abroad. The existence of MCT is important to research. In Mozambique everything depends on single persons – not institutions or systems. Donors fault that basic research was neglected – only support for applied research. |
| Brito | Lidia Brito | Universidade Eduardo Mondlane | Former Minister of Higher Education, Science and Technology. Now employed at UEM | The problem of HE starts in the secondary schools. The situation will not be better without better payment for people in HE. Universities should do research and other HEIs should respond to the needs of the market. Only 3 percent of research is in agriculture. GoM should define areas of research, the MOSTIS reaches to broadly. Lack of information and coordinated strategies. |